

AGRICULTURE AND FOOD SECURITY IN OIC MEMBER COUNTRIES

Opportunities for Cooperation

2014

Editor
SAVAŞ ALPAY

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Editor

Savaş Alpay

Lead Researchers

Nabil Mohammed Dabour | Nadi Serhan Aydın

Researchers

Mazhar Hussain | Cem Tintin | Kenan Bağcı

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)

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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

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

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ABBREVIATIONS AND ACRONYMS

FAO	: Food and Agriculture Organization of the United Nations
OIC	: Organisation of Islamic Cooperation
SSA	: Sub-Saharan Africa
WORLDMMUN	: World Model United Nations
IPCC- UN	: Intergovernmental Panel on Climate Change
CO ₂	: Carbon dioxide
GHG	: Green House Gases
IPCC	: Intergovernmental Panel on Climate Change
UNEP	: United Nations Environment Programme
CPI	: Consumer Price Index
FPI	: Food Production Index
J-PAL	: The Abdul Latif Jameel Poverty Action Lab
LIFDCs	: Low-Income Food-Deficit Countries
MDGs	: Millenium Development Goals
LGB	: Larger grain borer

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 the total GDP of the OIC countries amounted to only 10.3% in 2012, gradually declining from 12.2% 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 30 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 34.7% of the total population of the OIC countries in 2011, 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 37 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, 31 OIC member 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 2014* highlights the recent state as well as the constraints and challenges of agricultural development and food security in the OIC member 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.

Prof. Savaş Alpay
Director General
SESRIC

EXECUTIVE SUMMARY

Agriculture Sector: Resources and Potential

Agricultural activities play an important role in the OIC economies as in many developing countries in terms of employment, production, and therefore development. Recent statistics show that 240 million people (representing 14.5 per cent of the total population) in the OIC countries are economically active in the agriculture sector. In particular, in 17 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 51.8% of population in the OIC countries lives in rural areas. The OIC countries occupy 29% of the world agricultural land area with permanent meadows and pastures take the lion share of the agricultural land in the OIC countries.

All these figures imply that the 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 the OIC members collectively to the world agricultural production network as a major player.

In terms of water resources and their use in agricultural activities, the OIC countries collectively emerge as an important group of countries. The share of the OIC countries in the world in terms of precipitation in depth is 22%. Among the OIC member countries, Malaysia has the highest average precipitation in depth score whereas Egypt and Libya ranks at the bottom. IRWR (internal renewable water resources) constitute almost 73% of total renewable water resources in the OIC countries which implies that the 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 member 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.

The OIC countries withdraw 29.4% 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 the OIC countries.

The OIC countries have a small share (7.4%) in the world in terms of the agricultural capital stock. Moreover, the OIC countries have an insufficient fertilizer use ratio and low degree of agricultural mechanization. For example, the OIC average of the fertilizer use per hectare of arable land is 46 kilograms, whereas in other developing countries it is calculated as 93 kilograms.

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 the OIC countries are below the average of the world as of 2012, even

though the OIC countries collectively have experienced an increase in their productivity levels since 2002.

In research and technology, the OIC countries slightly perform better than other developing countries in terms of the agricultural research staff numbers. Among the members, Jordan has the highest number of agricultural research staff per one million agricultural population in the public sector, which is 2187. However, in terms of the agricultural spending per agricultural person in research and technology, the OIC countries lag behind the other developing countries with an average spending amount of US \$13.8. Malaysia spends the highest amount of money (US \$248) per agricultural person among the OIC members. Overall, the picture that the OIC countries draw in research and biotechnology is far from clear. There are several OIC members that do not or cannot report the research and biotechnology data on the one hand; there are some member frontrunner OIC countries like Jordan and Malaysia on the other.

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 10.3 per cent in 2012.

Agricultural Production Index of the FAO shows that the OIC countries, as a group, have registered, on average, a comparable performance in increasing their agricultural output vis-à-vis other developing countries as well as the world during the period 2000-2012 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 the OIC countries has experienced a relatively modest increase as compared to other developing countries as well as the world as a whole.

During 2000-2012, 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 member 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 79.1%, 75.2%, 74.2% and 66.6% of the total production of cereals, fruits, vegetables and meat in 2012, respectively.

The member countries have their highest shares globally in the total production of palm oil (90.3%), cocoa (67.4%), cassava (43.8%), sorghum (34.6%), and millet (34.4%) – as compared to other major commodities based on 2011 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, 92.6% of coffee, 90.6% of sugar, 80.1% of rice, 73.4% of wheat, 70.4% of millet, 68.2% of cocoa, 65.1% of sorghum, and 45.4% of cassava supplies domestically are utilised as human food products in the member countries, whereas 74.9% of barley, 67.1% of oats, 46.2% of maize, and 29.3% of cassava supplies domestically are utilised 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 91.1 kg of livestock products in 2011, as compared to the average 117.4 kg in other developing countries and 314.7 in developed countries. World average is 141.1 kg in 2011. 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 2012, OIC countries as a group have increased their meat, milk and eggs production by 59.3%, 54.1% and 53.3%, 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 2011, OIC countries accounted for 4.5% of world total livestock produce exports and 17.5% of total imports.

Capture fisheries and aquaculture supplied the world with about 182.9 million tonnes of fish in 2012. During 2000-2011, the average per capita consumption of fisheries products in OIC member countries has increased from 10.2 to 14.4 kg – registering a 41.2% increase. This growth pace compares favourably to other developing countries where the average per capita consumption has increased from 14.1 to 18.0 during the same period (28.4%). Again, on the production side, OIC countries accounted for 16.5% of the total world fisheries production in 2012. 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 16.8% in 2012. 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 16.4% 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 90.4 in 2011.

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 \$48.8 billion imports in 2011, OIC countries accounted for 59.4% of total cereal imports of developing countries, and more than one-third (38.3%) of the world's. Their respective shares in total cereals exports of developing countries and the world were 11.9% and 5.3% in the same year. 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 89.9%, 69.0%, 68.3%, and 73.4% of total cereal, dairy product, fruit & vegetables, and meat exports of OIC countries, respectively, whereas, top 5 importers accounted for 44.4%, 47.8%, 46.3% and 55.8% 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\$ 42.4 billion trade deficit in 2011. Overall, when all agricultural products are considered, it is observed that the OIC countries, as a group, have more than doubled their trade deficit from \$23.2 billion in 2000 to \$62.1 in 2011. 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 member 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 member 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 the 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 member 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 region, 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 twenty-three OIC member countries are subject to water stress and/or scarcity and that more than 86.2 per cent 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 the 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. OIC countries as a group produce around 14.5 per cent of total crop production in the world but their share in total world processed crops is 16.8 per cent.. This indicates that OIC countries have the capacity to process what they already produce and to benefit from value addition during procession of agricultural products. Similarly, OIC countries produce 14.6 per cent of total world primary livestock production, but they account for only 10.4 per cent of total processed livestock production. With respect to processing of livestock, 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 output, wages and employment in agro-food industries compared to the averages of non-OIC 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 per cent in OIC countries and only 10.2 per cent in other developing countries. Similarly, agro-food industries represent on average 15.3 per cent of total employment in manufacturing industries in 25 OIC countries compared to only 10.2 per cent in other developing countries. Wages in agro-food industries represent accordingly a higher share of total payments, 12.1 per cent of wages paid in all manufacturing industries in OIC countries compared to 9 per cent in non-OIC countries.

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

State of Food Security

Global food production index (FPI) has increased by 17% in the period 2000-2012. FPI of the OIC member countries, as a group, also indicated an upward trend and remained above the world average. However, at the individual country level, the increase in FPI was lower than the world average in 21 OIC countries in 2011.

Food production per capita index of the OIC countries exhibited an upward trend during 2000-2012. On average, in terms of per capita food production, OIC countries witnessed an increase of 9% remaining above the world average of 8% increase during the same period.

During the period 2000-2012, food trade indicated an upward trend, where global food exports increased from US\$ 431 billion in 2000 to US\$ 1374 billion in 2012. OIC member 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\$ 132 billion in 2012. However, at the individual country level, food exports are concentrated in a few OIC member countries, where in 2012, only 10 countries, together, accounted for 84% of the total food exports of the OIC countries.

Total food imports of the OIC countries increased from US\$ 43 billion in 2000 to US\$ 199 billion in 2012. As was the case in food exports, OIC food imports are also concentrated in a few member countries, where in 2012, the top 10 OIC food importing countries accounted for 68% of the total food imports of the OIC countries.

During the period 2000-2012, the growth of food exports were outweighed by the growth of food imports in the OIC countries. Food trade deficit of the OIC countries has increased rapidly US\$ 16 billion in 2000 to US\$ 67 billion in 2012.

According to recent FAO classifications, 27 OIC member countries are found to be among the world 55 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 27 OIC-LIFDCs, where 18 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 1.3 million metric tons in 2010-12, down from 5.6 million metric tons in 1990-92, corresponding to a decrease of 76%. Similarly, the total cereal aid shipments to the OIC-LIFDCs declined from 4.2 million metric tons in 1990-92 to 1.1 million metric tons in 2010-12, corresponding to a decrease of 74%.

Although the prevalence of under-nourishment (i.e. the share of undernourished people in the total population) in the OIC Countries declined from 22.2% in 1990-92 to 14.5% in 2011-13 period, there were still 161 million undernourished people in the OIC countries, corresponding to 19% 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 2011-13. 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. As of 2013, prices of maize, sorghum, soybeans and wheat were above their 2008 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 the 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 the OIC member 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 2012 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 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 the 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 member 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 member 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 the 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

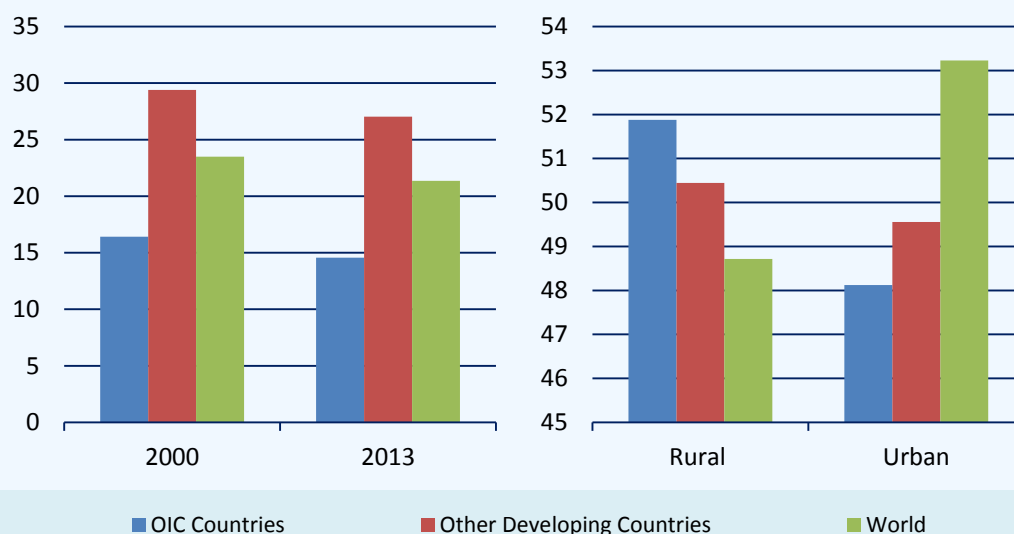
Agricultural activities play an important role in the OIC economies as in many other developing countries in terms of employment, production and therefore development. This chapter overviews some selected agricultural indicators such as the land use, irrigation techniques and agricultural productivity for the OIC countries in a comparative perspective. The analysis shows that compared with the situation in the 2000s, the 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 member 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 the 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 1.6 billion in 2013, 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 (24% and 19.2%, respectively). Only 8 OIC countries (Kazakhstan, Algeria, Sudan, Saudi Arabia, Indonesia, Libya, Iran and Niger, in decreasing order) account for 50.7% of total land area of the OIC countries. The top five most populous

FIGURE 1.1
Structure of the Population; Economically Active Agricultural Population (left) and Urban & Rural Population (right) in 2013 (as percentage of total population)

More than half of the population lives in rural areas in the OIC countries



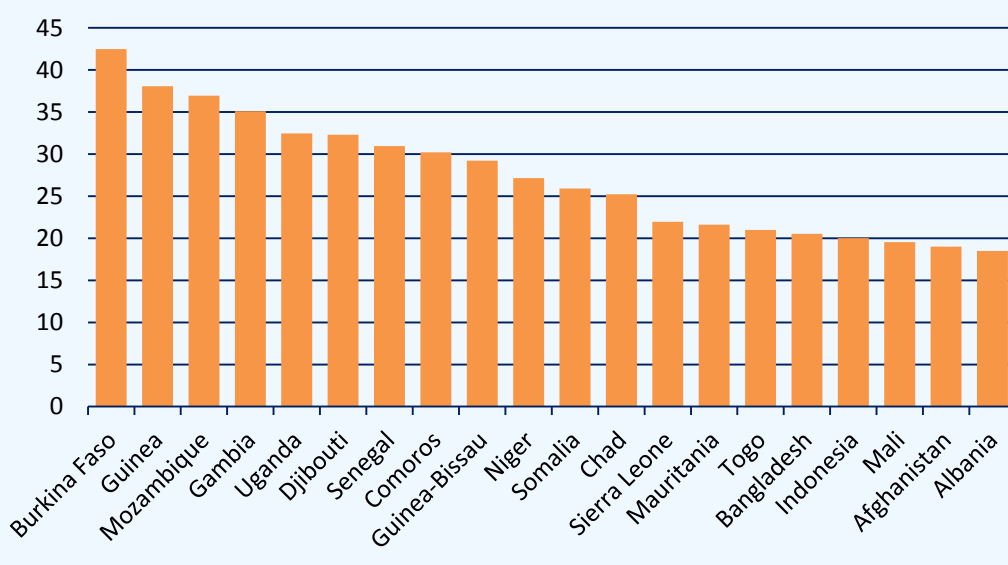
Source: Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Table 1)

OIC countries are Indonesia, Pakistan, Nigeria, Bangladesh and Egypt, representing 51.2% of total population of OIC countries.

In 2013, rural population in the OIC countries accounted for 51.8% of their total population, compared to 50.4% in the other developing countries and 48.7% world average (Figure 1.1, right). During the period 2000-2013, the total population of the OIC countries increased by an average annual rate of 2.2% against the averages of 0.9% and 1.1% in other developing countries and the world, respectively.

FIGURE 1.2
Economically Active Agricultural Population in 2013 (as percentage of total population)

Share of the economically active agricultural population is more than 20% of the total population in 17 OIC countries



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

Agricultural Population

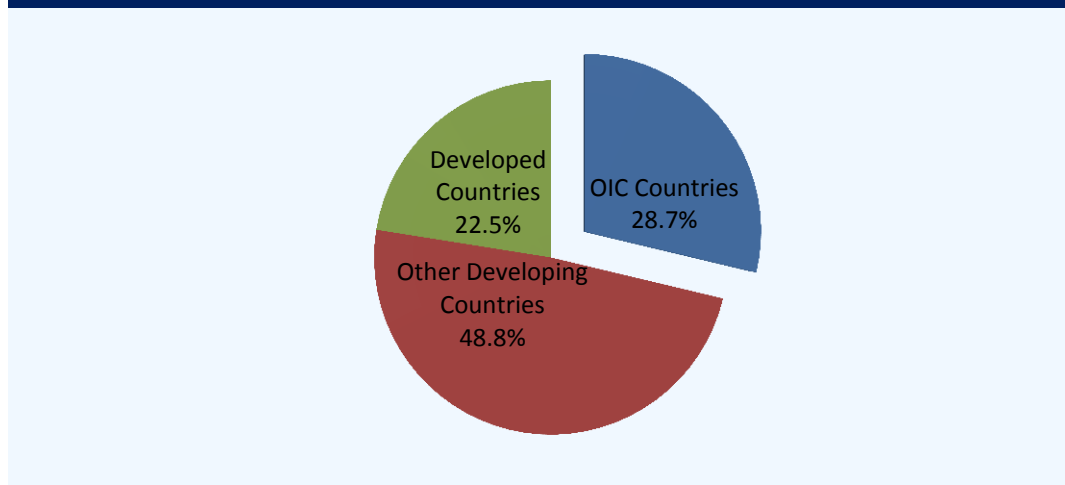
In 2013, the economically active agricultural population accounted for 240 million in the OIC countries, corresponding to 14.5% of the total population and compared to 16.4% in 2000 (Figure 1.1, left). This ratio remained below that of the other developing countries (27.0%) and the world average (21.3%).

Yet, the economically active agricultural population is still accounting for more than 20% of the total population in 17 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 Guinea, Mozambique, and Gambia (Figure 1.2).

Agricultural Land

In addition to the agriculture labour force, the effective and productive use of land in agriculture 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 37% of the total agricultural land area of the developing countries and 28.7% of that of the world (Figure 1.3). The share of agricultural land area accounted for 46.7% of total land area in OIC countries, compared to 39% in all developing countries and 38.2% 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 the OIC member countries (25.6%) is still significantly below the

FIGURE 1.3
Distribution of the Agricultural Land in the World



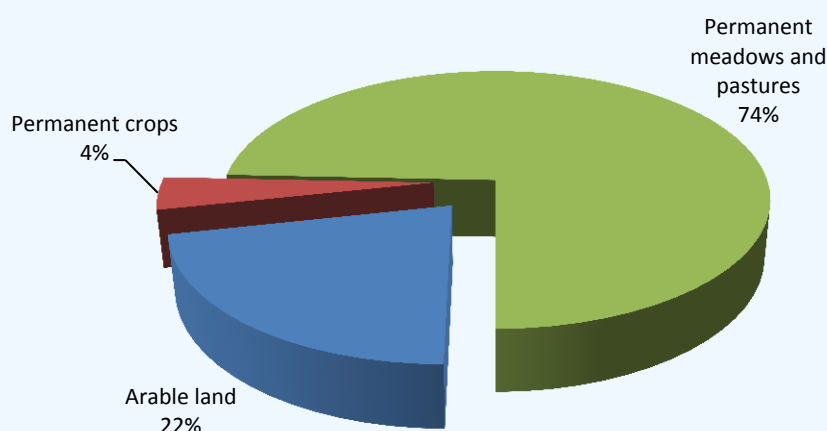
29% of the world agricultural land belongs to the OIC members

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

averages of both developed countries (31.1%) and the world (31.7%). The arable land area in the OIC countries amounted to only 303 million hectares in 2011, corresponding to 21.6% of their agricultural area. In other developing countries, the arable land area accounts for 31.9% of the agricultural area and the world average is 28.6%. Thus, the percentage of the arable land of the 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 the OIC countries (53.7 million hectares) accounted for 35.3% of the total permanent crops land in the world and 41.1% of that of the developing countries. Although the permanent crops land of the OIC countries accounted for only 4% of their total agricultural land area, this ratio was slightly higher than that of the other developing countries (3.4%) and the world average (3.1%). On the other hand, as shown in Figure 1.4, the bulk of the agricultural land area in

FIGURE 1.4
Structure of the Agricultural Land in the 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)

the OIC countries (74.3% or 1.07 billion hectares) is permanent meadows and pastures, largely used for grazing of livestock..

Land use in agriculture in the 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 (77.4%), Somalia (70.2%), and Turkmenistan (69.5%), 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 and permanent crops land areas in terms of the percentage of these areas in their agricultural areas, notably Egypt (99.7%), Malaysia (96.4%), Indonesia (79.4%), Suriname (78.6%), and Cameroon (78.6%). The share of arable land area in agricultural area was over 50% in 13 OIC countries, notably in Bangladesh (82.7%), Egypt (78.2%), Pakistan (77.7%), Benin (74.2%), Suriname (71.3%), and Togo (65.1%). In contrast, this ratio was less than 10% in 10 OIC countries, even it is negligible in some countries like Mauritania and Djibouti (less than 1%).

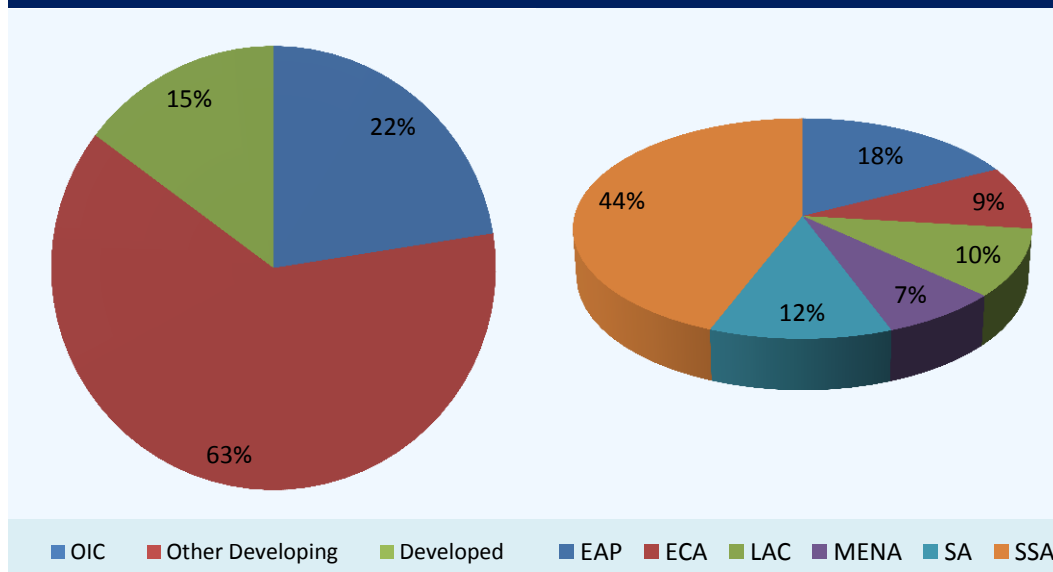
TABLE 1.1
Water Resource Indicators, 2008-2012

	Average Precipitation in Depth (mm/yr)	IRWR (km ³ /yr)	ERWR (km ³ /yr)	TRWR (km ³ /yr)	TRWR per capita (m ³ /yr)
OIC Countries	47,209	5,286	1,964	7,250	4,724
Other Developing Countries	131,562	28,330	8,827	37,157	8,571
Developed Countries	31,041	8,887	609	9,496	9,581
World	209,812	42,504	11,400	53,904	7,802
OIC as % of					
Developing Countries	26.4	15.7	18.2	16.3	...
World	22.5	12.4	17.2	13.5	...

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

FIGURE 1.5

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



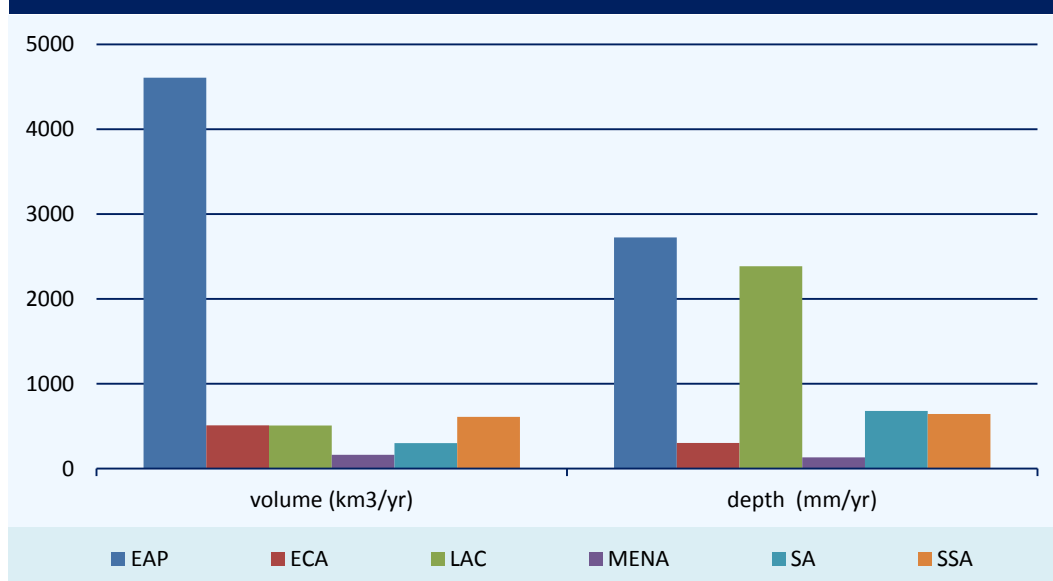
Source: Food and Agriculture Organization (FAO) AQUASTAT Online Database (Annex Table 3)

1.2. Water Resources and Their Use in Agriculture

Considering that the bulk of the world's water resources is used in agriculture and that the global demand for food is increasing rapidly, the role of water 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

FIGURE 1.6

Average Precipitation (weighted by countries' agricultural lands), 2008-2012



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

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 the OIC countries, particularly those in water-scarce regions.

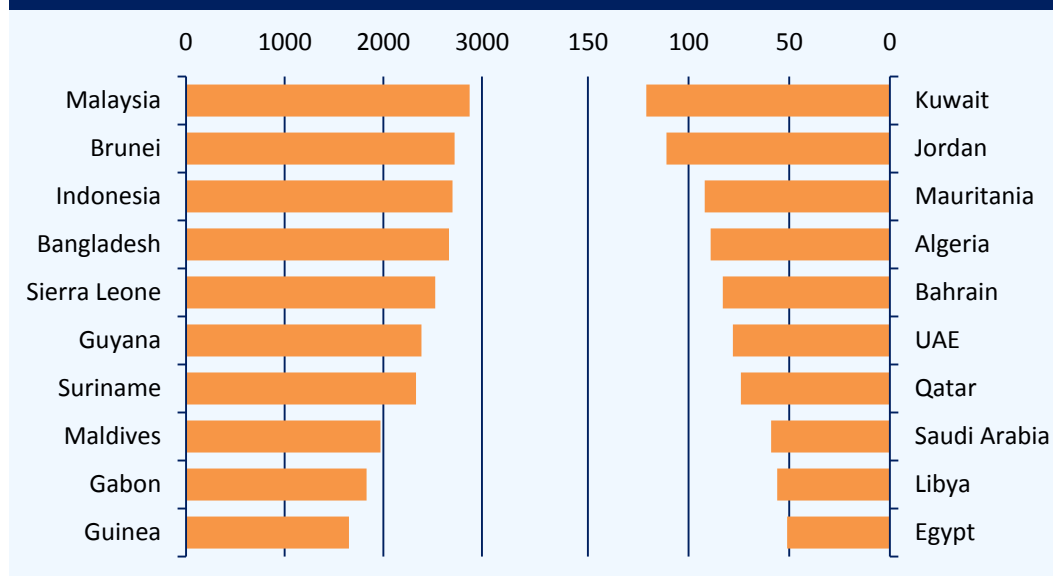
Precipitation in depth

In the period 2008-2012, average precipitation in depth annually amounted to slightly over 47 thousands (mm/year) in the OIC countries. This means that the OIC countries, collectively received 22.5% of the world’s annual average precipitation and 26.4% of that of developing countries (Table 1.1). 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 the OIC countries. In contrast, countries in the MENA region, collectively received only 8% of total precipitation.

Taking into account the countries’ agricultural lands and average precipitations together, uneven distribution of average precipitation among sub-regions in the OIC region becomes clearer. During 2008-2012, countries in EAP, on average, received precipitation of 2,724 mm per year (or 4,608 km³/year), corresponding to 18% of total average precipitation recorded in the 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 1.7
Average Precipitation in Depth(mm/year) , the highest (left) and the lowest (right) 10 OIC countries, 2008-2012

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

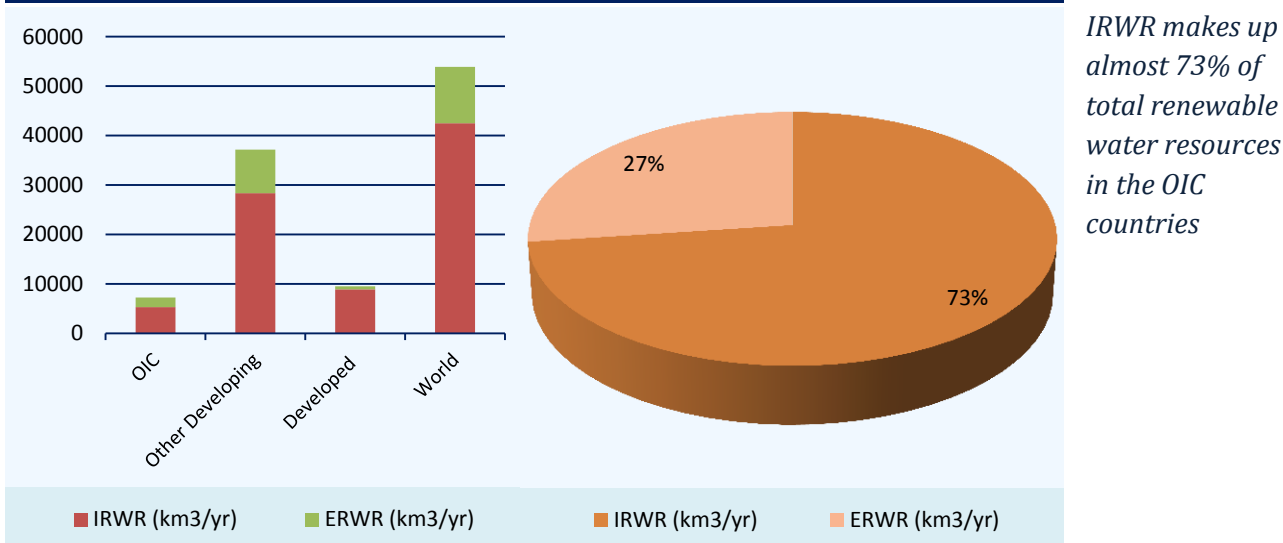


Source: Food and Agriculture Organization (FAO) AQUASTAT Online Database (Annex Table 3)

Figure 1.7 depicts the average precipitation in depth by country. As it is seen from the figure (left), Malaysia ranks first receiving almost 3,000 mm per year followed by Brunei Darussalam (2722 mm/year). In contrast, located in the arid-regions, most of the Arab countries in MENA received levels of average precipitation below 100 mm per year (right hand of the figure).

FIGURE 1.8

Structure of Renewable Water Sources (left) in OIC countries (right), 2008-2012



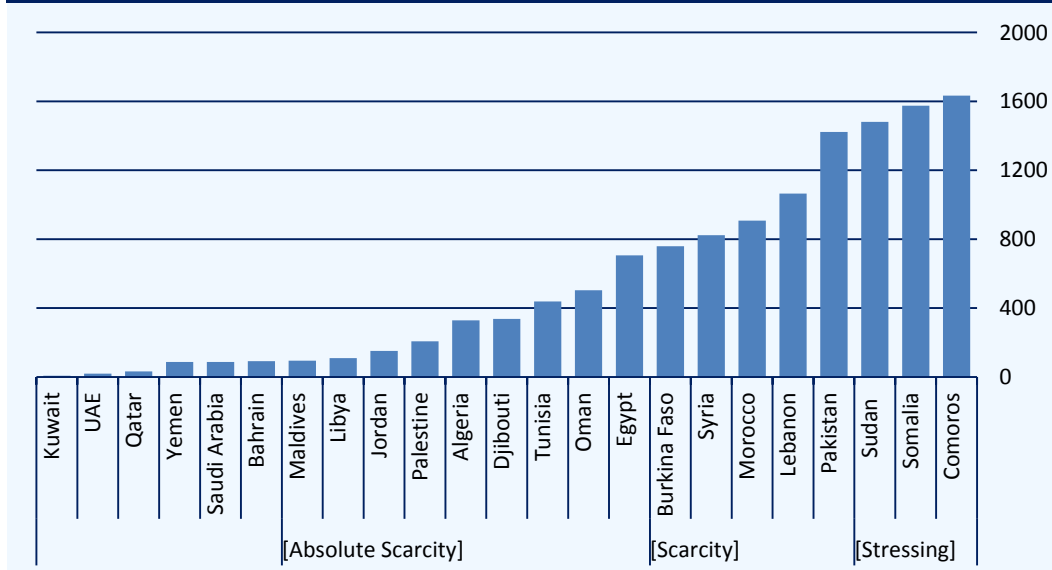
Source: Food and Agriculture Organization (FAO) AQUASTAT Online Database (Annex Table 3)

Renewable water resources

Having 7,250 km³ per year during 2008-2012 period, the OIC countries collectively account for 13.5% of total renewable water resources (TRWR) in the world. Compared to the level of other developing countries (37,157 km³/year), share of the 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 in the OIC countries was almost half of the level of the other developing countries. Compared to the world level (7,729 m³/year), TRWR per capita in the OIC countries (4,558 m³/year) was also significantly below than the level of the world (Table 1.1).

FIGURE 1.9

Total Renewable Water Resources per Capita (m³/year), 2008-2012



Source: Food and Agriculture Organization (FAO) AQUASTAT Online Database (Annex Table 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 93.6% (Figure 1.8, left). Compared to the other developing countries, the share of IRWR in TRWR in the OIC countries is slightly below than that of other developing countries (72.9% and 76.2%, respectively). IRWR in the OIC countries accounts for 12.4% of total IRWR in the world, and 15.7% in the developing countries. Additionally, ERWR in the OIC countries covers 17.2% of total ERWR in the world and 18.2% of that of the developing countries (Table 1.1).

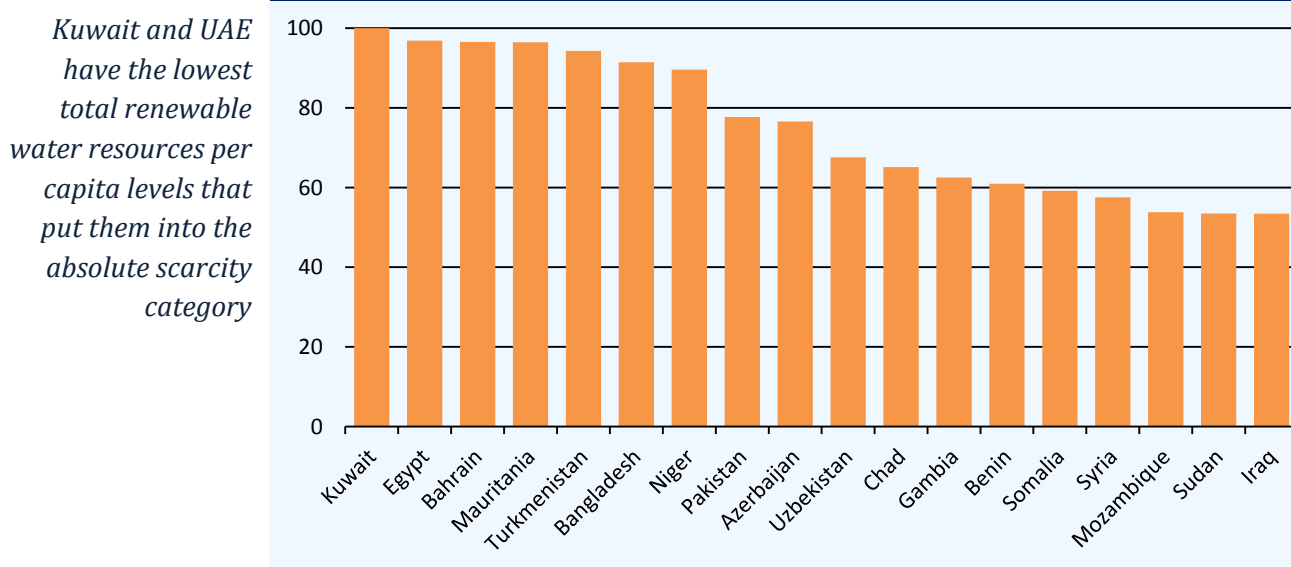
Water scarcity

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 m³/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 m³/year are considered suffering *water scarcity* and those with TRWR/year per capita less than 500 m³/year are considered suffering *water absolute scarcity* (UN-Water, FAO, 2007). The OIC countries which are suffering from water stress and/or scarcity are neatly summarized in Figure 1.9. According to the figure, 23 OIC countries experience water stress and/or scarcity. Out of that, 5 countries experience water stress, 5 countries face water scarcity and the rest 13 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 the OIC countries are dependent on neighbouring countries for its 27.1% of total water need per year in the period 2008-2012. This ratio was lower both in other developing countries (23.8%) and the world (21%). Figure 1.10 depicts the OIC member

FIGURE 1.10
External Sources Dependency Ratio (at percentile scale), 2008-2012



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

countries whose dependency ratios are higher than 50%. According to the figure, 18 countries are eligible for the criteria. In particular, the OIC countries in the Middle East and North-eastern Africa recorded the highest water resources dependency ratios.

Having full dependency on external sources, Kuwait ranks first, followed by Egypt (96.9%), Bahrain (96.6%), Mauritania (96.5%), Turkmenistan (94.3%), and Bangladesh (91.4%). There are eight main international river basins in the OIC region: 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 flows from Saudi Arabia while Egypt depends on the Nile River from Ethiopia, Mauritania on Senegal River, Turkmenistan on Amu Darya and Syr Darya Rivers.

TABLE 1.2

Water Withdrawal, 2008-2012

	Total Water Withdrawal			Agricultural Water Withdrawal		
	km ³ /year	% of IRWR	% of TRWR	km ³ /year	% of Total Withdrawal	% of TRWR
OIC Countries	928	17.6	12.8	800	86.2	11
Other Developing Countries	1,130	7.4	5.6	1,573	75.4	4.2
World	2,871	9.2	7.2	2,727	70	5.1
OIC as percentage of						
Developing Countries	30.8	...	...	33.7	...	...
World	23.8	...	...	29.4	...	...

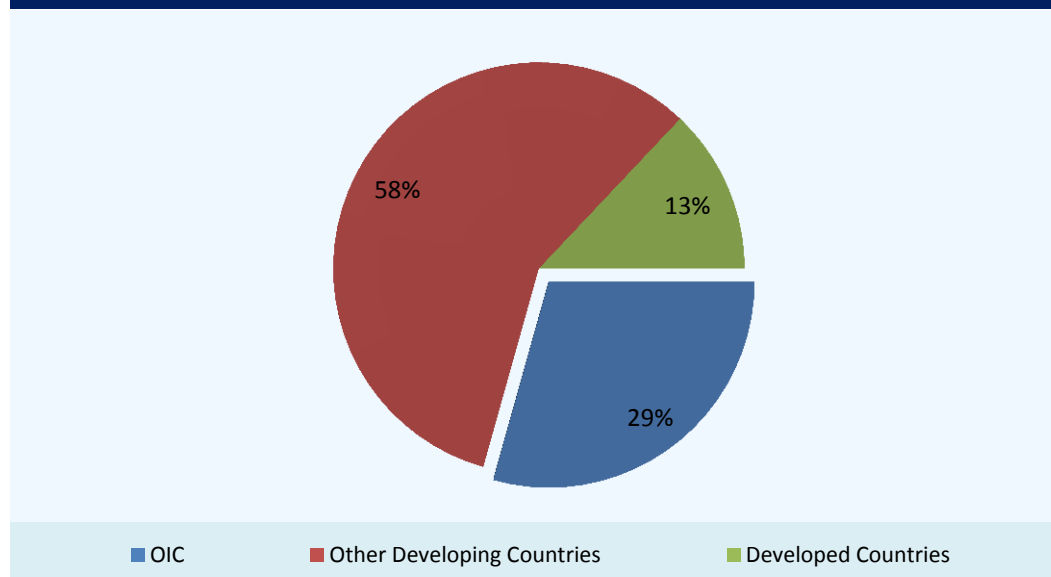
Source: Food and Agriculture Organization (FAO) AQUASTAT Online Database, SESRIC Staff analysis

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%), the OIC countries, collectively, withdraws 23.8% of total water withdrawal in the world. That is

FIGURE 1.11

Agricultural Water Withdrawal: Share of the OIC Countries in the World, 2008-2012



OIC countries withdraw 29% of the agricultural water in the world

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

partly due to inefficient use of water in agriculture (Table 1.2). As a matter of fact, agricultural water withdrawal in the OIC countries accounts for 86.2% of total water withdrawal. Compared to the world average of 70% and the average of other developing countries of 75.4%, the percentage in the 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 withdrawal in the OIC countries accounts for 17.6% of total IRWR which is much above the levels of other developing countries and the world (7.4% and 9.2%, respectively).

TABLE 1.3

Area Equipped for Irrigation, 2008-2012

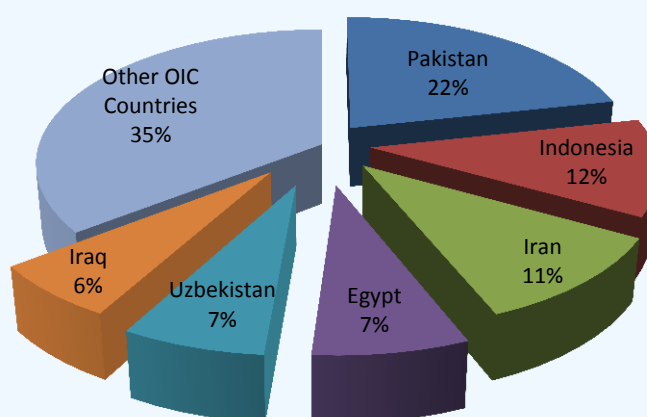
	Area equipped for irrigation (million ha)	Area equipped for irrigation as percentage of	
		Arable Land	Agricultural Area
OIC Countries	75.2	25.7	5.3
Other Developing Countries	177,345	23.7	7.3
World	296,381	21.5	6.1
OIC as percentage of			
Developing Countries	34.2	...	...
World	25.4	...	...

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

As everywhere else, the bulk of total water withdrawal in the OIC countries is used in agriculture. Agricultural water withdrawal in the OIC countries accounts for 86.2% of their total withdrawal and for 11% of their TRWR. Agricultural water withdrawal in the OIC countries amounted to 800 km³/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 region is far from being uniform. In absolute terms, 16 countries, collectively accounted for 91% of the total agricultural water withdrawal in all the OIC countries, and only 5 countries of them accounted for 58% of total agricultural water withdrawal in the OIC

FIGURE 1.12

Agricultural Water Withdrawal: Shares of top countries among the OIC countries, 2008-2012



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

countries. Pakistan especially stands out with its high level of withdrawal, amounted to 172.4 km³/ year, corresponding to 22% of total agricultural water withdrawal in the OIC countries (Figure 1.12).

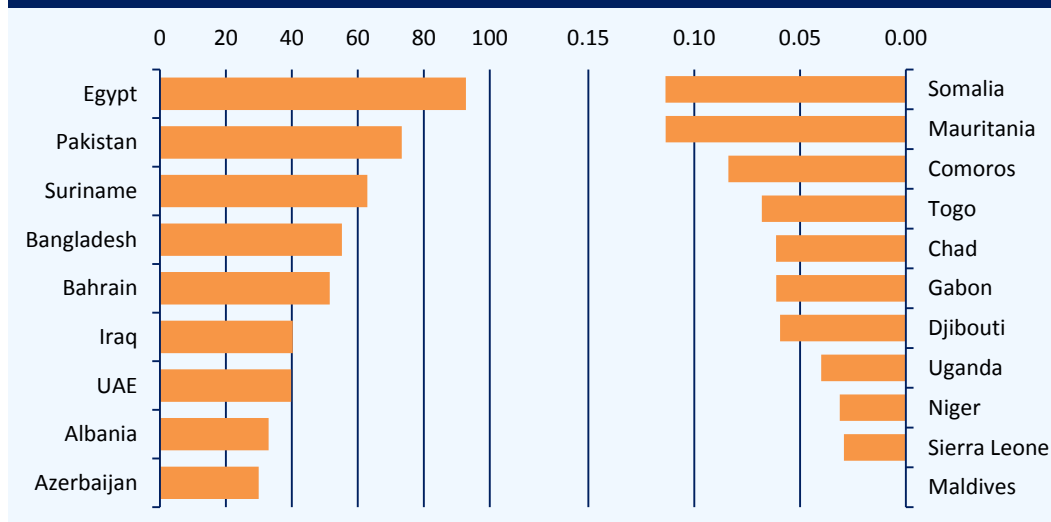
Irrigation

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 the 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 the 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 the OIC countries. As in case of agricultural withdrawal, Pakistan stands out with its share of irrigation area in the OIC region, namely the country with its irrigation area of 19.3 million hectares, alone accounts for 25.6% of total irrigation area in the OIC region. 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

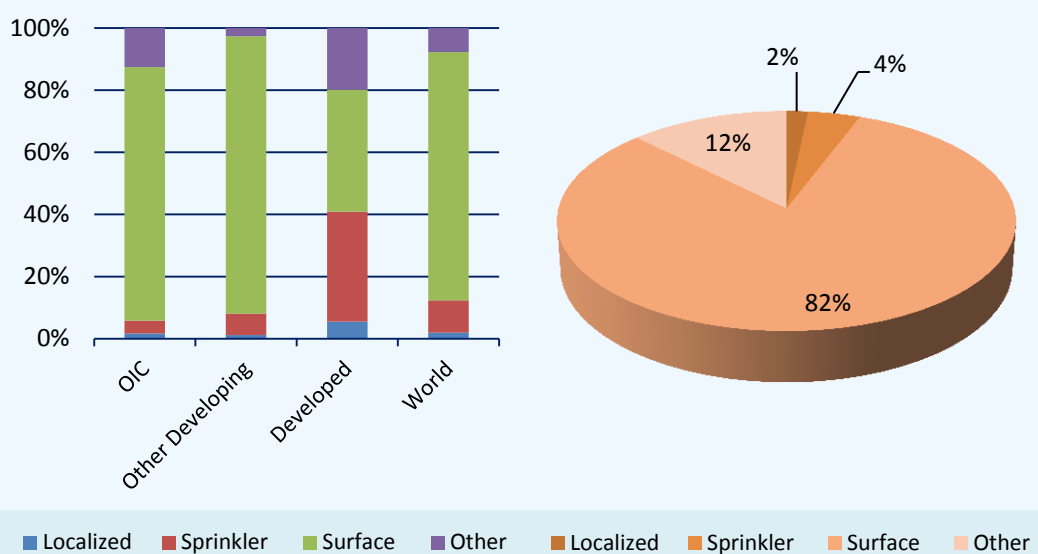
Source: Food and Agriculture Organization (FAO) AQUASTAT Online Database (Annex Table 5)

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

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

Surface irrigation
(the least water-
saving technique)
is the main
irrigation
technique in the
OIC countries



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

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 the 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 the 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%). The 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 the OIC countries; a ratio which is below the world average of 2%. Prevalence of this technique also varies across countries within the OIC region. United Arab Emirates and Jordan stand out with their remarkably high levels in use of the technique, reaching 86.3% and 81.2%, respectively. In 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

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 Pressurized Irrigation Techniques", UN-FAO,2000).

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.

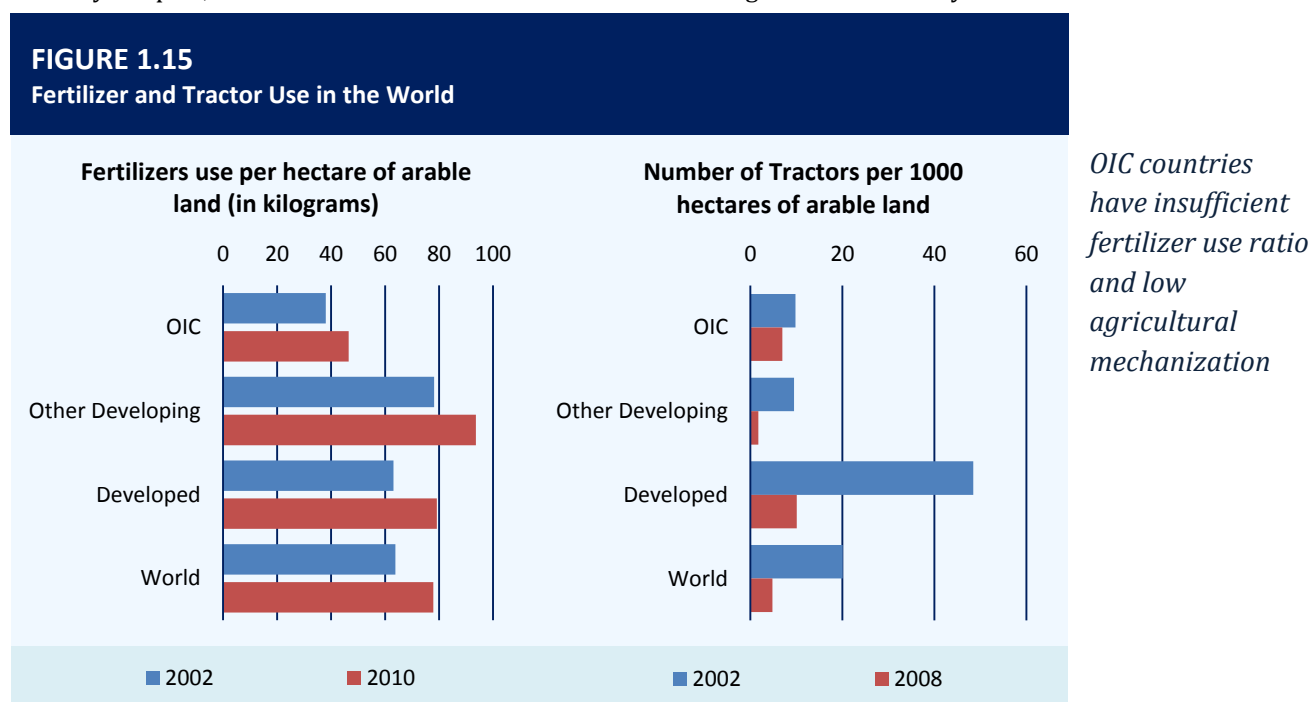
1.3. Use of Fertilizers and Agricultural Mechanization

The average use of fertilizer per hectare of the arable land in OIC countries climbed from 38 kilograms in 2002 to 46 kilograms in 2010. 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 non-OIC developing countries. As of 2010, the world average fertilizer use reached 77.8 kilograms. In other developing countries, the ratio was measured as 93 kilograms that is 102% per cent higher than the OIC average.

Figure 1.15 also presents the number of tractor per 1000 hectares of arable land In the OIC countries; the ratio is declined to 6.94 in 2008 from 9.81 in 2002. This reduction shows that 1000 hectares of arable land needs to be harvested by 6.94 tractors instead of 981. Even though the number of tractors used rose in the OIC countries between 2002 and 2008, the arable land size increased more. Therefore, the ratio declined in the OIC countries. Developed countries and other developing countries also experienced a similar reduction in this ratio. As of 2008, 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, the OIC countries stay in a better position collectively in terms of tractor use. Nevertheless, the OIC countries still have insufficient agricultural mechanization relative to developed countries group in which the ratio is calculated as 10. Overall, the use of agricultural machinery in the OIC countries needs to be improved where the same area of arable land is harvested by 6.94 tractors in the OIC countries compared to 10 in developed countries.

1.4. Agricultural Productivity

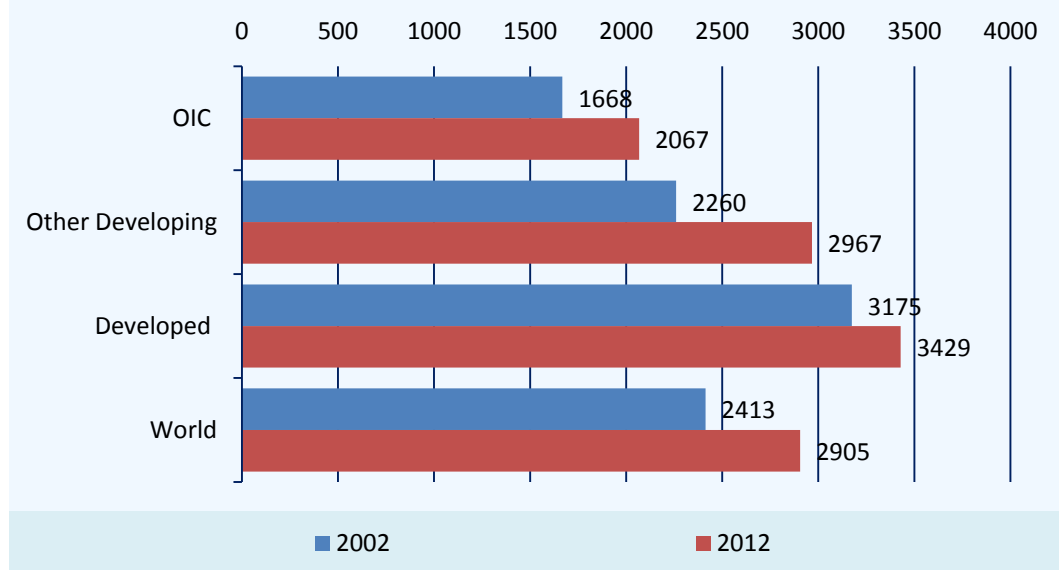
Although agriculture is known to be the primary economic activity for developing countries including the OIC members, productivity seems not to be the primary concern for the industry. In part, this is due to the inefficient use of land in agriculture in many of these



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

FIGURE 1.16
Land productivity in the World (value of production per hectare of arable land)

Land productivity in the OIC countries is below the world average



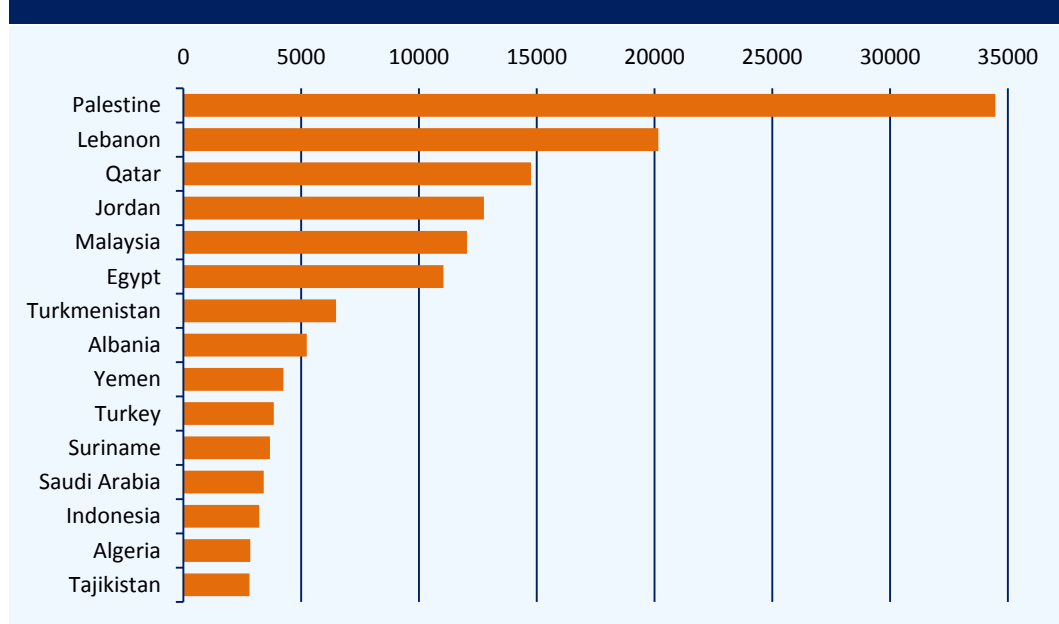
Source: Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis

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

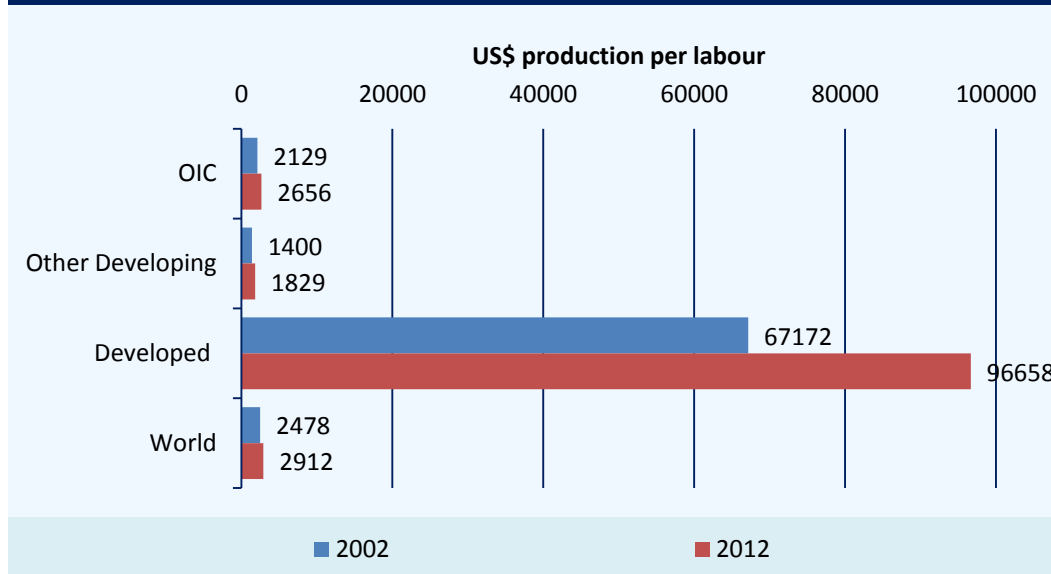
Total arable land in the OIC region, with an increase of 5.4% as per that in 2002, amounted to 255 million hectares in 2012. On the other hand, total value of agricultural production reached US\$ 527 billion in 2012, corresponding to an increase of 30.4% compared to the

FIGURE 1.17
Land productivity in the OIC Members in 2012 (value of prod. per hectare of arable land)



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

FIGURE 1.18
Labour Productivity in the World in 2012 (constant 2004-2006 US\$)



Labour productivity in the OIC countries is higher than other developing countries but below the average of the world

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

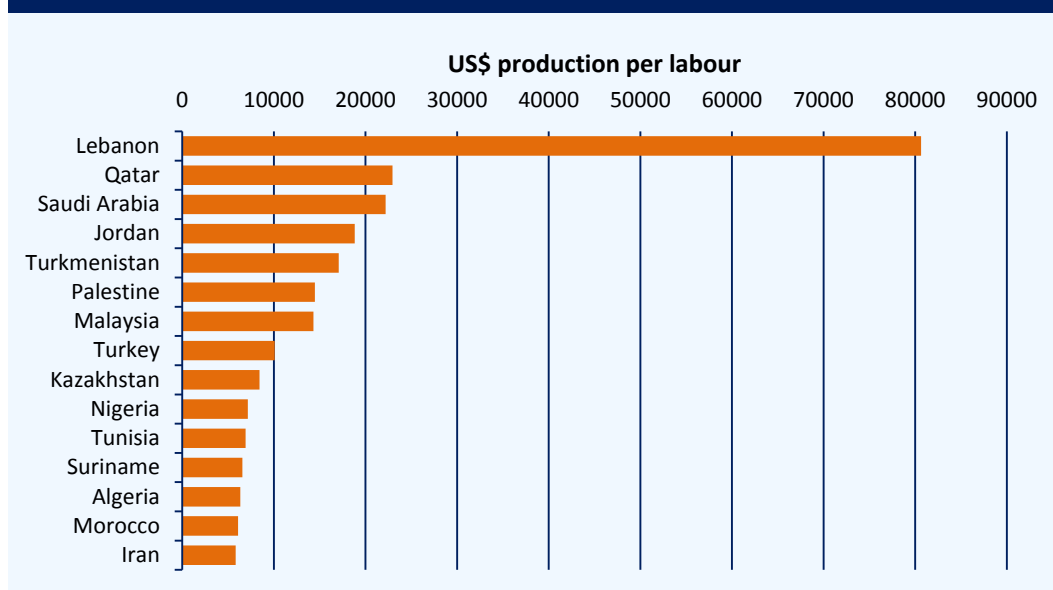
level of 2002. In 2012, OIC countries produced 15.1% of the world total agricultural production in value. In terms of productivity, OIC countries raised the level of land productivity from US\$ 1668 per hectare of arable land in 2002 to US\$ 2067 in 2012, corresponding to an annualized growth rate of 2.2%. On the other hand, other developing countries made better progress in boosting land productivity over the same period and achieved an annual growth of 2.8%. The productivity growth in developed countries remained at 0.8% and in the world at 1.9% per annum. Despite the catching-up process, OIC countries continue to 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 countries. In 2012, there were 18 OIC countries with levels of land productivity more than the OIC average calculated based on the data available for 37 OIC countries. Out of them, Palestine ranks first with almost US\$ 35,000 per hectare followed by Lebanon and Qatar (Figure 1.17). In contrast, there were 9 OIC countries with productivity levels below 1,000 USD per hectare. Guyana and Senegal are the OIC countries with the least land productivity level in 2012.

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 2012, an economically active person in agriculture could produce less than US\$ 2,700 worth of agricultural production compared to US\$ 1,800 in other developing countries and US\$ 96,700 in developed countries (Figure 1.18). Over the last decade, OIC countries achieved 1.6% annualized growth in labour productivity, compared to 3.7% in other developing countries and 2.2% in developed countries. Therefore, the progress made by OIC countries in increasing labour productivity is well below the progress made in other country groups.

FIGURE 1.19
Labour Productivity in the OIC Members in 2012 (constant 2004-2006 US\$)

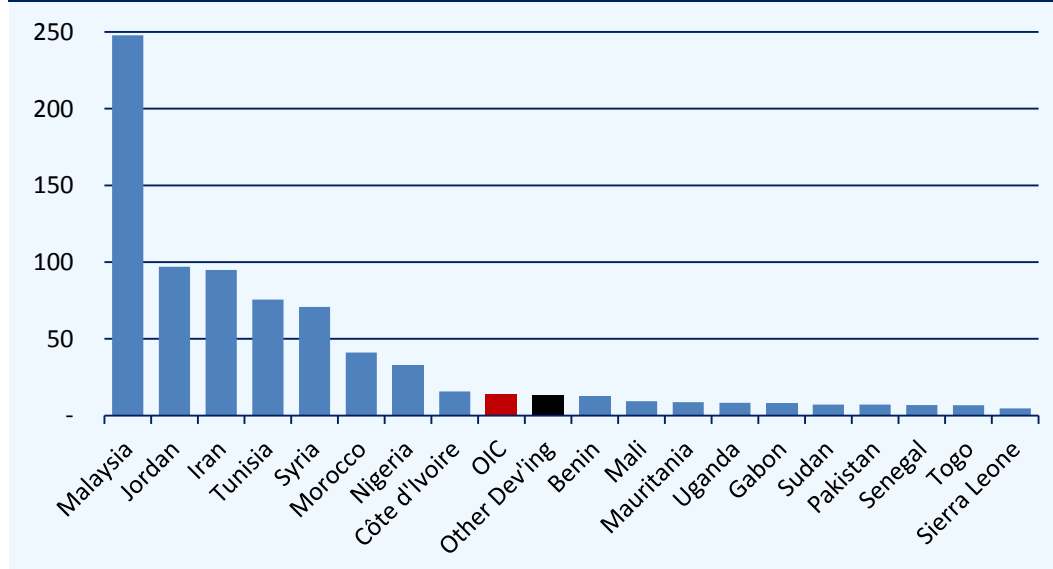


Source: Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis

Figure 1.19 presents the top OIC countries in terms of labour productivity in 2012. Among the OIC countries, the best performing countries in terms agricultural labour productivity were Lebanon with over US\$ 80,000 per person in agriculture, followed by Qatar (US\$ 23,000) and Saudi Arabia (US\$ 22,200). However, even the best performing OIC country

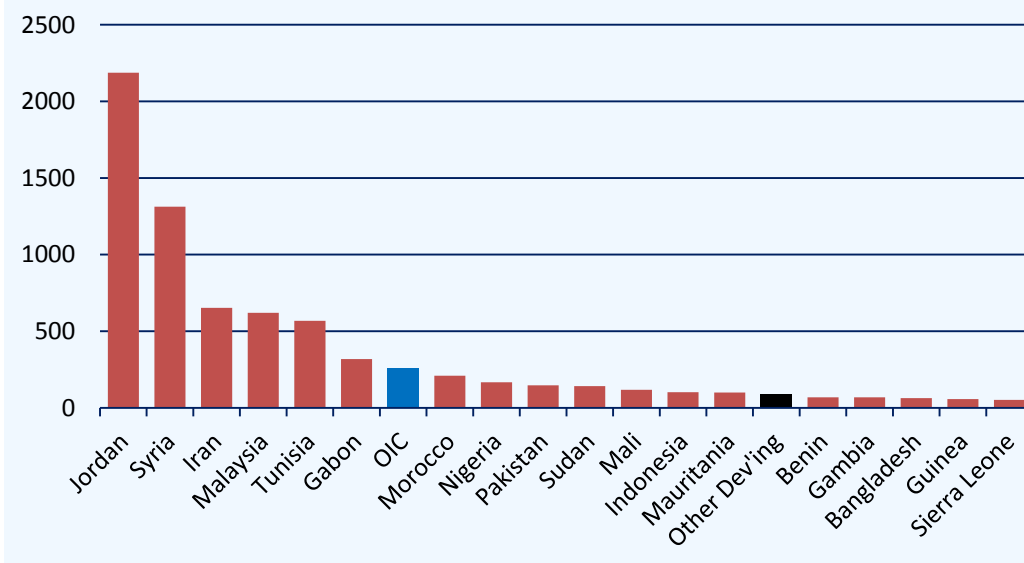
FIGURE 1.20
Agricultural R&D Spending per Agricultural Person by Public Sector, 2002-2009 (2005 PPP \$)

Malaysia has the highest amount of agricultural spending per agricultural person in Research and Development



Source: ASTI (Agriculture Science and Technology Indicators) Database, SESRIC Staff analysis

cannot achieved a productivity level equal to the average of developed countries. Jordan, Turkmenistan, Palestine, Malaysia and Turkey were the countries that had labour productivity values above US\$ 10,000 in 2012.

FIGURE 1.21**Agricultural Research Staff per one million of Agricultural Population, 2002-2009**

OIC countries have a higher agricultural research staff per one million agricultural population than other developing countries

Source: ASTI (Agriculture Science and Technology Indicators) Database, SESRIC Staff analysis

Agricultural Research and Development

Agricultural research and development 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 particularly important role, but much of the investment in developing countries are made by public sector. Therefore, greater collaboration between public and private sectors can facilitate better results for productivity and development.

According to the latest data available during the period 2002-2009, agricultural research and development expenditure by public sector varied significantly among the OIC countries. However, average expenditures in OIC and other developing countries for which data are available are close to each other. 25 OIC countries on average spent 13.8 USD per economically active person in agriculture compared to 13,1 USD in 37 other developing countries. At individual country level, it is observed that Malaysia spent the highest amount per active agricultural person with 248 USD, followed by Jordan (97 USD) and Iran (95 USD) (Figure 1.20). On the other hand, in 8 OIC countries, R&D expenditure in agriculture is less than 5 USD per agricultural person.

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 25 OIC and 38 other developing countries during the period 2002-2009. It is observed that the highest number of agricultural research staff working for public sector was available in Jordan with almost 2,200 researchers per million economically active agricultural population, followed by Syria (1,312) and Iran (653). On the other hand, Niger has only 23 agricultural research staff per one million of its economically active agricultural population.

On average, there were 259 researchers per million in OIC countries compared to 90 in other developing countries. In absolute numbers, Indonesia with 11,216 agricultural research staff has the highest number of researchers among the OIC countries. On the other hand, Gambia with only 38 agricultural staff working for public sector has the lowest number of researchers. Box 1 below provides an example of how research and development activities can be a defining factor in the development of agricultural sector.

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 per cent, 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 per cent in 1990 to 18.4 per cent in 2007.

Source: Ministry of Agriculture, Republic of Indonesia.



2. Agricultural Production and Trade

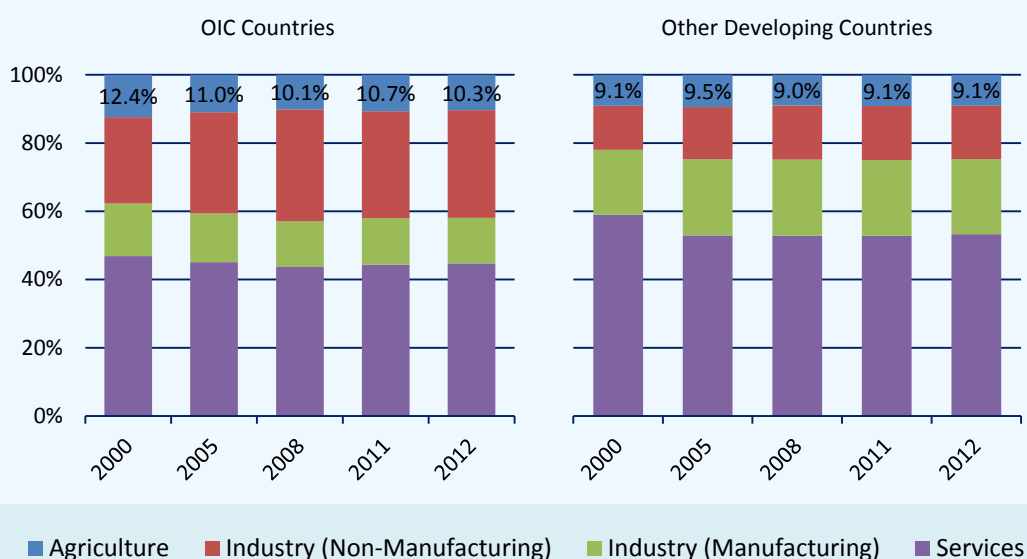
Agriculture is widely known to be the primary economic activity and assumed to play a major role in the economies of developing countries. However, this feature does not stand firm as far as its contribution to the OIC economies is concerned.

2.1. Agricultural Production

The share of agriculture in the total GDP of OIC countries has gradually declined from 12.4 per cent in 2000 to 10.1 per cent in 2008 (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 started to expand to on average above 11.0% during 2009-2010. With industrial activity recovering, the average share of agriculture in OIC economies contracted to 10.7 per cent in 2011 and to 10.3% in 2012. A more stable trend was observed in other developing countries, where the average share of agriculture in the economy has for long remained slightly above 9 per cent and was recorded at 9.1 per cent in 2011 and 2012.

At the individual country level, in 2012, the agricultural sector accounted for more than one third of the total value-added in 10 OIC member countries; namely in Benin, Burkina Faso, Comoros, Guinea-Bissau, Mali, Niger, Sierra Leone, Somalia, Sudan, and Togo – all of which were listed among the LDCs in the same year according to the classification by the 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 one per cent in the UAE and Brunei (0.7%), Bahrain and Kuwait (0.3%), and Qatar (0.1%).

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

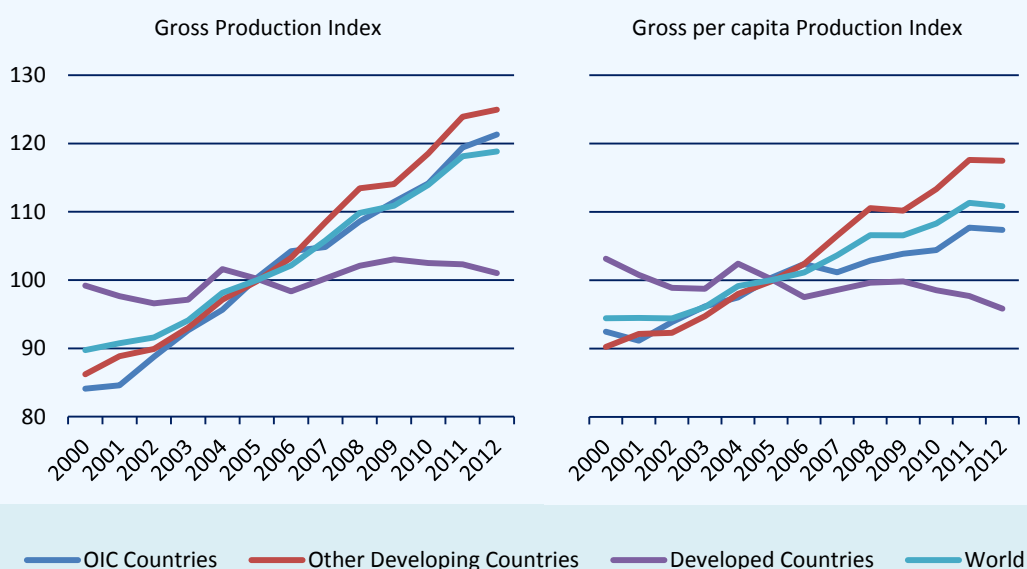


Source: United Nations National Accounts Main Aggregates Database (Annex Table 6)

2.1.1. Gross Production Index

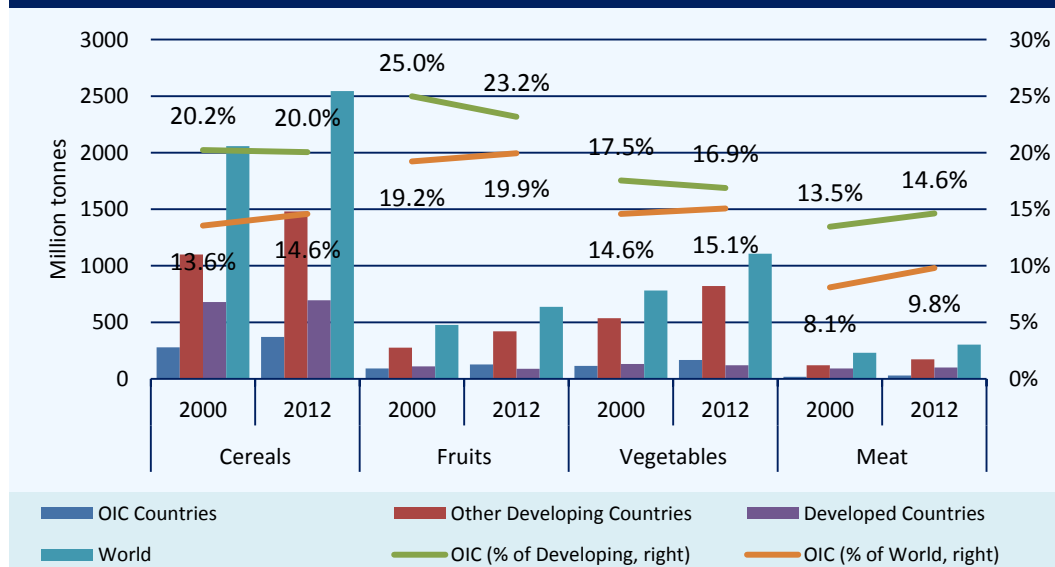
In terms of agricultural production index of the FAO, OIC countries, as a group, have recorded, on average, a comparable performance vis-à-vis other developing countries as well as the world during the period 2000-2012 and a much better one when compared to the developed countries (Figure 2.2, left panel). Yet, as of 2012, there were 23 member countries which recorded a lower agriculture production index score than that of the world. Moreover,

FIGURE 2.2
Agricultural Production Indices



Source: Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Tables 7-8)

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



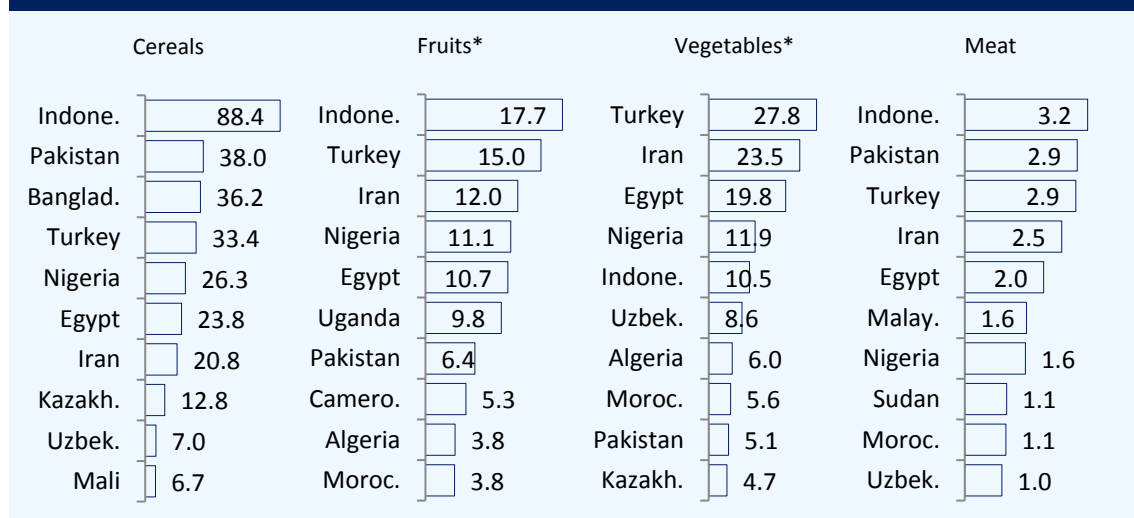
Source: Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Table 9)

the index points to significant annual average increases in agriculture production in some member countries during the period under consideration. These include Sierra Leone with an average increase of 11.3% in, Tajikistan with 7.0%, Mali with 6.6%, Kuwait with 6.3% and Algeria with 6.2%.

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 the OIC countries has experienced a modest increase as compared to other developing countries as well as the world as a whole (Figure 2.2, right panel). The stagnation in per capita production trend, however, has been much strong during 2007-2010 and this led to a significant

FIGURE 2.4
Top 10 Agricultural Producers in 2012 (Cereals, Fruits, Vegetables and Meat, million tonnes)



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

widening in the per capita production gap between the member countries and other developing countries. At the individual country level, as of 2012, there were 37 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 agriculture production, during the period under consideration, of 7.9% for Sierra Leone, 4.7% for Tajikistan, 4.5% for Algeria, and 3.8% for Uzbekistan, Albania and Azerbaijan.

2.2. Production and Utilization of Major Commodities

As for 2012, OIC countries accounted for 14.6% of the world total cereals production, with a slight improvement over its 2000 level of 13.6%, and 20.0% of that of the developing countries (Figure 2.3). This corresponds to a production volume of 371.0 million tonnes in 2012. Again in 2012, with 127.0 million tonnes, the share of OIC countries in the world fruit production was recorded at 19.9%, increasing slightly from 19.2% in 2000, and their cumulative share in the developing countries was recorded at 23.2%, decreasing from 25.0% in 2000. On the other hand, the total production of vegetables in OIC countries was recorded at 163 million tonnes in 2011. The share of the OIC countries in the total production of vegetables in the world increased slightly from 14.6% in 2000 to 15.1% in 2012 whereas

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 2011. The agricultural sector maintains its position as the leading sector of this development.

Agricultural sector has continued growing in the last 8 years despite the effects of globalization and economic crises around the world and has reached the most stable term of last 50 years.

In the global ranking of agricultural sector sizes, Turkey's agricultural sector was ranking 11th in 2002. It became 7th in 2010. 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.

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

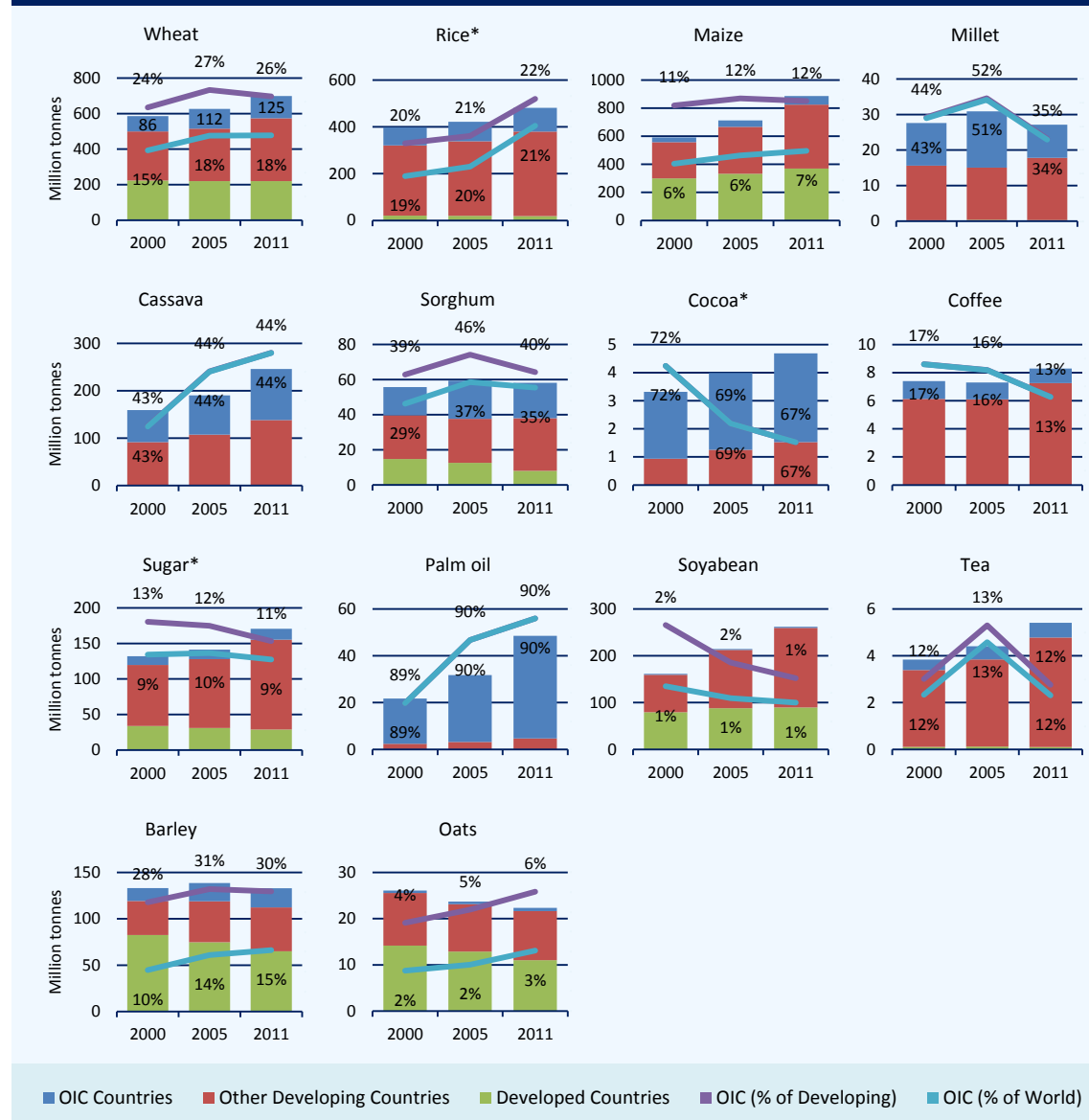
New livestock support schemes were introduced. The farmers dealing with organic livestock breeding have supported by payments 50% higher than before.

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

their share in developing countries' production decreased from 17.5% in 2000 to 16.9% in 2012. As far as the meat production is concerned, OIC countries have seen improvements in their shares in the world as well as developing countries. Namely, with 29.6 million tonnes in 2012, the member countries registered 9.8% and 14.6% shares in total meat production of the world and developing countries, respectively, which were above their 8.1% and 13.5% levels recorded in 2000, respectively.

It is also observed that the total OIC agricultural production concentrated in a few member countries as only ten countries accounted for the 79.1%, 75.2%, 74.2% and 66.6% of the total production of cereals, fruits, vegetables and meat in 2011 (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

FIGURE 2.5
Production of Major Commodities

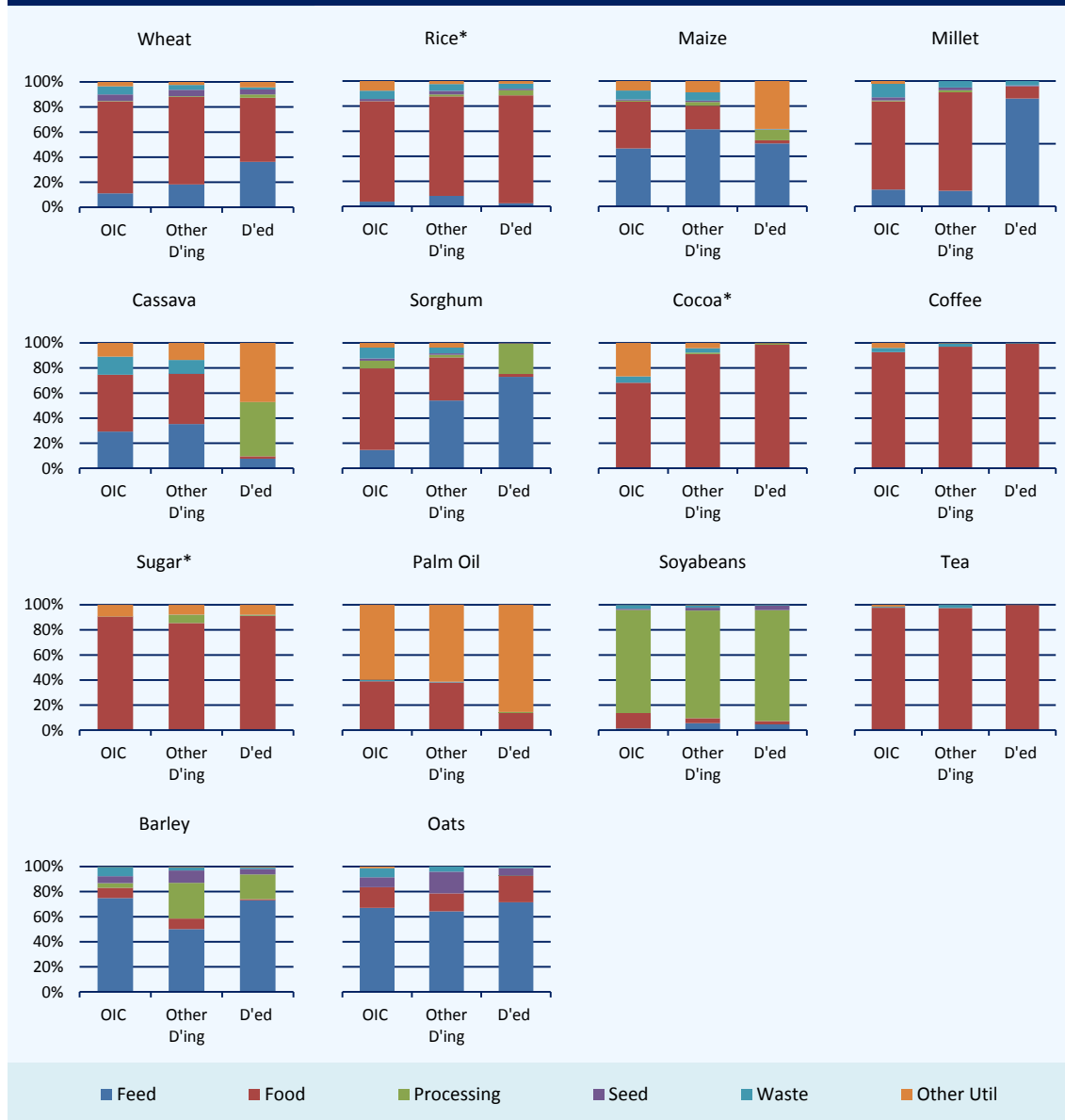


Source: Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis. * Rice is milled equivalent. Cocoa refers to cocoa beans. Sugar is raw equivalent.

countries which collectively dominate the OIC's agricultural production (see, e.g., Box 2).

Figure 2.5 shows the production volume of major agricultural commodities in the OIC region and the corresponding shares of OIC countries in other developing as well as developed countries in 2011. The member countries have their highest shares globally in the total production of palm oil (90.3%), cocoa (67.4%), cassava (43.8%), sorghum (34.6%), and millet (34.4%) – as compared to other major commodities in Figure 2.5. In commodities such as wheat, rice, maize, cassava, sorghum, palm oil, barley 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, sugar, cocoa, coffee, tea and soyabean during the period under study. 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 (127.3% increase from 19.3 to 43.8 million

FIGURE 2.6
Utilisation of Major Commodities (2011)



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.

tonnes), maize (84.1% increase from 33.4 to 61.5 million tonnes), cassava (59.2% increase from 67.7 to 107.9 million tonnes), wheat (45.1% increase from 86.3 to 125.2 million tonnes), and tea (40.8% increase from 0.4 to 0.6 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 the year 2011. For majority of these commodities, food and feed are apparently the primary methods of utilisation. Namely, in 2011, 97.7% of tea, 92.6% of coffee, 90.6% of sugar, 80.1% of rice, 73.4% of wheat, 70.4% of millet, 68.2% of cocoa, 65.1% of sorghum, and 45.4% of cassava supplies domestically were utilised as human food products in the member countries. On the other hand, again in the same year, 74.9% of barley, 67.1% of oats, 46.2% of maize, and 29.3% of cassava supplies domestically were utilised for feeding livestock and poultry. Besides food and feed, significant portions of the commodities such as palm oil (59.9%) and cocoa (26.6%) were used for non-food purposes. Majority of soybeans (82.3%), on the other hand, were processed before they are used for other purposes.

TABLE 2.1

OIC Countries among Top-20 Largest Producers of Major Agriculture Commodities Worldwide (2011)

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

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

2.3. Top Producers of Major Agriculture Commodities

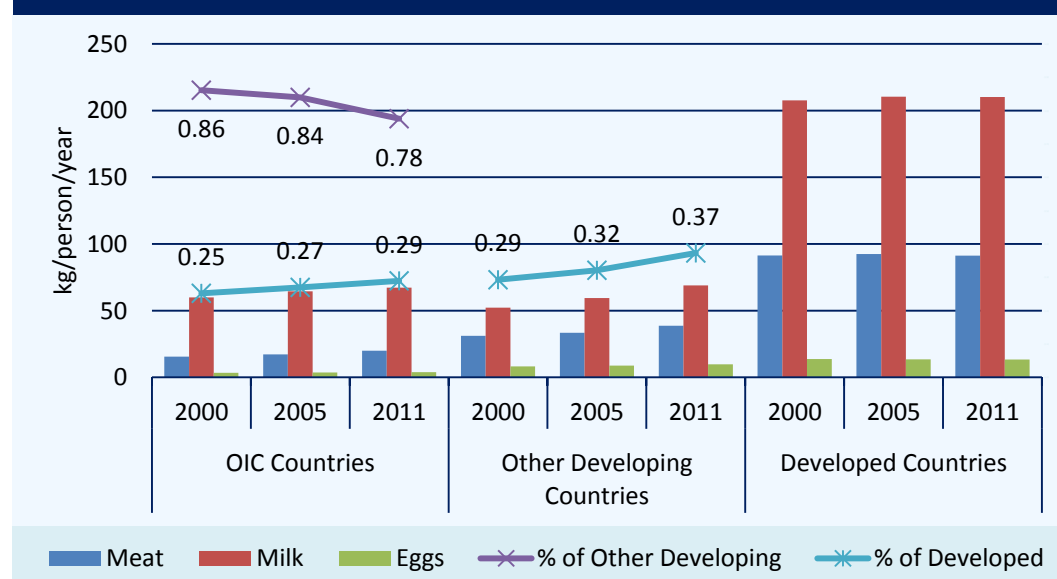
Notwithstanding the low level of development in the agriculture sector and the relatively low share of OIC countries in the global agricultural production, 26 member countries are among

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 without or with low value added 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

FIGURE 2.7
Per capita Consumption of Livestock Products



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

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.

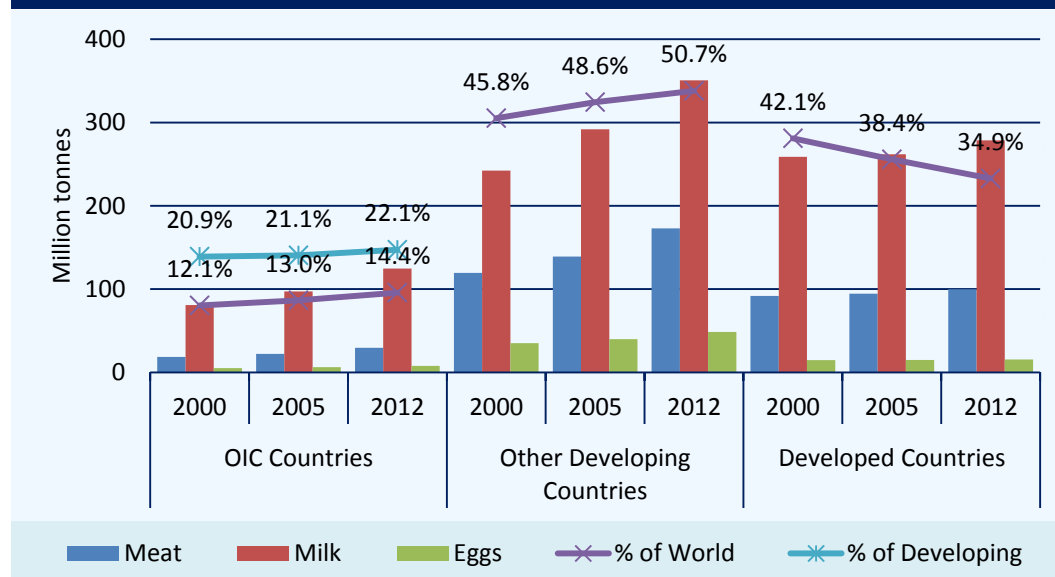
2.4.1. Livestock

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 15.6 to 19.9 kg/person over the period 2000-2011. Yet, this figure is still much lower than 38.7 and 91.2 kg/person levels observed in other developing countries and developed countries, respectively. As for milk consumption, although the member countries, with an average annual milk consumption level of 67.3 kg/person, compares fairly to other developing countries (69.0 kg/person), this figure is much lower than the average consumption level of the developed countries (above 210.1 kg/person). A similar argument holds true for the egg consumption as well. One person in OIC countries consumed on average 3.8 kg of eggs in 2011, which is significantly lower than the averages of other developing countries (9.8 kg) and developed countries (13.4 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 2011, which points to a significant deterioration 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 the developed countries, however, has registered an improvement, increasing from 0.25 in 2000 to 0.29 in 2011.

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 2012, OIC countries as a group have increased their meat, milk and eggs production by 59.3% (from 18.6 to 29.6 million tonnes), 54.1% (from 80.9 to 124.7 million tonnes) and 53.3% (from 5.1 to 7.9 million tonnes), respectively. Accordingly, their share in overall production of livestock produce in the world has also improved. In 2012, the member countries accounted for 14.4% of the world total production of livestock products, registering an increase over its year 2000 value of 12.1%. 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 20%. As far as the drivers of the production growth are considered, the current report concludes that supply-side factors

FIGURE 2.8
Production of Livestock Products



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

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.

TABLE 2.2
Trade in Livestock Products (2000, 2005 and 2011)

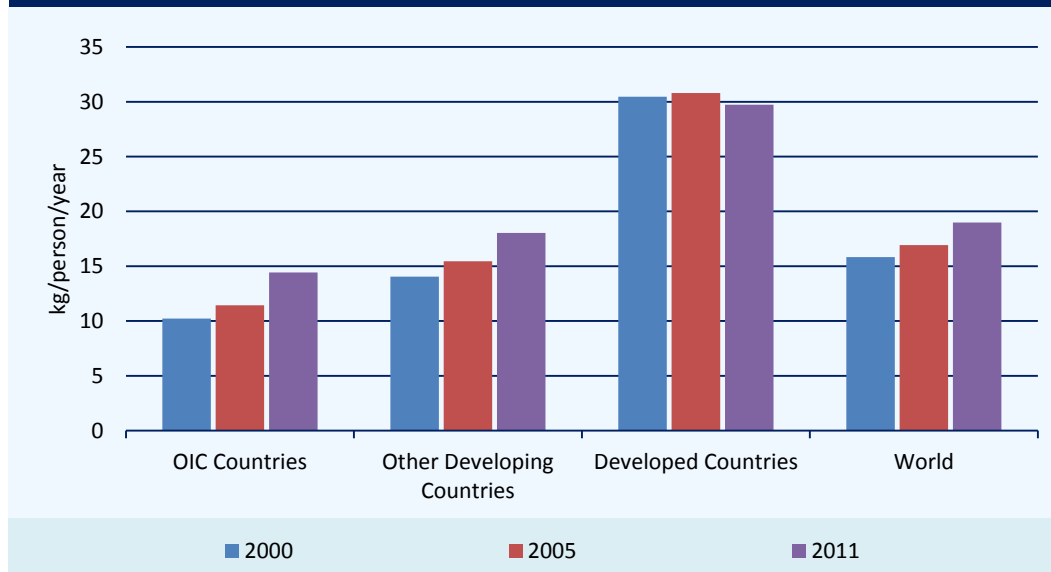
	Exports			Imports			Trade Balance		
	2000	2005	2011	2000	2005	2011	2000	2005	2011
OIC Countries	<i>(thousand tonnes)</i>			<i>(thousand tonnes)</i>			<i>(thousand tonnes)</i>		
Total Meat	79	207	616	1,720	2,643	4,491	1,642	2,435	3,875
<i>Bovine</i>	15	43	99	618	882	1,277	603	839	1,179
<i>Ovine</i>	12	15	31	128	179	181	116	164	150
<i>Poultry</i>	43	129	457	916	1,483	2,878	873	1,354	2,421
<i>Other Meat</i>	6	15	14	10	17	13	4	2	0
Dairy ¹	1040	2958	5654	11,046	14,749	20,364	10,007	11,791	14,710
Eggs	117	137	421	117	119	388	0	18	33
Other Developing C.	<i>(thousand tonnes)</i>			<i>(thousand tonnes)</i>			<i>(thousand tonnes)</i>		
Total Meat	4,914	10,571	13,039	5,368	8,242	11,561	454	2,329	1,478
<i>Bovine</i>	1,747	3,917	3,892	1,299	2,046	2,217	448	1,871	1,675
<i>Ovine</i>	52	89	75	211	186	174	160	96	99
<i>Poultry</i>	2,199	4,558	6,769	2,696	3,936	5,074	497	622	1,695
<i>Other Meat</i>	131	141	339	76	83	121	55	57	218
Dairy ¹	6,546	12,461	14,291	16,072	18,016	26,367	9,527	5,555	12,077
Eggs	197	325	535	94	148	236	103	177	300
Developed C.	<i>(thousand tonnes)</i>			<i>(thousand tonnes)</i>			<i>(thousand tonnes)</i>		
Total Meat	19,465	20,593	28,358	16,251	18,541	23,203	3,213	2,052	5,155
<i>Bovine</i>	5,558	4,875	6,025	5,352	5,387	5,714	206	511	311
<i>Ovine</i>	896	906	771	600	610	558	296	296	213
<i>Poultry</i>	6,539	6,274	9,311	4,129	4,762	7,246	2,409	1,512	2,065
<i>Other Meat</i>	216	224	321	386	317	619	169	94	298
Dairy ¹	65,188	70,830	85,539	42,054	48,293	56,620	23,134	22,538	28,919
Eggs	816	942	1,266	855	1,086	1,423	39	144	158
OIC Countries	%			%					
as % of Developing	9.6%	12.4%	19.4%	37.4%	39.9%	39.8%			
as % of World	1.3%	2.8%	4.5%	13.8%	15.7%	17.5%			

Notes: ¹ Milk equivalent

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 2000-2011, the total trade deficit of OIC countries in meat has more than doubled by increasing from 1.6 to 3.9 million tonnes. This was largely due to the rapid expansion of poultry meat imports and, therefore, trade deficit in poultry (2.4 million

FIGURE 2.9
Per capita Consumption of Fisheries Products



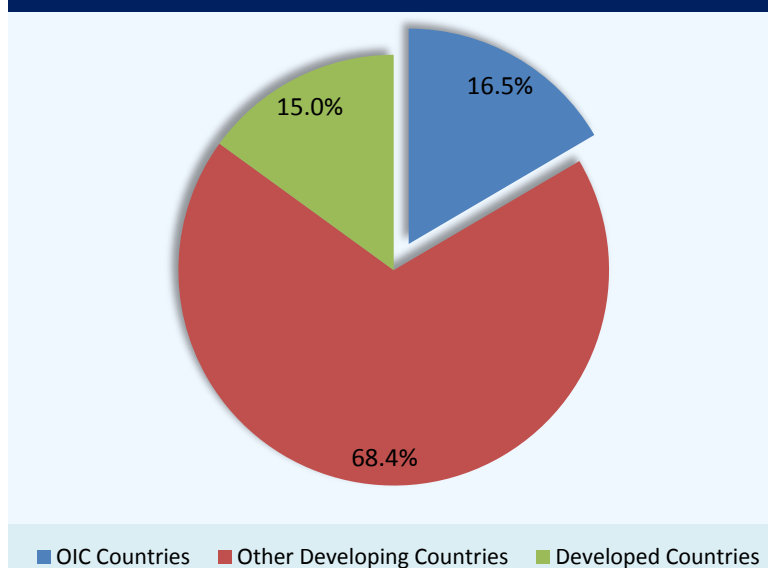
Source: Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis

tonnes in 2011 vis-à-vis only 0.9 in 2000). Yet, a less optimistic situation is observed in Table 2.2 for dairy products. As of 2011, 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 (12.1 million tonnes in 2011). Overall, as of 2011, OIC countries accounted for 4.5% of world total livestock produce exports, which is more than three times as large as the 2000 level of 1.3%, and 17.5% of imports (which was 13.8% in 2000). These numbers correspond to 19.4% and 39.8% of the developing country exports and imports, respectively, again in 2011.

2.4.2. Fisheries

Data from Fisheries and Aquaculture Department of the FAO reveals that capture fisheries and aquaculture supplied the world with about 182.9 million tonnes of fish in 2012. 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 2.5% per annum during the period 2000–2012. This outpaced the average increase of 1.2 percent 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 2000–2011. During this period, the average per capita consumption

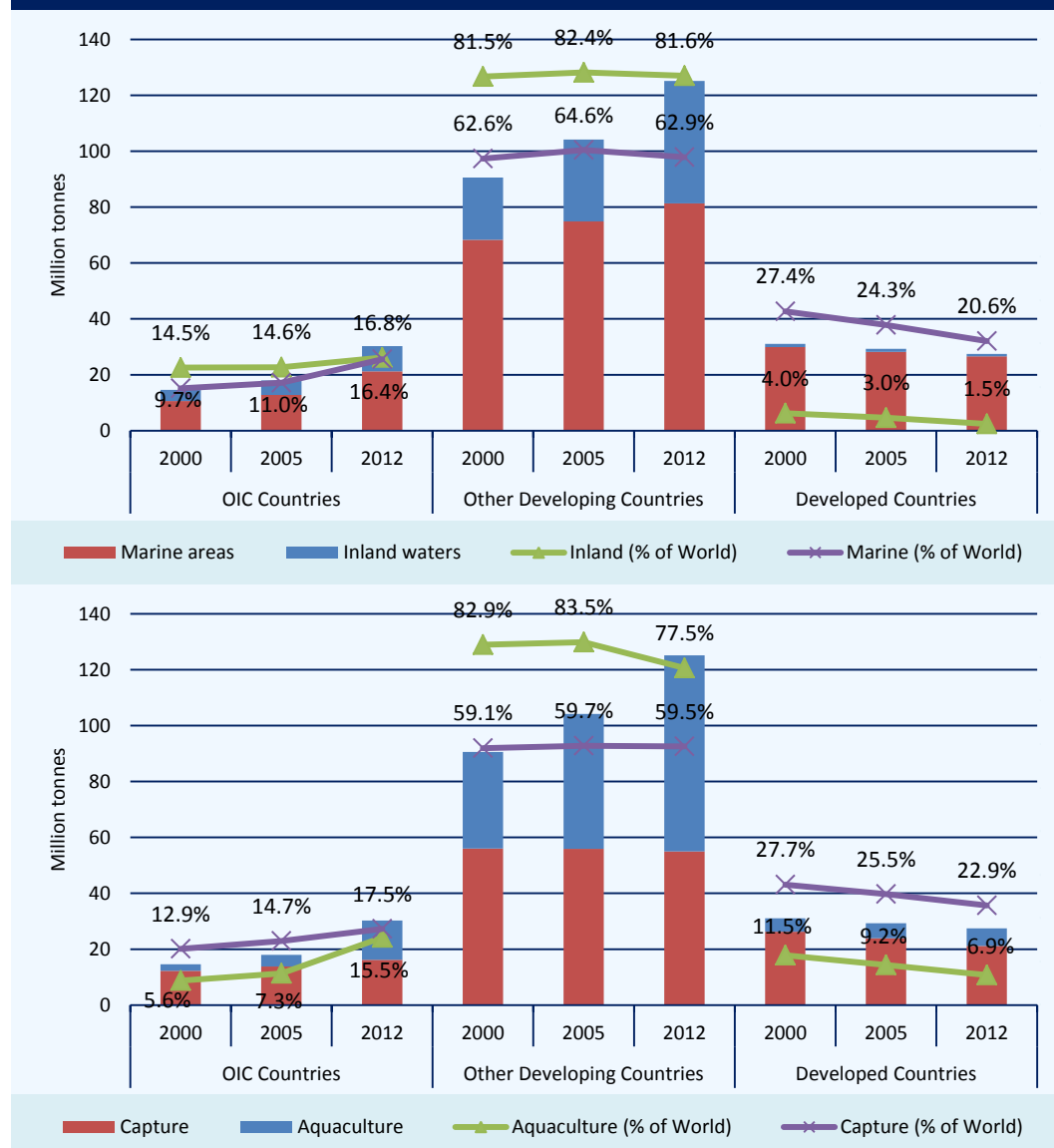
FIGURE 2.10
Share in Fisheries Production (2012)



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

in the member countries has increased from 10.2 to 14.4 kg – registering a 41.2% increase (3.2% per annum). Other developing countries experienced a similar pace of growth and increased their per capita consumption from 14.1 to 18.0 kg during the same period, registering a 28.4% increase. The growth figures of per capita consumption in developing countries were significantly higher than those in developed countries (a 2.4% decrease from 30.5 to 29.7 kg) and world as a whole (a 19.9% increase from 15.8 to 19.0 kg).

FIGURE 2.11
Production of Fisheries by Fishing Area and Fishing Method



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

As of 2012, OIC countries accounted for 16.5% of the total fisheries production in the world (Figure 2.10). This is much below the 68.4% share of other developing countries. In the same year, developed countries accounted for another 15.0% of the total production. Yet, 16.5% share of OIC countries in the total fisheries marks a sizeable improvement over 10.7% observed in year 2000. Over the same period, developing countries as a whole increased their share in total world fisheries production from 77.1% to 85.0%. Developed countries, on

the other hand, have seen their share contracting from 22.7% to its current level 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 53.7 million tonnes between 2000 and 2012 (a 96.1% increase), whereas marine production has remained relatively stable (i.e., 129.2 million tonnes in 2012 vis-à-vis 109.1 in 2000 which marks a cumulative increase of only 18.4%) (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 16.8% in 2012. Yet, a more significant improvement is visible in the case of marine production, whereby the member countries have increased their overall share in global marine fisheries production from 9.7% to 16.4% over the same period. The aforesaid shares correspond to 9.0 and 21.2 million tonnes of fisheries production in OIC countries in 2012 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 81.6% and 62.9% shares in 2012, respectively.

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	<i>(thousand tonnes)</i>			<i>(thousand tonnes)</i>			<i>(thousand tonnes)</i>		
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.	<i>(thousand tonnes)</i>			<i>(thousand tonnes)</i>			<i>(thousand tonnes)</i>		
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.	<i>(thousand tonnes)</i>			<i>(thousand tonnes)</i>			<i>(thousand tonnes)</i>		
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, chilled as well as prepared or preserved crustaceans and molluscs.

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

A similar argument also holds true for aquaculture fisheries production against capture as well. World aquaculture fisheries production is reported by FAO to have more than doubled

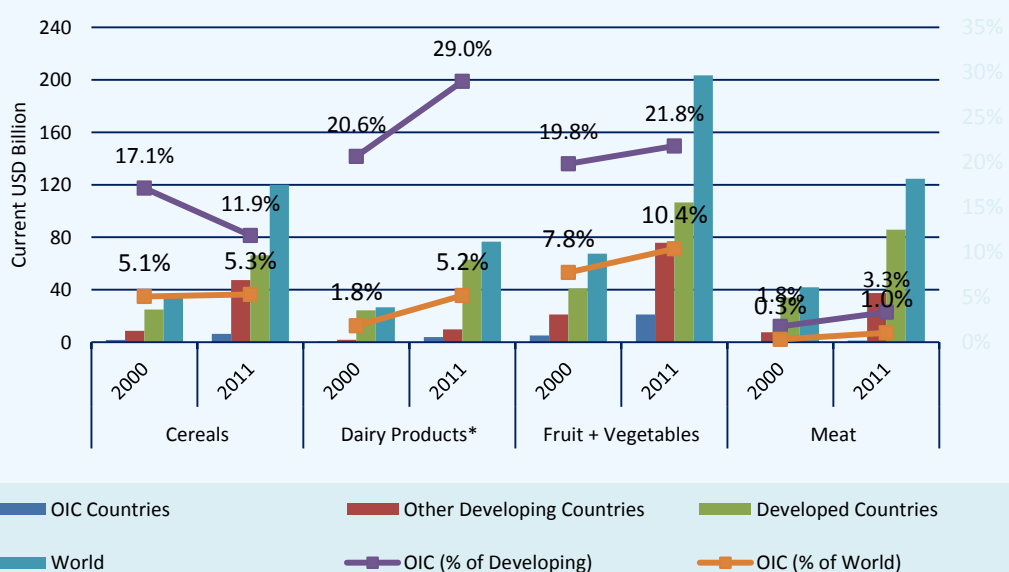
from 41.7 million tonnes in 2000 to 90.4 in 2012 (a 116.7% increase) (Figure 2.11, bottom). On the contrary, total capture production has been stable slightly above 90 million tonnes during the same period. OIC countries, with an increase from 2.3 to 14.1 million tonnes, have almost tripled their shares in world total aquaculture fisheries production from 5.6% to 15.5% during 2000-2012. Their share in global capture production, on the other hand, has also increased and reached 17.5% in 2012. As of the same year, other developing countries accounted for 77.5% and 59.5% 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 the 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.

2.5. Trade in Agriculture Products

As observed from Figure 2.12, the total cereal exports of the OIC countries amounted to \$6.4 billion in 2011, accounting for only 5.3% of the world total cereal exports in that year. This share points to a slight increase over its 5.1% level observed in 2000. The share of OIC countries in the total cereal exports of the developing countries, on the other hand, contracted to 11.9% in 2011, compared to 17.1% in 2000. As far as dairy products are concerned, it is observed that the dairy product exports of OIC countries reached \$4.0 billion in 2011 – significantly increasing its share in both that of developing countries (from 20.6% to 29.0%)

FIGURE 2.12
Exports of Major Agricultural Product Groups (2000-2011)

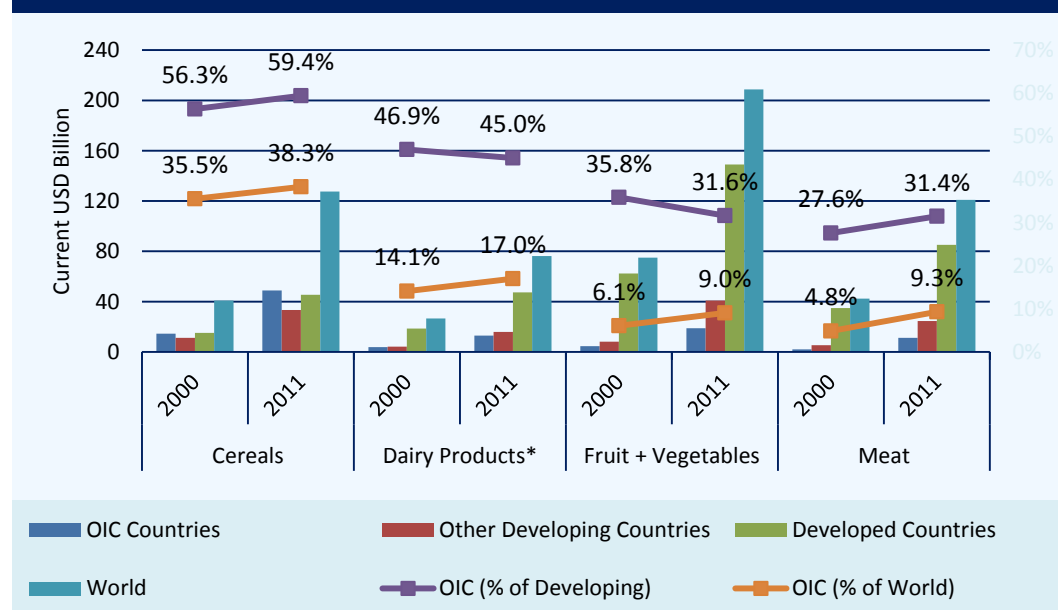


Source: Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Table 10). * Dairy products including eggs.

to 29.0%) and world as a whole (from 1.8% to 5.2%). The total exports of fruits and vegetables originating from the OIC member countries accounted for 21.8% and 10.4% in that of developing countries and world in 2011, respectively, increasing from \$5.2 billion in 2000 to \$21.1 billion in 2011. With the lowest share in the total exports of both the developing countries as well as world, as compared to other product groups, total meat exports from the OIC countries accounted for only 3.3% and 1.0% of that of the developing countries and the world, respectively, in 2011.

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 world and developing countries are considered together. As shown in Figure 2.13, with \$48.8 billion, OIC countries accounted for more than half (59.4%) of total cereals imports of developing countries in 2011, and more than one-third (38.3%) 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 \$12.9 billion in 2011, had a share of 45.0% in that of the developing countries in the same year, and 17.0% in that of the world. On the other hand, between 2000 and 2011, OIC countries increased their fruit and vegetables imports from \$4.5 to \$18.9 billion while their share in the total imports of developing countries vis-à-vis the world had a mixed look: the share of OIC countries in the world total fruit and vegetables imports has increased from

FIGURE 2.13
Imports of Major Agricultural Product Groups (2000-2011)



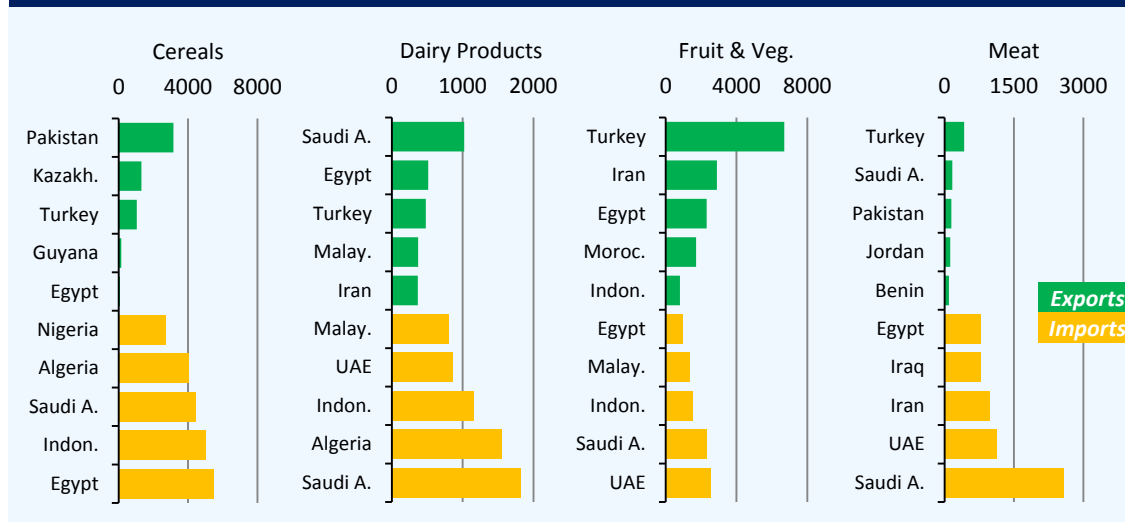
Source: Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Table 11). * Dairy products including eggs.

6.1% to 9.0% during 2000-2011 whereas their share in that of developing countries has decreased from 35.8% to 31.6% in the same period. The latter was apparently due to a more rapid increase in other developing country imports. As for the meat imports, it is observed that OIC countries have increased their collective share in meat imports of both developing countries (from 27.6% to 31.4%) and the world as a whole (from 4.8% to 9.3%) during the period under consideration.

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 89.9%, 69.0%, 68.3%, and 73.4% of total cereal, dairy product, fruit & vegetables, and meat exports of OIC countries in

FIGURE 2.14

Top 5 Exporters and Importers of Major Agricultural Product Groups (US\$ million, 2011)



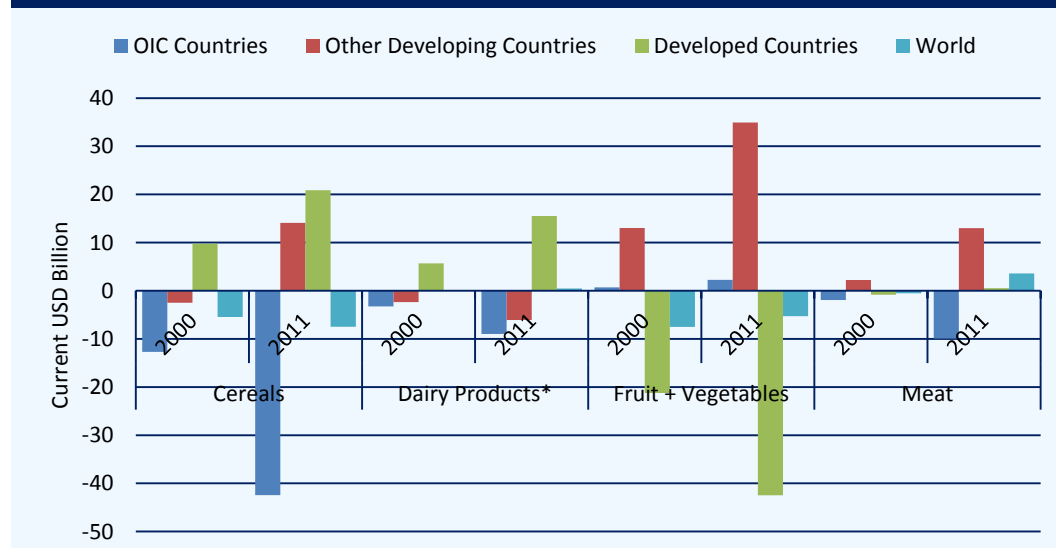
Source: Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis. * Dairy products including eggs.

2011, respectively, whereas, top 5 importers accounted for 44.4%, 47.8%, 46.3% and 55.8% 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, the OIC countries as a group registered significant trade balance

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.

deficits in most of these products (Figure 2.15). OIC countries are dependent on imports in all main four agricultural product groups, except for fruit and vegetables, and this dependency has increased significantly over the last decade. In 2011, total cereal trade deficit of OIC countries reached \$42.4 billion, compared to \$12.7 billion in 2000. In the same year, OIC countries trade deficit in dairy products amounted to \$9.0 billion, again compared to only \$3.3 billion in 2000. The majority of surpluses in cereal and dairy product trades are run by developed countries. On the other hand, between, 2000 and 2011, the OIC trade deficit in meat products has increased more than four-fold and reached \$9.9 billion in 2010. On the contrary, OIC countries were able to record a trade surplus, though small, in fruit and vegetables and, as of 2011, earned a net of \$2.3 billion from their trade in latter. 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 the OIC countries, as a group, have more than doubled their trade deficit from \$23.2 billion in 2000 to \$62.1 billion in 2011. 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, in turn, 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 member 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.



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.

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, 2007). 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 member 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. Against this backdrop, this chapter aims to highlight the impacts of climate change on some important agriculture related variables in the regions where a majority of OIC member 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 (°C), an aim recognized in the United Nations Climate Convention's Cancun Agreements. Globally GHG emissions are on rise. According to the latest report from the UN Environment Programme (UNEP), GHG emissions are now about 50 gigatonnes of carbon equivalent (GtCO₂e), 20% higher than they were in 2000. 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 °C. 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°C to 5°C by the end of this century (UNEP, 2012).

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 member 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 latest report from World Bank, in Sub-Saharan Africa median yield losses of 5 percent are projected for 1.5-2 °C warming, 15 percent for 2-2.5 °C warming and 15-20 percent 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 percent reductions in present maize, millet, and sorghum cropping areas for current cultivars. By 3°C warming, this reduction could grow to more than 90 percent. 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 percent for 3-4.5°C warming. Since 1980, rice and wheat yields have declined by approximately 8 percent 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. Their agriculture production is particularly vulnerable to the increasing warming 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, where most of the member countries are located.

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. The net impact of climate change is projected to be negative on global water supply. In fact, water resources are already under stress across the globe and average per capita renewable water resources have declined from 10180 m³ in 1990 to 7802 m³ in 2012 (FAO, AQUASTAT 2013). According to some estimates, climate change is expected to account for about 20 percent of the global increase in water scarcity and countries that currently suffer from water shortage will be hit the hardest (FAO, 2007).

Rain fed agriculture is a major source of food especially in the developing countries. According to the estimates of the International Water management Institution (IWMI, 2010), 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 the world food production by 1.5% by 2030 and at least by 5% in 2050 (UNEP, 2009). 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, 2008).

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 member 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.

In OIC member countries agriculture sector accounts for 86.2 percent of total consumption of renewable water resources. A majority of the OIC member 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 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

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). These estimates are higher than the forecast of as much as 59 cm by the Intergovernmental Panel on Climate Change in 2007. 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, 2007). 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 km²) is salt-affected, with 2,500–5,000 km² of lost production every year as a result of salinity (UNEP, 2009).

Sea level rise can seriously affect a number of OIC member 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 percent 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. And the cost of these climate-related disasters was estimated at 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 member 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. 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 percent of total land area in summer which could climbed up to 90 percent 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 CO₂ 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. 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, the CO₂ concentration in the atmosphere has increased from pre-industrial 280 ppm to 392 ppm in 2010 and is likely to be doubled in 2100 (HELP, 2012). The higher level of CO₂ in the atmosphere is an important variable which affects agriculture productivity through photosynthetic mechanism. Hence, concentration of CO₂ in the atmosphere, due to increase in GHG emissions, will certainly affect the crops and their productivity. However, so far the aggregate impacts of CO₂ 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 CO₂ 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 CO₂ 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.

A red tractor is shown in a field, likely harvesting or tilling. The tractor is the central focus, with a blue semi-transparent box overlaid on it containing the title. The background shows a field of crops under a cloudy sky.

4. Agriculture Development: Major Obstacles and Challenges

This chapter delineates the major obstacles and challenges that OIC member 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 2011, OIC member countries accounted for 28.7 percent of the world agricultural land area while its contribution to the world's total agricultural production was only 14.3 percent. The share of agricultural area accounted for 46.7 percent of total land area in OIC countries, compared to 39 percent in other developing countries and 38.2 percent in the world. However, the corresponding cultivated area within this agricultural area in OIC member countries is only 25.6 percent, while the rate in developing countries is 31.1 percent and the world average is 31.7 percent. Likewise, the share of arable land in OIC countries corresponds to 21.6 percent of their total agricultural area which is again far below the rate in developing countries and the world average, which are 31.8 and 28.5 percent, 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 the 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 member countries. Studies show that excessive inequality in land ownership reduces access

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)

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 member 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 the OIC countries is crucial for poverty alleviation and economic development. Agricultural output can be increased either through expanding 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 Guinean 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 the OIC member 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 the OIC member countries decreased from 17.6 percent in 1990 to 11.5 percent in 2013. 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 percent (WORLDIMUN, 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 the OIC countries.

Labor productivity in the OIC member 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 the OIC countries are lagging behind the other developing countries and the world average. In 2011, the average amount of production per hectare in the OIC countries was only 1.15 tons compared to 1.69 tons in other developing countries and 1.68 tons of the world average. Poor land productivity in the 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 46 kg in 2010, it is still far below the amount used in other developing countries (93kg) and the world average (77 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 percent 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 2007, gross capital stock as a percentage of GDP in the OIC countries was 1.42 percent while in the other developing countries and the world average it was respectively 1.78 and 2.06 percent. On average, farmers in OIC countries use one tractor per 100 hectares of arable land, contrary to one tractor per 73 hectares of arable land in other developing countries and 48 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 the 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 the OIC region is confined in a handful of countries such as Malaysia and Brunnei Darussalam that receive around 3,000 mm and 2722 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 4,724 m³/year, compared to 8,571 m³/year in developing countries and world average of 7,802 m³/year. In fact, 23 OIC countries are suffering water stress, 18 of them suffer water scarcity and 13 suffer absolute water scarcity. In return agricultural water withdrawal in OIC accounts account for 86.2 percent of total water withdrawal, compared to the world average of 70 percent and 75.4 percent 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 member 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 region remains dependent on irrigation systems, and that only 26.7 percent 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 member states. On the other side, where agricultural irrigation is intensive such as in Pakistan, Egypt and Iraq, salinization has emerged as a major problem because 82.1 percent of the agricultural area equipped with irrigation in the OIC countries is 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 3 and 1.7 percent, 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 (WORLDNUM, 2013). On the other hand, given that some OIC member 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 the 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 the OIC member 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 the OIC member 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 the 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 the OIC member 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 the OIC countries, especially in budget constrained least developed and low income member countries. Therefore, the challenge in the OIC 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 the 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' programmes 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 programmes need to be in place (Mahul&Stutley, 2010). Therefore, while planning for any agriculture insurance policies, policy makers in the 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 the OIC member 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 member 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, CO₂ 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, it is very likely that temperature changes during the 21st century would be faster than in the 20th century, ranging from between 1.4 to 5.8 degrees Celsius (IPCC 2007). According to modeling 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 percent (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 member 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 23 OIC member countries are subject to water stress and/or scarcity and that more than 86.2 percent 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 percent (SESRIC, 2010). When all these above mentioned adverse impacts of climate change are taken into account, agricultural capacities of the OIC member 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 the OIC member countries are far from promising as the gap of R&D in biotechnology between developed and the OIC countries is widening due to short supply of public and private funds available in OIC countries. Most of the OIC member 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 2000-2008, agricultural spending of public sector in the OIC was around US\$11.8 billion while in other developing countries it was US\$51.3 billion, which corresponds to US\$2.3 billion per year in the 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, the 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 member countries have an average agricultural spending per person higher than the OIC average. In fact national government funding for agricultural research fell by 27 percent in the SSA between 1981 and 2000, and many governments allocate less than 1 percent of their national budget to agriculture R&D (Mittal, 2009). Consequently, technological and scientific infrastructure capacities of OIC member 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 percent 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 member 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 member 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 one million of agricultural population, the OIC countries collectively have a higher rate compared to other developing countries where the number for the OIC is 51 while for the other developing countries it is 41.7. However, at country level within the OIC, the ratio represents uneven distribution across the OIC countries, as in only 8 OIC countries the ratio is more than the OIC average of

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 harvests¹. 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.

51, while Niger has only 9 agricultural research staff per its one million of agricultural population.

Another major challenge is the limited available capacity for technological spillover across OIC member countries since varying socio-economic conditions and structures among OIC member countries impede the development of OIC wide agricultural research strategies. Nevertheless, despite these structural discrepancies, means to complement each other

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.

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, 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 member states.

4.8. Grain Storage Houses

Another challenge for agriculture development in most OIC countries is the post-harvest

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 renegeing. 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

losses due to lack of proper grain storage facilities. According to existing evidence, Africa alone suffers 20-30 percent 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 the OIC member 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 percent would provide \$40 million gains annually (Morris, Binswanger and Byerlee, 2011). Nevertheless, the traditional storage house facilities currently utilized in the OIC member 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 member 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

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

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.



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 member 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.

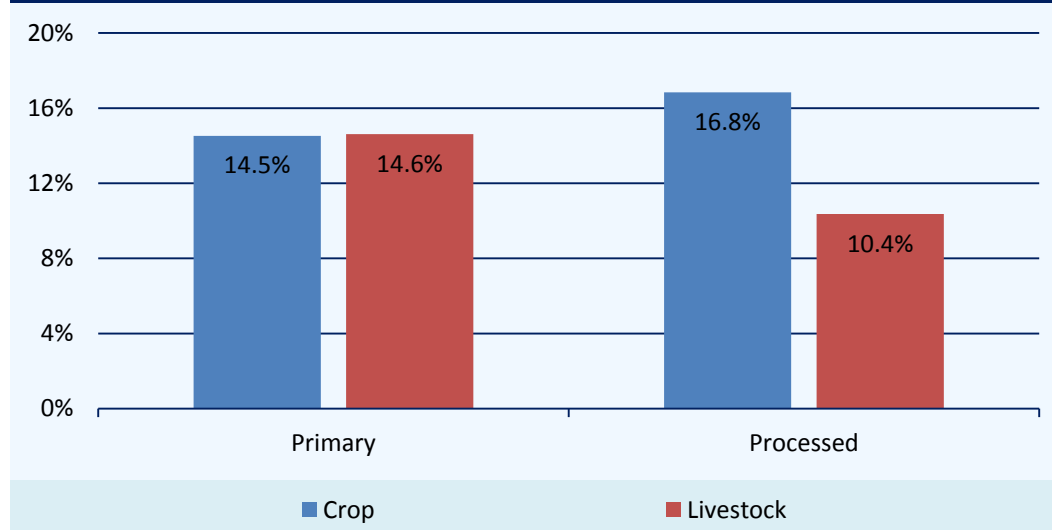
Agro-industry provides capital and services to farmers, promotes entrepreneurship, raises demand for agricultural products and connects farmers with markets through the handling, processing, marketing and distribution of agricultural products. Consequently, productivity and quality of agricultural production, 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 per cent in agriculture-based countries, 42 per cent in countries in transformation and 37 per cent 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 per cent to as high as 90 per cent (Wilkinson and Rocha, 2008).

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

- 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.

FIGURE 5.1**Primary and Processed Agro-Industrial Production in OIC Countries**

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

5.2. State of Agro-Food Industries in the OIC Countries

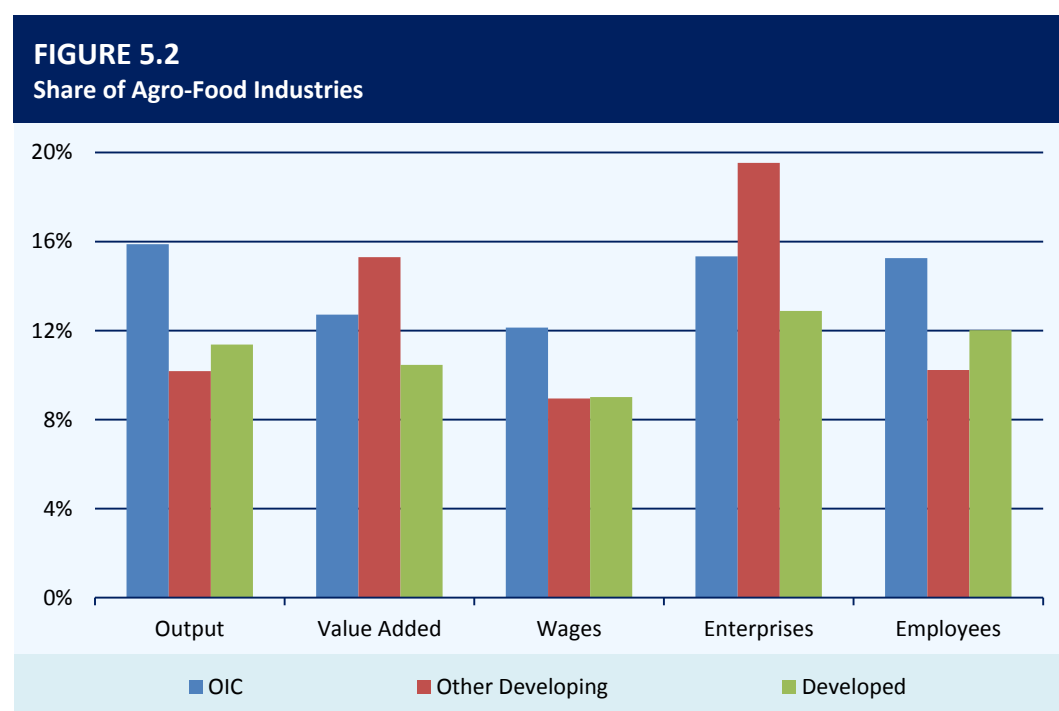
Agro-food industry is often the main industrial activity and a major contributor to production, export earnings and employment in many developing countries. As being a substantial part of developing countries, some OIC countries rely also heavily on agricultural sector. In this section, the state of 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 2012. Data compiled from FAO statistical database comprises 210 countries including also 56 OIC member countries. OIC countries as a group produce around 14.5 per cent of total crop production in the world but their share in total world processed crops is 16.8 per cent. This indicates that OIC countries have the capacity to process what they already produce and to benefit from value addition during procession of agricultural products.

Before comparing the processed livestock production, it should be noted that the data provided by FAO on primary livestock production include mainly meat, milk and egg production. However, the data provided under processed livestock include only dairy products such as butter and cheese. Therefore, the primary livestock production statistics is restricted to include only milk production to compare it with the processed livestock production. Having said that, Figure 5.1 shows that OIC countries produce 14.6 per cent of total world primary livestock production, but they account for only 10.4 per cent of total processed livestock production. With respect to processing of livestock, 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.



Source: UNIDO, INDSTAT4

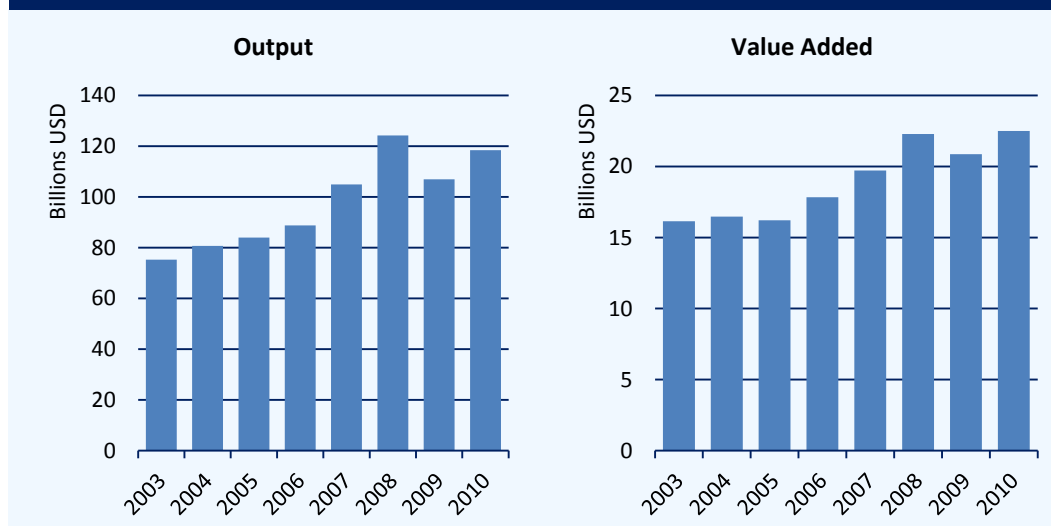
While being very insightful, this analysis provides only limited information on the state of agro-food industries in the OIC countries. Processing is only one link in a continuous chain between raw material production and final consumption. In what follows, some important indicators of agro-food industries are highlighted for the 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 the 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 6.2 compares the 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 member countries, 47 other developing countries and 32 developed

FIGURE 5.3
Output and Value-Added



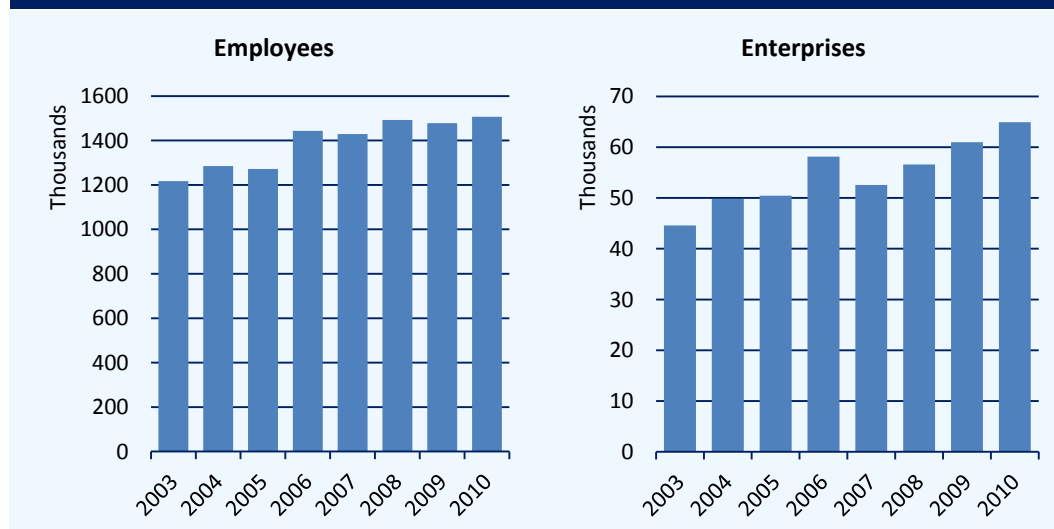
Source: UNIDO, INDSTAT4

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, the 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 non-OIC 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 per cent in OIC countries and only 10.2 per cent in other developing countries. Similarly, agro-food industries represent on average 15.3 per cent of total

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).

FIGURE 5.4
Number of Employees and Enterprises

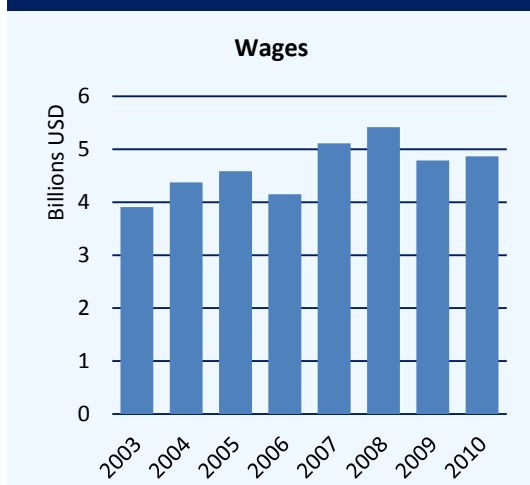


Source: UNIDO, INDSTAT4

employment in manufacturing industries in 25 OIC countries compared to only 10.2 per cent in other developing countries. Wages in agro-food industries represent accordingly a higher share of total payments, 12.1 per cent of wages paid in all manufacturing industries in OIC countries compared to 9 per cent in non-OIC countries.

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

FIGURE 5.5
Wages



Source: UNIDO, INDSTAT4

Although the data are available for 25 OIC countries, coverage in terms of years, as well as data items, varies from country to country and this makes it difficult to make time-series analysis. However for 11 OIC countries there are consistent yearly data to compare their performance over the period of 2003-2010.⁴ Figure 5.3 depicts the total output and value added by these countries during 2003-2010. While there is an upward trend until 2008, there is a significant progress especially after 2005 in both output and value-added. Total output of these countries increased from 75.3 billion USD in 2003 to 124.2 billion USD in 2008 and total value added in agro-industries increased from 16.1 billion USD to 22.3 billion USD over the same period (in constant 2005 prices). Although total output increased by 64 per cent, total value-added increased only by 38 per cent, indicating a lower share of value-added in total output produced in agro-food industries. The global economic crisis in 2009 apparently adversely affected the industry.

⁴ These countries are Albania, Azerbaijan, Indonesia, Iran, Jordan, Kyrgyz Republic, Malaysia, Morocco, Oman, Qatar and Turkey. The 2010 data for Indonesia, Iran and Turkey are extrapolated to increase the sample size.

Total output decreased to 10.7 billion USD in 2009, but could not restore its pre-crisis level in 2010. Total value added, however, exceeded its pre-crisis level by reaching 22.5 billion USD in 2010 after decreasing to 20.9 billion USD in 2009.

Figure 5.4 depicts the progress in employment and number of enterprises over the same period for 11 OIC member countries. The number of employees in agro-food industries increased from 1.2 million in 2003 to 1.5 million in 2010, indicating 25 per cent increase in total employment. The number of enterprises also increased from 45 thousand in 2003 to 65 thousand in 2008, indicating 44 per cent increase in total establishments operating in agro-food industries.

While there were clear upward trends in the indicators discussed above, wages paid to agro-industry workers followed rather oscillating trend. Figure 5.5 shows the average trend in 11 OIC countries in wages earned in agro-food industries. Total wages paid increased from 3.9 billion USD in 2003 to 4.9 billion USD in 2010 (in constant 2005 prices), indicating 26 per cent increase in total wages. In terms of wages per employees, a worker was paid on average 3,211 USD in 2003, but it increased to 3,629 USD in 2008, reflecting the improvements in income and standards of living for employees engaged in agro-food industries. After the global economic crisis, however, it decreased back to 3,230 USD. This again highlights the vulnerability of people engaged in agricultural activities to external shocks.

TABLE 5.1

Productivity in Agro-food / Manufacturing

Country	Year	Processed meat, fish, fruit, vegetables, fats (151)	Dairy products (1520)	Grain mill products; starches; animal feeds (153)	Other food products (154)	Total Manufacturing	Productivity in Agro-food / Manufacturing
Albania ⁽¹⁾	2010	7286	8956	9628	-	7951	1.08
Azerbaijan	2010	18970	68195	37857	17271	16145	1.46
Egypt	2010	5936	13024	9998	5204	11670	0.58
Indonesia	2009	19540	16874	12238	8275	12189	1.08
Iran	2009	12728	10590	10957	8537	19584	0.54
Jordan	2010	28124	15463	14135	8056	21074	0.65
Kuwait	2010	17523	28320	11924	9949	45471	0.30
Kyrgyzstan	2010	9294	6043	7072	5570	11304	0.58
Lebanon	2007	20299	14645	52580	17433	27438	0.70
Malaysia	2010	36455	20506	19895	16640	26071	0.98
Morocco	2010	10820	31179	21428	20982	19670	0.86
Oman	2010	26649	30568	62353	20840	78712	0.34
Pakistan	2006	38103	17783	14899	11333	15046	1.22
Palestn. ⁽²⁾	2010	21195	-	-	-	14580	1.45
Qatar ⁽²⁾	2010	16675	-	-	-	81648	0.20
S. Arabia ⁽²⁾	2006	35950	-	-	-	36790	0.98
Turkey	2009	10267	...	20167	14424	17262	0.72
Yemen ⁽²⁾	2006	7126	-	-	-	4447	1.60

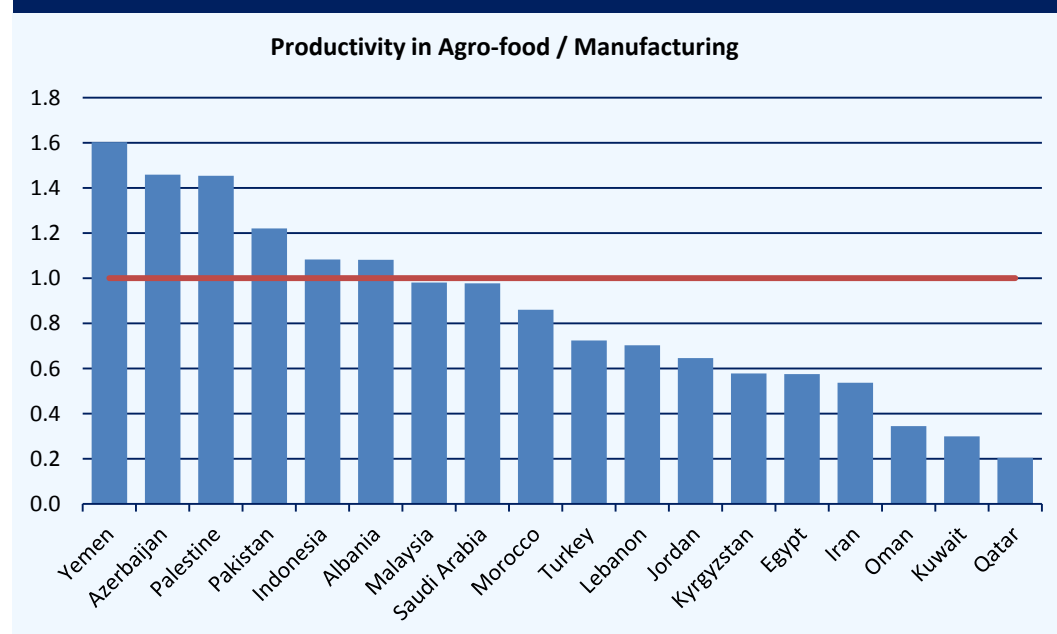
Source: UNIDO, INDSTAT4. (1) 153 includes also 154. (2) 151 includes also 1520, 153 and 154.

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 Albania, Azerbaijan, Indonesia, Morocco and Pakistan when compared with their productivities in total manufacturing. In terms of absolute values, Azerbaijan, Lebanon, Malaysia and Pakistan have productivity levels above 30.000 USD, reflecting their absolute competitiveness in certain categories of agro-food industries. Azerbaijan with over 68.000 USD value-added per worker in dairy products stands out the most productive country in a specific category of agro-food industries. Azerbaijan is around four times more productive in dairy products compared to its productivity in total

FIGURE 5.6
Productivity in Agro-food / Manufacturing



Source: UNIDO, INDSTAT4

manufacturing. On the other hand, Albania, Kyrgyzstan and Yemen 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.

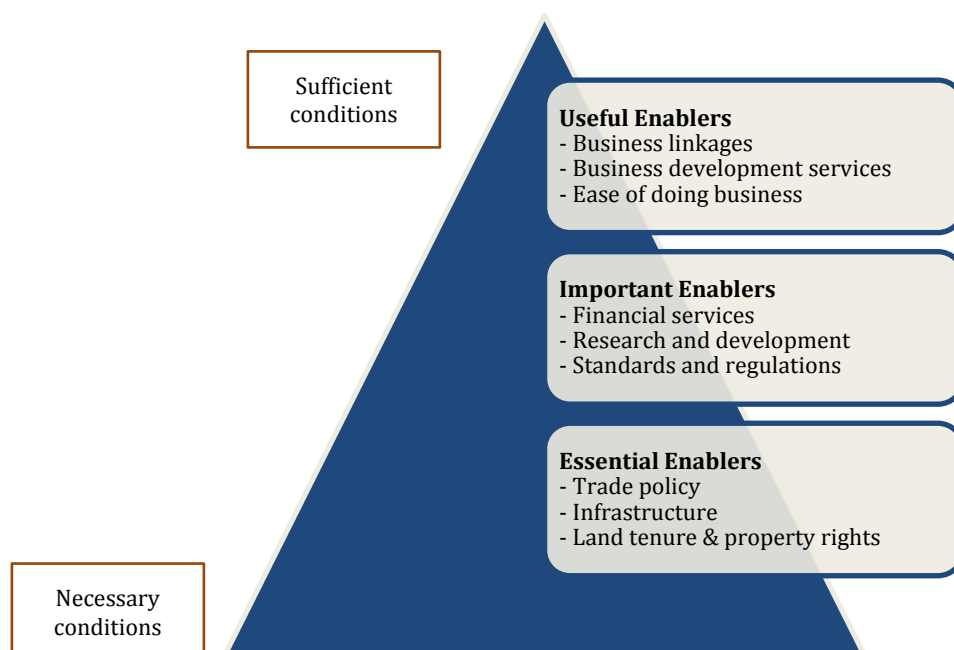
Figure 5.6 compares the relative productivity in agro-food sector with the productivity total manufacturing in OIC member countries for which data are available. Countries with average score of higher than 1 are the countries that are more productive in agro-food industries. Yemen, Azerbaijan, Palestine, Pakistan, Indonesia and Albania are relatively more productive in agro industries. On the other hand, natural resource abundant countries Qatar, Kuwait, Oman and Iran have agro-industrial productivity that is not always higher than the half of their productivity in total manufacturing.

Overall, this analysis confirms that the agro-food industries remain as one of the most efficient economic sectors in some OIC member 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 the OIC countries.

5.3. Promoting the Competitiveness of Agro-Food Industries

Developing countries have a natural comparative advantage⁵ 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

FIGURE 5.7
Hierarchy of Enabling Needs



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

countries. On the one hand, the rise of global markets based on competitive advantage⁶ is increasingly forcing policy makers to make assessments of the 'enabling environment' for 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 (see FAO, 2008). By developing a suitable mechanism at national and

⁵ 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.

⁶ 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

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.

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 the humanity today. Over the past few decades, many initiatives have been taken at both national and international levels to end the hunger and achieve the goal of food security at global level. In 2000, the elimination of hunger and under-nourishment has been identified in Millennium Development Goals (MDGs) as one of the most important objectives to be achieved at both national and global levels. However, despite all efforts, food insecurity is still on rise across the globe where the current estimates of the FAO indicated that 842 million people worldwide are now undernourished. The majority of these undernourished people reside in the developing regions of Asia & Pacific, Sub-Saharan Africa and Latin America & Caribbean. Considering the fact that the majority of the OIC member countries are located in these regions, it is quite evident that a significant portion of the undernourished people in these regions resides in the OIC countries, particularly in the least-developed member countries. It is undoubtedly that this situation has been worsened considering the impact of the surge in food insecurity, particularly after 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 the 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

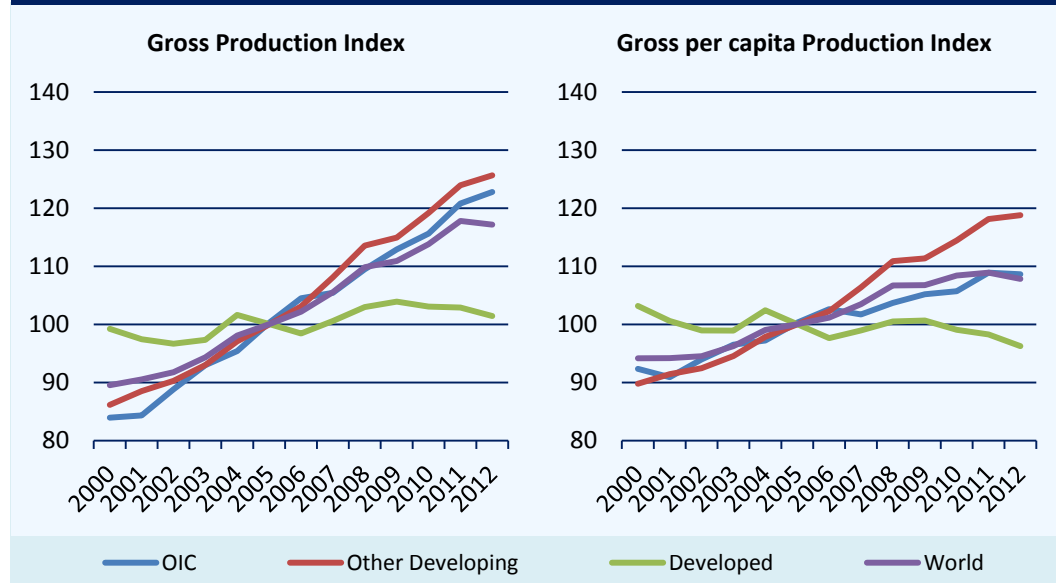
As shown at left hand side in Figure 6.1, global food production index (FPI) has increased by 17% in the period 2000-2012. FPI of the non-OIC developing countries remained above the world average and registered an increase of 26% throughout the period under

consideration. FPI of the OIC member countries, as a group, also indicated an upward trend and remained above the world average, whereas the developed countries could only increase their food production only by 1% for the same period which was far below the world average. Notably, although FPI of the OIC countries as a group increased by 23% during the period 2000-2012, at the individual country level, the FPI was lower than the world average in 21 OIC countries in 2012 (FAOSTAT).

Global per capita food production also indicated an upward trend which implies that growth

FIGURE 6.1
Food Production Index 2000-2012

Per capita food production gap with other countries is increasing



Source: Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Tables 12 and 13)

in food production was higher than population growth. As shown at right hand side in Figure 6.1 despite a fluctuation, food production per capita index of the developed countries recorded an overall decrease by 4% during the period under consideration. In contrast, food production per capita index of the OIC countries and non-OIC developing countries exhibited an upward trend during 2000-2012. On average, in terms of per capita food production, OIC countries and non-OIC developing countries witnessed an increase of 9% and 19%, respectively. Notably, both of the country groups remained above the world average of 8% increase during the same period.

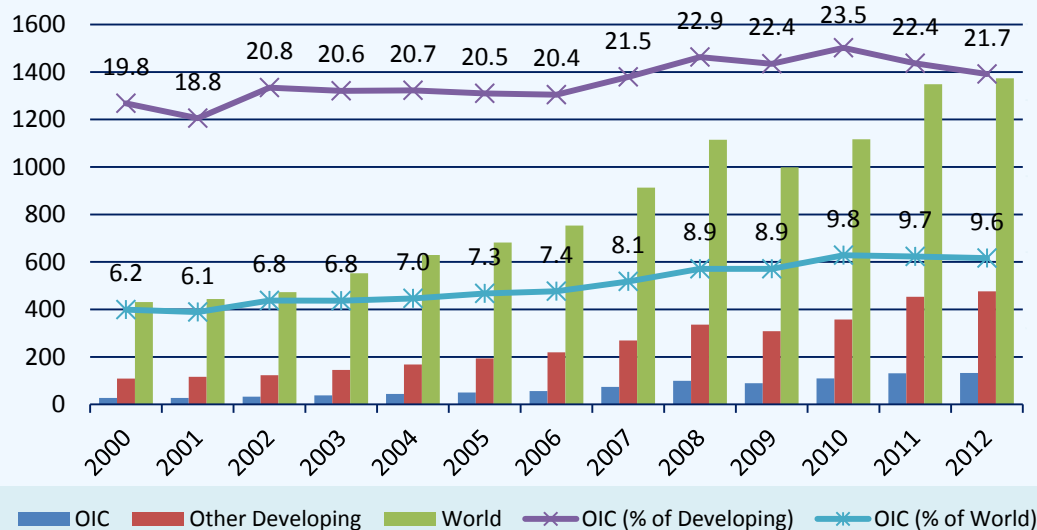
Yet, at the individual country level, food production per capita index was lower than the world average in 32 OIC countries at which 19 of them showed a significant decrease in their food production per capita indices (FAOSTAT).

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

During the period 2000-2012, food trade indicated an upward trend, where global food exports increased from US\$ 431 billion in 2000 to US\$ 1374 billion in 2012 (Figure 6.2). Similarly, total food exports of the developed countries exhibited an upward trend and reached to US\$ 765 billion in 2012 compared to US\$ 296 billion in 2000. OIC member

countries and non-OIC developing countries also witnessed an increasing 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\$ 132 billion in 2012 whereas the latter group increased their food exports to US\$ 476 billion in 2012 from US\$ 109 billion in 2000. On average, total food

FIGURE 6.2
Exports of Food (US\$ billion)

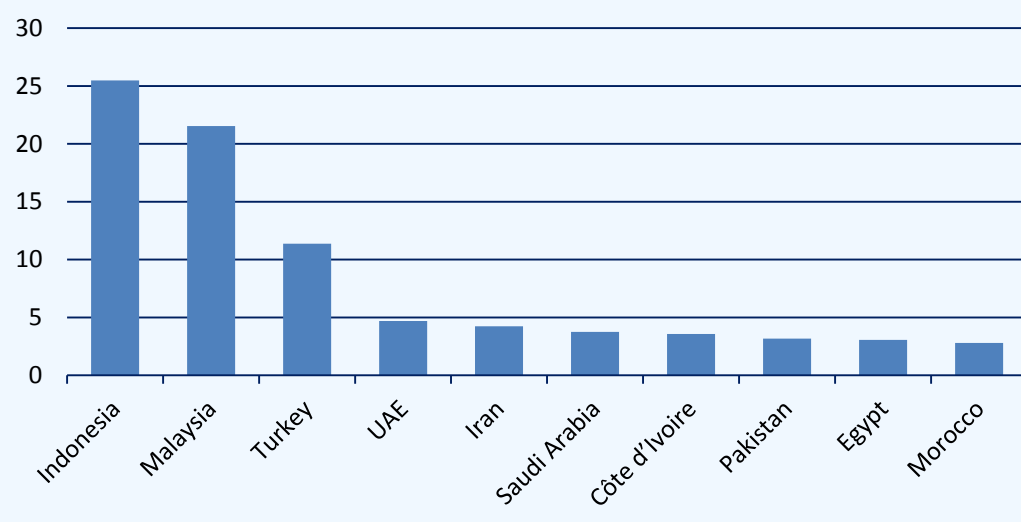


Source: World Trade Organization Online Database (Annex Table 14)

exports of the OIC countries accounted for 8% of world total food exports and 21% of total food exports of the developing countries during the period 2000-2012.

At the individual country level, food exports are concentrated in a few OIC member countries, where in 2012, only 10 countries, namely Indonesia, Malaysia, Turkey, United Arab Emirates, , Iran , Saudi Arabia, Cote d'Ivoire, Pakistan, Egypt and Morocco together accounted for 84% of the total food exports of the OIC countries. Moreover, only three of

FIGURE 6.3
OIC Top-10 Food Exporters, 2012



Source: World Trade Organization Online Database (Annex Table 14)

them, namely Indonesia, Malaysia and Turkey accounted for 58% of the total food exports of the OIC countries (Figure 6.3).

On the other hand, global food imports also showed an upward trend, where developed countries' food imports increased from US\$ 341 billion in 2000 to US\$ 834 billion in 2012 (Figure 6.4). Meanwhile, total food imports of the OIC countries increased from US\$ 43 billion in 2000 to US\$ 199 billion in 2012. During the same period, food imports of the non-OIC developing countries also increased to US\$ 341 billion in 2012 from US\$ 65 billion in 2000. On average, total OIC food import accounted for 11% of that of the world and 37% of the total food imports of the developing countries.

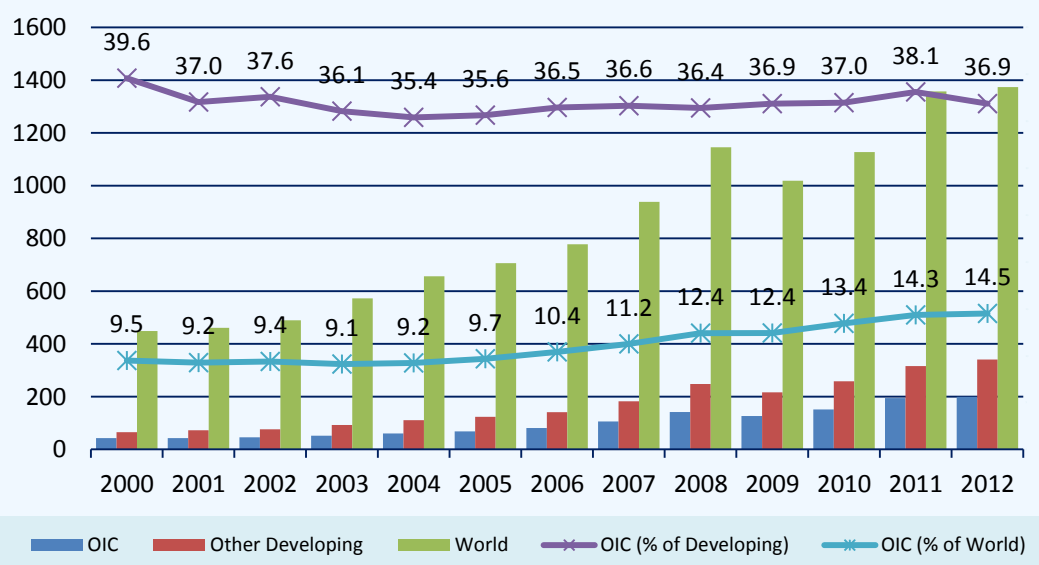
As was the case in food exports, OIC food imports are also concentrated in a few member countries, where in 2012, the top 10 OIC food importing countries, namely Saudi Arabia, Malaysia, Indonesia, Egypt, United Arab Emirates, Iraq, Iran, Turkey, Algeria, and Bangladesh accounted for 68% of the total food imports of the OIC countries (Figure 6.5).

During the period 2000-2012, the growth of food exports were outweighed by the growth of food imports in the OIC countries. Food trade deficit of the OIC countries has increased rapidly from US\$ 16 billion in 2000 to US\$ 67 billion in 2012 (Figure 6.6). This clearly indicates that the OIC countries, as a group, are on average net food importers, where the majority of them still heavily rely on imports of various food products to meet their increasing domestic food demand. This situation has been reflected in a steadily increasing food trade deficit trend in the OIC countries as a group, similar to that of the world average food trade deficit. Notably, during the same period, the developed countries were also net food importers. However, the non-OIC developing countries, in contrast, achieved a steadily increasing food trade surplus.

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 2012 (calculated based on WTO data).

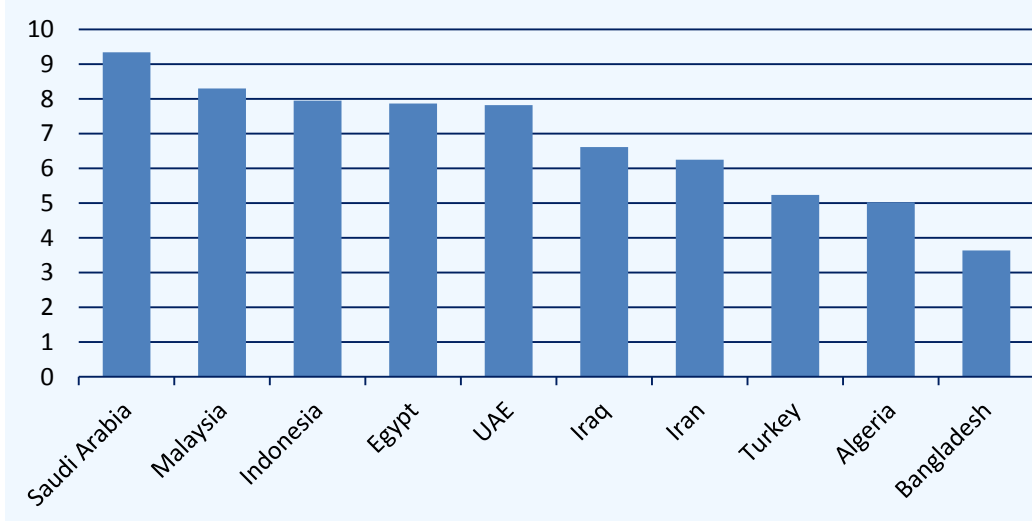
FIGURE 6.4
Food Imports (US\$ billion)

OIC countries are net importers of food



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

FIGURE 6.5
OIC Top-10 Food Importers, 2012

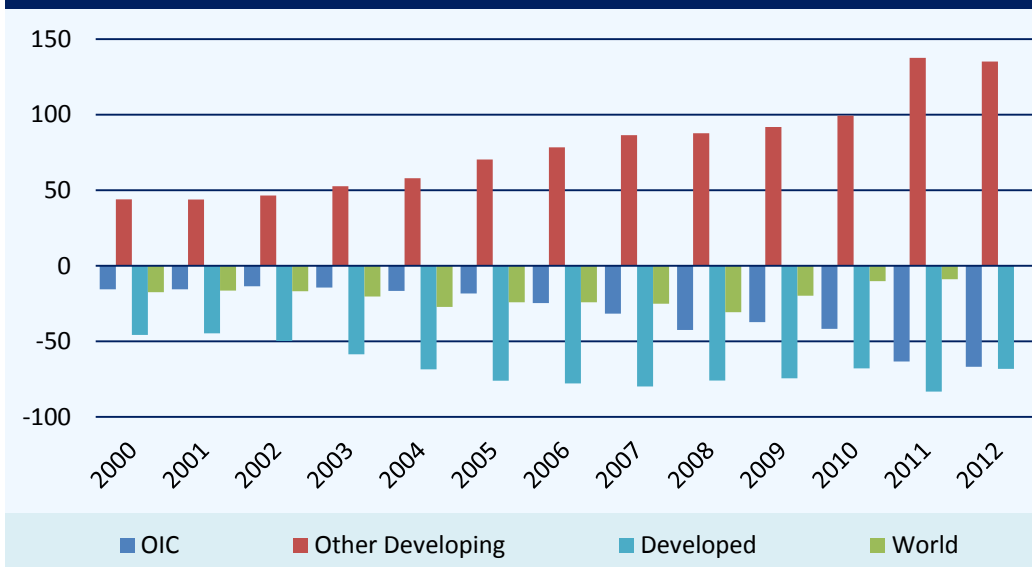


Source: World Trade Organization Online Database (Annex Table 15)

6.2. Low-Income Food Deficit Countries and Food Aid

According to recent FAO classifications, 27 OIC member countries are found to be among the world 55 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.

FIGURE 6.6
Food Trade Balance (US\$ billion)



Source: World Trade Organization Online Database

TABLE 6.1

Low-Income Food Deficit Countries (LIFDCs) in OIC Member Countries

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

TABLE 6.2

OIC Member Countries in Crisis and Requiring External Assistance*

1-Exceptional shortfall in aggregate food production/supplies	
Iraq	Conflict Escalation and Inetranal Displacement during Winter Harvesting
Syria	Civil Conflict
2-Widespread lack of access	
Burkina Faso	Influx of Refugees from Mali
Chad	Influx of Refugees from Darfur, CAR and northern Nigeria
Djibouti	Poor Rainy Season, Reduced humanitarian assistance
Guinea	High Food Prices
Mali	Civil Conflict and Insecurity in Northern Mali
Mauritania	Influx of Refugees from Mali , High Food Prices
Niger	Successive Food Security Crisis, Below-average Crop Harvest
Sierra Leone	Long-term High Inflation
Yemen	Prolonged Conflict, Poverty, High Food and Fuel Prices
3-Severe localized food insecurity	
Afghanistan	Conflict, Natural disasters
Cameroon	Weather related shocks, Influx of refugees from CAR
Côte d'Ivoire	Conflict, Internally displaced people
Kyrgyzstan	High Food Prices, Uncertain harvest
Mozambique	Natural calamities (heavy rains and floods)
Senegal	Production Shortfalls, High Food Prices
Somalia	Drought, Civil Conflict
Sudan	Conflict, Internally displaced people
Uganda	Production Shortfalls

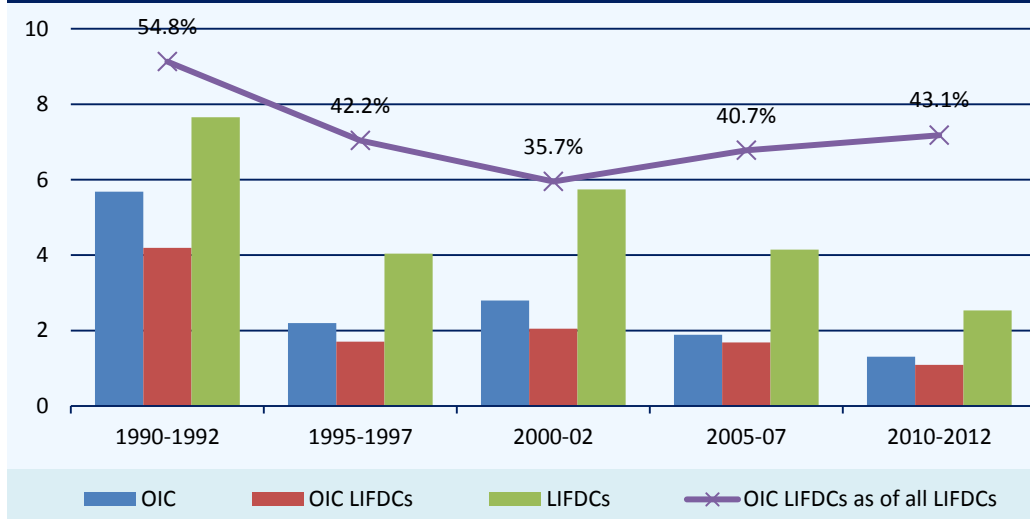
Notes: * Countries in crisis requiring external assistance are expected to lack the resources to deal with reported critical problems of food insecurity. Food crises are nearly always due to a combination of factors but for the purpose of response planning, it is important to establish whether the nature 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 (2012), "Crop Prospects and Food Situation, June 2012.

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 27 OIC-LIFDCs, where 18 of them have been classified by the FAO as “Countries in Crisis Requiring External Assistance” (Table 6.2).

FIGURE 6.7
Total Cereal Aid Shipments (Million Metric Tons)

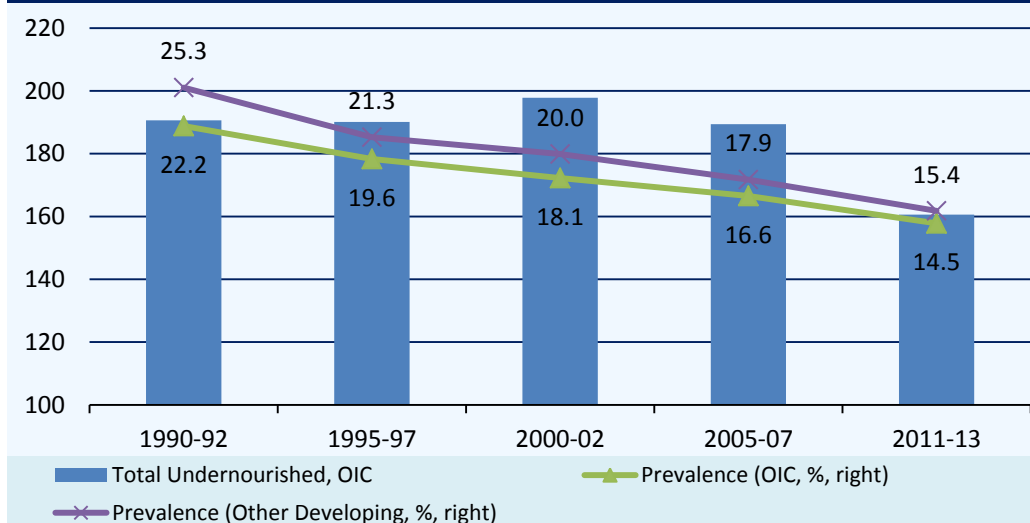


The volume of cereal aid shipments to OIC countries declined over time

Source: Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Table 16)

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,

FIGURE 6.8
Under-nourishment in OIC Member Countries



One in eight people across the globe are under-nourished

Source: Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Tables 17 and 18)

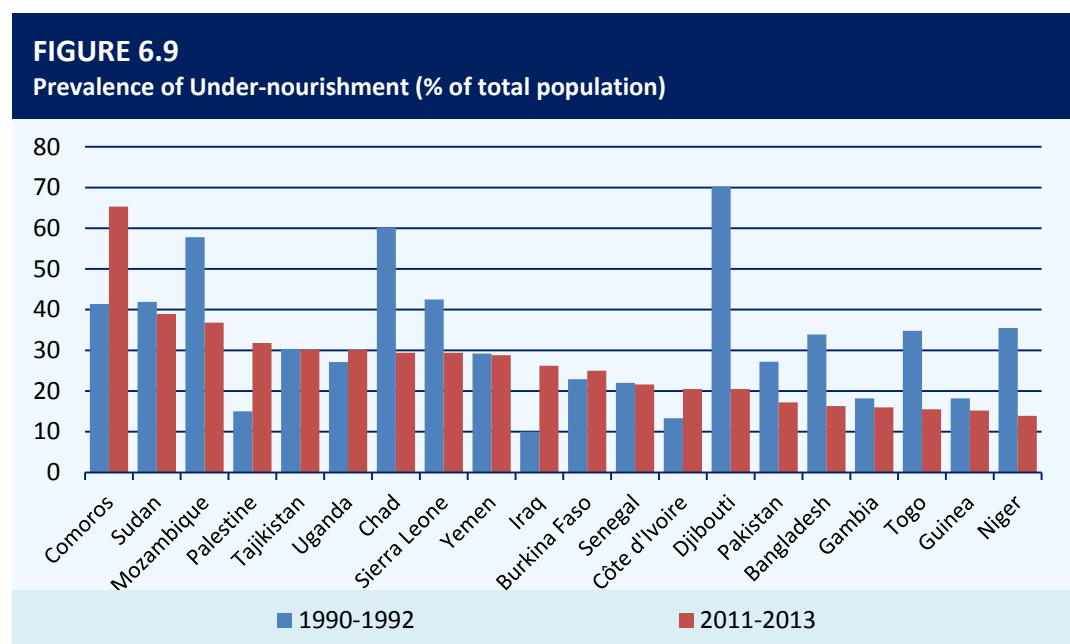
some LIFDCs with high prevalence of food insecurity are still permanent recipients of food aid.

According to 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 1.3 million metric tons in 2010-12, down from 5.6 million metric tons in 1990-92, corresponding to a decrease of 76%. Total cereal aid shipments to all LIFDCs also decreased from 7.6 million metric tons in 1990-92 to 2.5 million metric tons in 2010-12, corresponding to a decrease of 67%. Similarly, the total cereal aid shipments to the OIC-LIFDCs declined from 4.2 million metric tons in 1990-92 to 1.1 million metric tons in 2010-12, corresponding to a decrease of 74%. Accordingly, the share of OIC-LIFDCs in total cereal aid shipments to all LIFDCs has also declined from 55% to 43% during the period under consideration.

6.3. Food Deprivation (Undernourished People)

According to FAO's recent estimates (SOFI, 2013), some 842 million people across the globe are now undernourished which represents 12.0 % of the global population, or one in eight people. The majority of these undernourished people reside in developing regions of Asia & Pacific (552 million), Sub-Saharan Africa (223 million) and Latin America & Caribbean (47 million). Being a substantial part of the developing countries, the OIC member countries are no exception. In 2011-13, there were 161 million undernourished people in the OIC Countries (Figure 6.8), corresponding to 19% 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 the OIC Countries declined from 22.2% in 1990-92 to 14.5% in 2011-13 by remaining below the other developing countries average of 15.4% and above the world average of 12.0% during the same period.

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 2011-13. 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 like Comoros, Mozambique, Sudan, Chad, Sierra Leone, Togo and Yemen (Figure 6.9). It



Source: Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Table 18)

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.

BOX 5

Promoting Adoption of New Rice Varieties: Addressing the Costs of Early Adoption in Sierra Leone

Researchers: Jeannie Annan, Charles Dixon, Rachel Glennerster, Frances Kimmins, Tavneet Suri;
Location: Sierra Leone; **Timeline:** 2011-present

Many African countries do not produce enough rice to meet their growing consumption needs. Sierra Leone, a net exporter of rice before the civil war, must now import a third of its total consumption at a high cost. Low rice production is a threat to food security for vulnerable groups, particularly the rural poor who grow rice as their primary staple diet.

A promising solution is the dissemination of high-yielding rice varieties, such as the New Rice of Africa (NERICA) varieties, which have become known as the “miracle crop” for African rice farmers because they combine the genetic qualities of Asian rice (high yielding) and African rice (high resistance to drought and disease). NERICA also has shorter maturity and so can be harvested in the hungry season with potential food security benefits. However, there are also concerns that NERICA requires more labor and must be dried during the rainy season. Current estimates suggest only 2 percent of farmers in Sierra Leone use NERICAs. Improved varieties cost farmer 40 to 100 percent more than traditional varieties, representing a significant barrier to adoption amongst poor farmers.

Researchers sought to test whether improved seeds are beneficial for the poor in Sierra Leone and how best to promote uptake given the high costs of early adoption. Early adopters generate positive externalities to surrounding farmers and communities by delivering information on the effectiveness of new varieties and how to make the most of them in local conditions.

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

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.

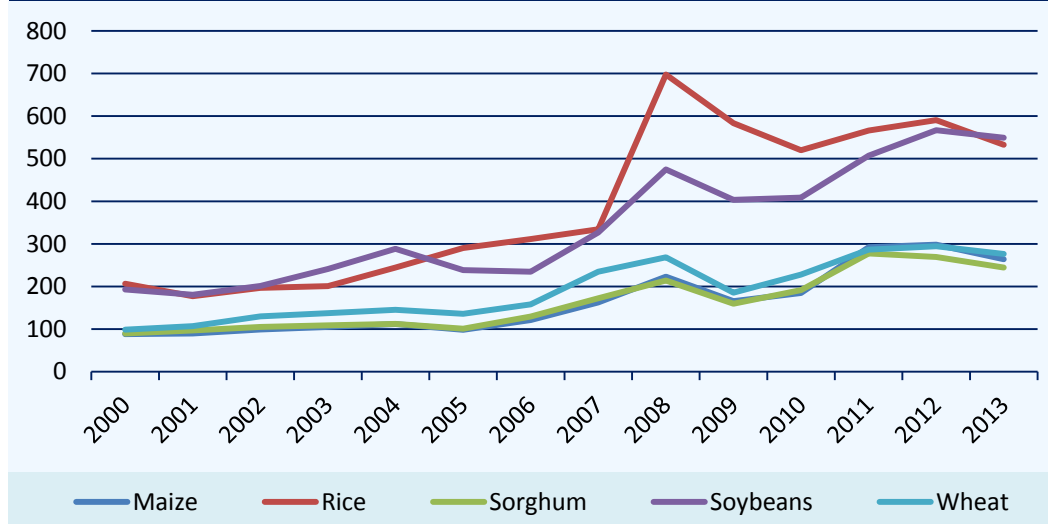
During the food crisis of 2006-08, prices of all major food commodities witnessed an exponential increase and reached to their historic peaks in 2008. After a slight decrease in 2009, prices of most of the major food commodities exhibited an upward trend again. As of 2013, prices of maize, sorghum, soybeans and wheat were above their 2008 levels. As shown in Figure 6.10, wheat prices reached to \$276/ton in 2013, registering nearly 3% increase over 2008 prices. Corresponding to a 18% increase over 2008 level, maize prices reached to \$264/ton in 2013. Meanwhile, prices of sorghum increased by 14% and soybeans by 16% over the prices of 2008.

At the individual OIC country level, prices of major food commodities have shown different trends. According to FAO's 2012 “Crop Prospects and Food Situation”, in February 2011 the prices of millet in Niger and Burkina Faso were 12% and 9%, respectively, lower than its February 2010 levels. However, during the same period, prices of wheat in Bangladesh increased by 40%. In Kyrgyzstan, prices of wheat flour in February 2011 were 70% higher than its level in February 2010.

Overall, despite a slight decrease in international food prices in some countries, food prices are still very high in many parts of the world, especially in developing countries. According to FAO statistics, high food prices still persist in many developing countries, including OIC members, where prices of some major food commodities like maize, sorghum, soybeans and wheat are significantly higher than their 2008 food crisis level.

FIGURE 6.10
Prices of Major Food Commodities (US\$/ton)

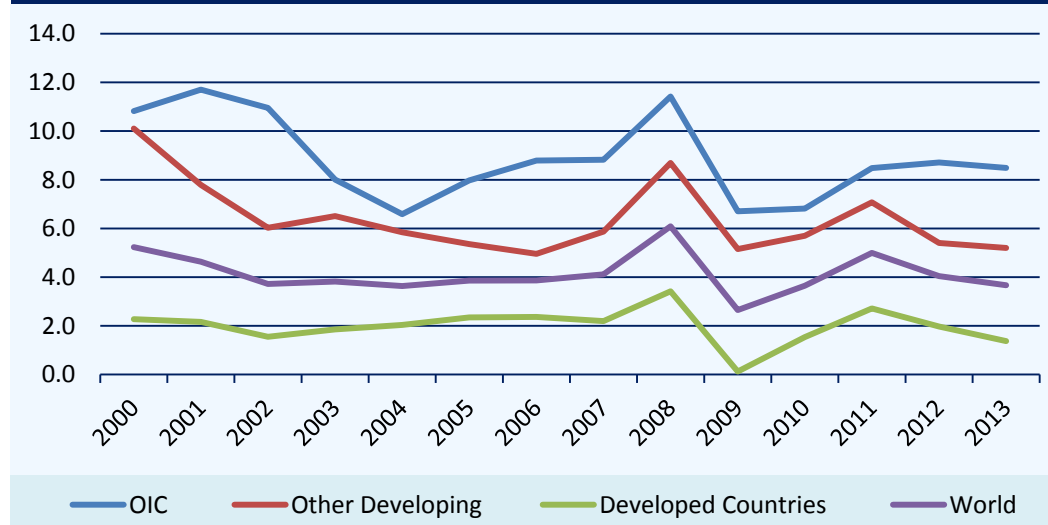
Prices of major food commodities are on the rise



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

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 the 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

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



Source: IMF, World Economic Outlook Database, 2014

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. As shown in Figure 6.11, world inflation rate has shown a volatile trend after 2004. As of 2013, it reached 3.7% which is significantly lower than its level in 2008.

In the OIC countries, average inflation rate has been significantly higher than the average of the developed and developing economies. During 2001-2004, the average OIC inflation rate exhibited a downward trend and declined from its peak level of 11.7% to approximately 6.6% but thereafter it started increasing moderately until 2007. However, triggered by food and fuel price hike, inflation rebounded to double-digit level of 11.4% at the end of 2008, nearly double the world average inflation rate. Despite a decrease thereafter, the average inflation accelerated to 8.5% in 2013.

TABLE 6.3**Food Price Contribution to Consumer Price Index (Feb 2011 to Feb 2012)**

	Total CPI % change	Food Price Inflation %	Expenditure share of food, %	Contribution of Food to total change in CPI, %
Developing Countries				
Ethiopia	32	41.4	57	7.3
Venezuela	26.3	30.1	29.5	8.9
Uganda	25.7	27.3	27.2	7.4
Tanzania	19.7	26.2	47.8	12.5
Kenya	18.3	24.6	36	8.9
Nigeria	10.9	13.1	51.8	6.8
Malawi	10.3	6.1	56.3	3.4
Pakistan	10.1	9.2	45.5	4.2
Argentina	9.7	8.1	20.3	1.6
Bangladesh	9.7	10.9	52	5.7
Algeria	9.4	12.3	43.8	5.4
Developed Countries				
USA	2.9	5.3	7.8	0.6
France	2.3	3.6	14.7	0.4
Germany	2.1	3	10.4	0.4
UK	3.6	3.5	11.8	0.4
Japan	0.1	1.4	19	0.2
Spain	2	2.3	18.2	0.3
Poland	4.6	4.7	24.1	0.6

Source: OECD-FAO, *Agricultural Outlook 2012-2021*

The share of food prices in global inflation is greater in the developing economies compared to developed countries due to the fact that food constitutes a larger share of the total consumption basket of these countries. From February 2011 to February 2012, food inflation contributed 6.8 percentage points of the total 10.9% consumer price index (CPI) in Nigeria, 4.2 percentage points of the CPI of 10.1% in Pakistan, 5.7 percentage points of the CPI of 9.7% in Bangladesh, and 5.4 percentage points of the CPI of 9.4% in Algeria (Table 6.3).

In addition to its direct effect on inflation, food price hike also increased the inflation rate through indirect channels such as posing upward pressure on salary growth and increasing the prices of non-food commodities. Most low income developing countries, where food represents major portion in consumer spending, witnessed these indirect effects more severely than the others. According to IMF estimates, inflation in low-income countries could double driven mainly by higher food prices (IMF, WEO 2012).

Due to higher share of food in household expenditures, people in developing countries are usually left with very low income for other basic social services such as education, health care, and housing. Food inflation further aggravates this situation by affecting the real

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 more 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)

income of poor households negatively. Evidence from previous real income shocks suggests that there is a significant risk to educational outcomes for the poor as they cannot afford sending their children to school, and instead they put them in productive activities to sustain the household expenditures. For example, in 1997/98, Burkina Faso faced an increase of more than 40% in prices of the three main food crops –sorghum, millet, and maize– mainly triggered by the substantial decline in agricultural output due to draught (Grimm, 2009). Consequently, both the producers as well as the consumers of food were negatively affected and their real income deteriorated which, in turn, led to a substantial cut in their spending

on education and a drop of more than 10% in enrolment rates. Another example is Bangladesh, where a World Bank survey (October 2008) indicated that about half of the households surveyed reduced their spending on education to cope with rising food prices.

Higher food prices also have adverse effects on health, particularly in the poor segments of the society, where due to low income and high share of food in their total expenditures, poor people left with no choice but to reduce the quantity and quality of food. Consequently, lack of appropriate nutrition in an already poor health conditions increases the exposure of poor people, particularly children, to diseases.



7.0 IC Cooperation in Agriculture and Food Security: Opportunities and Project Proposals

7.1. Background

The importance of agriculture sector in the economies of the OIC member 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 the OIC member 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 member 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 the OIC Member States 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 Member States 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 the 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 member 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 member 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.

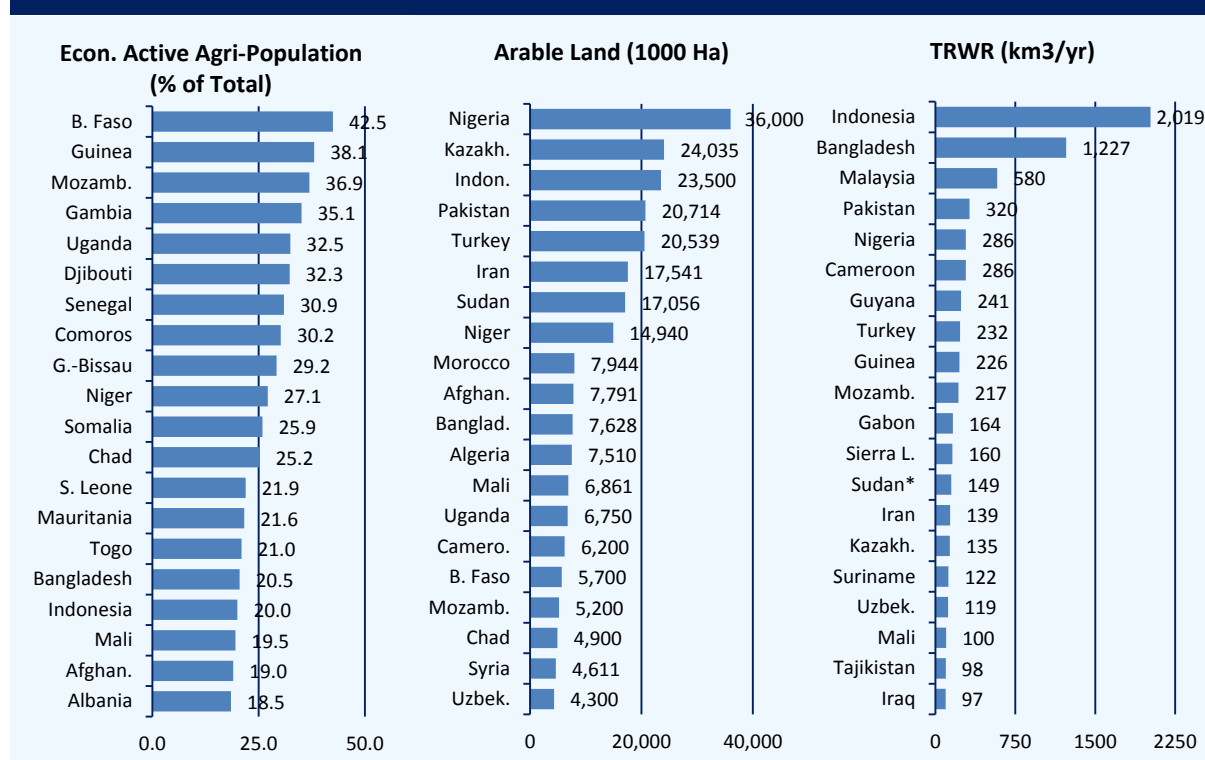
This is particularly true in the case of many OIC least-developed and low-income agricultural-based countries where, due to limited financial resources, both domestically and in terms of FDI, the inherent agricultural potential of these countries does not manifest itself in the form of reasonable levels 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 member 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 member 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 member 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 8.1. It is clear that 37 OIC countries (19 of them are least-developed countries) enjoy high potential at least in terms of one of the three-

FIGURE 7.1
Top Agricultural-Based OIC Countries



Notes: Sudan includes South Sudan

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

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

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 Bangladesh, Cameroon, Mali, Mozambique and Sudan 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 (Indonesia, Pakistan, Nigeria, Turkey, Iran, and Kazakhstan) 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 (Morocco, Algeria, Syria, and Uzbekistan) and those in the sixth group (Malaysia, Guyana, Gabon, Suriname, Uzbekistan, Tajikistan and Iraq) may also provide better prospects for investors.

The five countries in the third group, namely Afghanistan, Burkina Faso, Chad, Niger, Uganda, 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 37 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 37 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 Turkey, Malaysia, Indonesia, Kazakhstan and Nigeria, are already among the top 10 OIC countries in terms of attracting FDI (see SESRIC Annual Economic Report on the OIC Countries, 2012). In addition, as shown earlier in Table 2.2 in Section 2 of this report, many of these countries, from different climatic regions, figure 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 the OIC region 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 member 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 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 member states, 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 Member States 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 the 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 Member States 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, dairy, 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 member 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 the OIC member 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 member 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
Maputo/ Mozambique	17-18 January 2013	Agronomy: Crop Rotation
Kampala Uganda	15-17 January 2013	Agronomy: Soil Tillage
Atakpamé /Togo	20-22 December 2012	Fiber Technology: Contamination
Koutiala/ Mali	15-17 October 2012	Fiber Technology: Lint Quality

Source: SESRIC OIC-VET Programme website at: <http://www.oicvet.org>

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 the OIC member

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
Beirut/Lebanon	04-06 February 2013	Land Management: Soil Analysis and Mapping
Mogadishu/Somalia	02-04 February 2013	Livestock and Fisheries
Khartoum/ Sudan	29-31 January 2013	Crop Cultivation: Cultivation of Arable Crops
Maputo Mozambique	17-18 January 2013	Agronomy: Crop Rotation

Source: SESRIC OIC-VET Programme website at: <http://www.oicvet.org>

countries. The 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 the OIC member 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 the OIC member 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 member 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 member 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 member countries.
- Developing awareness programmes for farm households in OIC member 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 the OIC member 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 member 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 member 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 the 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 member countries.

Rationale and Expected Benefits

- To increase the volume of foreign and intra-OIC direct investments into the OIC region.
- To improve image of the OIC member 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 member 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 member 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 the OIC member countries on a voluntary basis. In the future, the Market may also be opened to non-OIC member 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 10.7% in 2011, gradually declining from around 18% in the beginning of 1990s. In fact, various policy, structural, climatic and geographical factors were behind this state of affairs. In the majority of the 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 35 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 the 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 34.7% of their total population in 2012, 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, 31 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 the 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 the 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 the OIC member 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 member 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 member 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 member 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 dams 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.

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DATA SOURCES

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STATISTICAL TABLES

Table A.1: Population (2013)

Countries	Total, million	Urban		Rural		Agricultural	
		million	% of total	(million)	% of total	(million)	% of total
Afghanistan	30552	7372	24.13	23179	75.87	5809	19.01
Albania	3173	1764	55.59	1409	44.41	587	18.50
Algeria	39208	29282	74.68	9926	25.32	3387	8.64
Azerbaijan	9413	5093	54.11	4321	45.90	1076	11.43
Bahrain	1332	1183	88.81	149	11.19	4	0.30
Bangladesh	156595	45969	29.36	110626	70.64	32154	20.53
Benin	10323	4772	46.23	5552	53.78	1769	17.14
Brunei	418	321	76.79	97	23.21	..	..
Burkina Faso	16935	4775	28.20	12160	71.80	7194	42.48
Cameroon	22254	11849	53.24	10405	46.76	3803	17.09
Chad	12825	2816	21.96	10009	78.04	3234	25.22
Comoros	735	207	28.16	528	71.84	222	30.20
Côte d'Ivoire	20316	10719	52.76	9597	47.24	2715	13.36
Djibouti	873	674	77.21	199	22.79	282	32.30
Egypt	82056	35946	43.81	46110	56.19	6277	7.65
Gabon	1672	1452	86.84	220	13.16	196	11.72
Gambia	1849	1080	58.41	769	41.59	649	35.10
Guinea	11745	4274	36.39	7471	63.61	4470	38.06
Guinea-Bissau	1704	772	45.31	932	54.69	498	29.23
Guyana	800	228	28.50	572	71.50	52	6.50
Indonesia	249866	130549	52.25	119316	47.75	50004	20.01
Iran	77447	53708	69.35	23739	30.65	6630	8.56
Iraq	33765	22415	66.39	11350	33.61	408	1.21
Jordan	7274	6052	83.20	1221	16.79	119	1.64
Kazakhstan	16441	8774	53.37	7667	46.63	1147	6.98
Kuwait	3369	3311	98.28	58	1.72	17	0.50
Kyrgyzstan	5548	1969	35.49	3578	64.49	504	9.08
Lebanon	4822	4218	87.47	604	12.53	27	0.56
Libya	6202	4841	78.06	1361	21.94	57	0.92
Malaysia	29717	22037	74.16	7680	25.84	1486	5.00
Maldives	345	150	43.48	195	56.52	23	6.67
Mali	15302	5542	36.22	9759	63.78	2989	19.53
Mauritania	3890	1634	42.01	2256	57.99	841	21.62
Morocco	33008	19065	57.76	13944	42.24	2905	8.80
Mozambique	25834	8185	31.68	17648	68.31	9544	36.94
Niger	17831	3268	18.33	14564	81.68	4839	27.14
Nigeria	173615	88312	50.87	85303	49.13	12520	7.21
Oman	3632	2686	73.95	946	26.05	420	11.56
Pakistan	182143	67113	36.85	115030	63.15	25895	14.22
Palestine	4326	3235	74.78	1091	25.22	105	2.43
Qatar	2169	2148	99.03	20	0.92	9	0.41
Saudi Arabia	28829	23845	82.71	4984	17.29	459	1.59
Senegal	14133	6095	43.13	8038	56.87	4373	30.94
Sierra Leone	6092	2436	39.99	3656	60.01	1337	21.95
Somalia	10496	4059	38.67	6436	61.32	2720	25.91
Sudan	37964	11363	29.93	26601	70.07	6025	15.87
Suriname	539	380	70.50	159	29.50	33	6.12
Syria	21898	12449	56.85	9449	43.15	1369	6.25
Tajikistan	8208	2183	26.60	6024	73.39	897	10.93
Togo	6817	2657	38.98	4160	61.02	1430	20.98
Tunisia	10997	7338	66.73	3659	33.27	821	7.47
Turkey	74933	54997	73.39	19935	26.60	7710	10.29
Turkmenistan	5240	2587	49.37	2653	50.63	728	13.89
Uganda	37579	6162	16.40	31416	83.60	12197	32.46
UAE	9346	7939	84.95	1407	15.05	161	1.72
Uzbekistan	28934	10490	36.25	18445	63.75	2708	9.36
Yemen	24407	8171	33.48	16236	66.52	2214	9.07
OIC Total/Average	1647736	792911	48.12	854819	51.88	240049	14.57
Other Dev'ing Total/Avg.	5832447	2890344	49.56	2942097	50.44	1576504	27.03
World Total/Average	8578785	4566255	53.23	4012514	46.77	1832062	21.36
OIC (% of Dev'ing)	28.25	27.43		29.05		15.23	
OIC (% of World)	19.21	17.36		21.30		13.10	

Source: FAOSTAT Online Database

Table A.2: Agricultural Land (2011)

	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	1,000 Ha	% of Agri. Area
Afghanistan	65223	37910	58.12	7791	20.55	119	0.31	30000	79.13		
Albania	2740	1201	43.83	622	51.79	74	6.16	505	42.05		
Algeria	238174	41383	17.38	7510	18.15	910	2.20	32963	79.65		
Azerbaijan	8265.8	4768.7	57.69	1885.7	39.54	227.2	4.76	2655.8	55.69		
Bahrain	76	8.36	11.00	1.36	16.27	3	35.89	4	47.85		
Bangladesh	13017	9128	70.12	7628	83.57	900	9.86	600	6.57		
Benin	11276	3430	30.42	2580	75.22	300	8.75	550	16.03		
Brunei	527	11.4	2.16	3	26.32	5	43.86	3.4	29.82		
Burkina Faso	27360	11765	43.00	5700	48.45	65	0.55	6000	51.00		
Cameroon	47271	9600	20.31	6200	64.58	1400	14.58	2000	20.83		
Chad	125920	49932	39.65	4900	9.81	32	0.06	45000	90.12		
Comoros	186.1	155	83.29	82	52.90	58	37.42	15	9.68		
Côte d'Ivoire	31800	20500	64.47	2900	14.15	4400	21.46	13200	64.39		
Djibouti	2318	1702	73.43	2	0.12	..	..	1700	99.88
Egypt	99545	3665	3.68	2870	78.31	795	21.69	..	..
Gabon	25767	5160	20.03	325	6.30	170	3.29	4665	90.41		
Gambia	1012	615	60.77	450	73.17	5	0.81	160	26.02		
Guinea	24572	14240	57.95	2850	20.01	690	4.85	10700	75.14		
Guinea-Bissau	2812	1630	57.97	300	18.40	250	15.34	1080	66.26		
Guyana	19685	1677	8.52	420	25.04	27	1.61	1230	73.35		
Indonesia	181157	54500	30.08	23500	43.12	20000	36.70	11000	20.18		
Iran	162855	48957	30.06	17541	35.83	1892	3.86	29524	60.31		
Iraq	43432	8210	18.90	4000	48.72	210	2.56	4000	48.72		
Jordan	8878	1002.6	11.29	175.6	17.51	85	8.48	742	74.01		
Kazakhstan	269970	209115	77.46	24035	11.49	80	0.04	185000	88.47		
Kuwait	1782	152	8.53	11	7.24	5	3.29	136	89.47		
Kyrgyzstan	19180	10608.5	55.31	1275.9	12.03	74.7	0.70	9257.9	87.27		
Lebanon	1023	638	62.37	112	17.55	126	19.75	400	62.70		
Libya	175954	15585	8.86	1750	11.23	335	2.15	13500	86.62		
Malaysia	32855	7870	23.95	1800	22.87	5785	73.51	285	3.62		
Maldives	30	7	23.33	3	42.86	3	42.86	1	14.29		
Mali	122019	41621	34.11	6861	16.48	120	0.29	34640	83.23		
Mauritania	103070	39711	38.53	450	1.13	11	0.03	39250	98.84		
Morocco	44630	30103.8	67.45	7943.8	26.39	1160	3.85	21000	69.76		
Mozambique	78638	49400	62.82	5200	10.53	200	0.40	44000	89.07		
Niger	91077	76200	83.67	36000	47.24	3200	4.20	37000	48.56		
Nigeria	30950	1770.5	5.72	32	1.81	38.5	2.17	1700	96.02		
Oman	602	260.5	43.27	44.5	17.08	66	25.34	150	57.58		
Pakistan	1161	66	5.68	14	21.21	2	3.03	50	75.76		
Palestine	77088	26550	34.44	20714	78.02	836	3.15	5000	18.83		
Qatar	214969	173355	80.64	3110	1.79	245	0.14	170000	98.06		
Saudi Arabia	19253	9505	49.37	3850	40.50	55	0.58	5600	58.92		
Senegal	7162	3435	47.96	1100	32.02	135	3.93	2200	64.05		
Sierra Leone	62734	44129	70.34	1100	2.49	29	0.07	43000	97.44		
Somalia	..	108678.8	..	17056	15.69	169	0.16	91453.8	84.15		
Suriname	15600	82	0.53	59	71.95	6	7.32	17	20.73		
Syria	18363	13864	75.50	4611	33.26	1054	7.60	8199	59.14		
Tajikistan	13996	4855	34.69	850	17.51	130	2.68	3875	79.81		
Togo	5439	3720	68.39	2510	67.47	210	5.65	1000	26.88		
Tunisia	15536	10072	64.83	2839	28.19	2394	23.77	4839	48.04		
Turkey	76963	38247	49.70	20539	53.70	3091	8.08	14617	38.22		
Turkmenistan	46993	32660	69.50	1900	5.82	60	0.18	30700	94.00		
Uganda	19981	14062	70.38	6750	48.00	2200	15.65	5112	36.35		
UAE	8360	397.3	4.75	50.6	12.74	41.7	10.50	305	76.77		
Uzbekistan	42540	26660	62.67	4300	16.13	360	1.35	22000	82.52		
Yemen	52797	23452	44.42	1161	4.95	291	1.24	22000	93.81		
OIC Total/Average	2941253	1404257	47.74	293208	20.88	56652	4.03	1043367	74.30		
Other Dev'ing Total/Avg.	6738343	3787960	56.22	770947	20.35	82802	2.19	1539994	40.65		
World Total/Average	12765739	4883081	38.25	1396271	28.59	153937	3.15	3332873	68.25		
OIC (% of Dev'ing)	43.65	37.07		38.03		68.42		67.75			
OIC (% of World)	23.04	28.76		21.00		36.80		31.31			

Source: FAOSTAT Online Database

Table A.3: Water Use (2012)

	Average Precipitation in Depth (mm/yr)	IRWR (km3/yr)	ERWR (km3/yr)	TRWR (km3/yr)	TRWR per Capita (m3/yr)	Dependency Ratio %
Afghanistan	327	47.2	18.2	65.3	2069	27.8
Albania	1485	26.9	14.8	41.7	13015	35.5
Algeria	89	11.3	0.4	11.7	329	3.6
Azerbaijan	447	8.1	26.6	34.7	3774	76.6
Bahrain	83	0.0	0.1	0.1	91.92	96.6
Bangladesh	2666	105.0	1122.0	1227.0	8252	91.4
Benin	1039	10.3	16.1	26.4	2982	61.0
Brunei	2722	8.5	0.0	8.5	21303	0.0
Burkina Faso	748	12.5	0.0	12.5	759	0.0
Cameroon	1604	273.0	12.5	285.5	14567	4.4
Chad	322	15.0	28.0	43.0	3830	65.1
Comoros	900	1.2	0.0	1.2	1633	0.0
Cote d'Ivoire	1348	76.8	4.3	81.1	4111	5.3
Djibouti	220	0.3	0.0	0.3	337.5	0.0
Egypt	51	1.8	55.5	57.3	706.4	96.9
Gabon	1831	164.0	0.0	164.0	108970	0.0
Gambia	836	3.0	5.0	8.0	4630	62.5
Guinea	1651	226.0	0.0	226.0	22641	0.0
Guinea-Bissau	1577	16.0	15.0	31.0	20462	48.4
Guyana	2387	241.0	0.0	241.0	319629	0.0
Indonesia	2702	2019.0	0.0	2019.0	8417	0.0
Iran	228	128.5	2.7	131.2	1859	2.0
Iraq	216	35.2	40.4	75.6	2387	53.4
Jordan	111	0.7	0.3	0.9	151.4	27.2
Kazakhstan	250	64.4	44.1	108.4	6839	40.6
Kuwait	121	0.0	0.0	0.0	7.307	100.0
Kyrgyzstan	533	48.9	-25.3	23.6	9177	-107.2
Lebanon	661	4.8	-0.3	4.5	1065	-6.6
Libya	56	0.7	0.0	0.7	110.1	0.0
Malaysia	2875	580.0	0.0	580.0	20422	0.0
Maldives	1972	0.0	0.0	0.0	94.94	0.0
Mali	282	60.0	40.0	100.0	6506	40.0
Mauritania	92	0.4	11.0	11.4	3295	96.5
Morocco	346	29.0	0.0	29.0	907.6	0.0
Mozambique	1032	100.3	116.8	217.1	9281	53.8
Niger	151	3.5	30.2	33.7	2169	89.6
Nigeria	1150	221.0	65.2	286.2	1807	22.8
Oman	125	1.4	0.0	1.4	503.2	0.0
Pakistan	494	55.0	191.8	246.8	1422	77.7
Palestine	402	0.8	0.0	0.8	207.2	3.0
Qatar	74	0.1	0.0	0.1	32.97	3.4
Saudi Arabia	59	2.4	0.0	2.4	87.44	0.0
Senegal	686	25.8	13.0	38.8	3120	33.5
Sierra Leone	2526	160.0	0.0	160.0	27267	0.0
Somalia	282	6.0	8.7	14.7	1575	59.2
Sudan	416	30.0	34.5	64.5	1481	53.5
Suriname	2331	88.0	34.0	122.0	232381	27.9
Syria	252	7.1	9.7	16.8	823.1	57.5
Tajikistan	691	63.5	-42.2	21.2	2323	-198.9
Togo	1168	11.5	3.2	14.7	2439	21.8
Tunisia	207	4.2	0.4	4.6	438.4	8.7
Turkey	593	227.0	-16.6	210.4	2936	-7.9
Turkmenistan	161	1.4	23.4	24.8	4903	94.3
Uganda	1180	39.0	27.0	66.0	1975	40.9
UAE	78	0.2	0.0	0.2	19.97	0.0
Uzbekistan	206	16.3	34.1	50.4	1837	67.6
Yemen	167	2.1	0.0	2.1	87.31	0.0
OIC Total/Average	47209	5286.0	1964.3	7250.3	4557.69	27.1
Other Dev'ing Total/Avg.	131562	28330.3	8826.8	37157.2	8466.48	23.8
World Total/Average	209812	42503.6	11400.0	53903.8	7729.2	21.1
OIC (% of Dev'ing)	26.40753	15.7	18.2	16.3	...	...
OIC (% of World)	22.50062	12.4	17.2	13.5	...	...

Source: AQUASTAT Online Database

Table A.4: Water Withdrawals (2008-2012)

	Total Water Withdrawal			Agricultural Water Withdrawal		
	km3/yr	% of IRWR	% of TRWR	km3/yr	% of Total Withd.	% of TRWR
Afghanistan	20.3	43.0	31.0	20.0	98.6	30.6
Albania	1.8	6.8	4.4	1.1	57.7	2.5
Algeria	6.2	54.8	52.8	3.9	64.0	33.8
Azerbaijan	12.2	150.5	35.2	9.3	76.4	26.9
Bahrain	0.4	8935.0	308.1	0.2	44.5	137.2
Bangladesh	35.9	34.2	2.9	31.5	87.8	2.6
Benin	0.1	1.3	0.5	0.1	45.4	0.2
Brunei	0.1	1.1	1.1			
Burkina Faso	1.0	7.9	7.9	0.7	70.1	5.5
Cameroon	1.0	0.4	0.3	0.7	76.1	0.3
Chad	0.4	2.4	0.9	0.2	51.8	0.4
Comoros	0.0	0.8	0.8	0.0	47.0	0.4
Cote d'Ivoire	1.4	1.8	1.7	0.6	42.6	0.7
Djibouti	0.0	6.3	6.3	0.0	15.8	1.0
Egypt	68.3	3794.4	119.2	59.0	86.4	103.0
Gabon	0.1	0.1	0.1	0.1	38.5	0.0
Gambia	0.1	2.4	0.9	0.0	28.1	0.3
Guinea	1.6	0.7	0.7	1.4	84.0	0.6
Guinea-Bissau	0.2	1.1	0.6	0.1	82.3	0.5
Guyana	1.6	0.7	0.7	1.6	97.6	0.7
Indonesia	113.3	5.6	5.6	92.8	81.9	4.6
Iran	93.3	72.6	71.1	86.0	92.2	65.5
Iraq	66.0	187.5	87.3	52.0	78.8	68.8
Jordan	0.9	138.0	100.4	0.6	65.0	65.2
Kazakhstan	21.1	32.9	19.5	14.0	66.2	12.9
Kuwait	0.9		4566.0	0.5	53.9	2459.5
Kyrgyzstan	10.1	20.6	42.7	9.5	93.8	40.0
Lebanon	1.3	27.3	29.1	0.8	59.5	17.3
Libya	4.3	618.0	618.0	3.6	82.8	512.0
Malaysia	13.2	2.3	2.3	4.5	34.2	0.8
Maldives	0.0	19.7	19.7	0.0	0.0	0.0
Mali	6.5	10.9	6.5	5.9	90.1	5.9
Mauritania	1.6	400.3	14.0	1.5	93.7	13.2
Morocco	12.6	43.5	43.5	11.0	87.3	38.0
Mozambique	0.7	0.7	0.3	0.6	73.9	0.3
Niger	2.4	67.5	7.0	2.1	88.0	6.2
Nigeria	10.3	4.7	3.6	5.5	53.4	1.9
Oman	1.3	94.4	94.4	1.2	88.4	83.4
Pakistan	183.5	333.6	74.4	172.4	94.0	69.9
Palestine	0.4	51.5	49.9	0.2	45.2	22.6
Qatar	0.4	792.9	765.5	0.3	59.0	451.7
Saudi Arabia	23.7	986.3	986.3	20.8	88.0	867.9
Senegal	2.2	8.6	5.7	2.1	93.0	5.3
Sierra Leone	0.5	0.3	0.3	0.4	71.0	0.2
Somalia	3.3	55.0	22.4	3.3	99.5	22.3
Sudan	37.1	123.8	57.6	36.1	97.1	55.9
Suriname	0.7	0.8	0.5	0.6	92.5	0.5
Syria	16.8	235.0	99.8	14.7	87.5	87.4
Tajikistan	11.5	18.1	54.1	10.4	90.9	49.2
Togo	0.2	1.5	1.1	0.1	45.0	0.5
Tunisia	2.9	67.9	62.0	2.2	76.0	47.1
Turkey	40.1	17.7	19.1	29.6	73.8	14.1
Turkmenistan	24.9	1773.0	100.6	24.0	96.5	97.1
Uganda	0.3	0.8	0.5	0.1	37.8	0.2
UAE	4.0	2665.3	2665.3	3.3	82.8	2208.0
Uzbekistan	59.6	364.8	118.3	54.4	91.2	107.9
Yemen	3.6	169.8	169.8	3.2	90.7	154.0
OIC Total/Average	928.3	17.6	12.8	800.5	86.2	11.0
Other Dev'ing Total/Avg.	2086.8	7.4	5.6	1573.4	75.4	4.2
World Total/Average	3894.4	9.2	7.2	2727.0	70.0	5.1
OIC (% of Dev'ing)	30.8	...	...	33.7	...	...
OIC (% of World)	23.8	...	...	29.4	...	...

Source: AQUASTAT Online Database

Table A.5: Irrigation (2008-2012)

	Total Area Equipped for Irrigation			Irrigation Techniques (% of Total Irrigated Area)		
	1,000 Ha	% of Agri. Area	% of Arable Area	Surface	Sprinkler	Localized
Afghanistan	3208.0	8.5	41.2		3.6	
Albania	397.0	33.0	64.9	100.0	0.0	
Algeria	513.4	1.2	6.8		7.8	
Azerbaijan	1426.0	30.0	76.1	91.3	10.4	0.2
Bahrain	4.0	51.5	308.8	84.4	4.0	11.6
Bangladesh	5050.0	55.2	66.7	100.0	0.0	0.0
Benin	11.0	0.3	0.4	46.0	41.7	12.4
Brunei	1.0	8.8	33.3	100.0	0.0	0.0
Burkina Faso	18.6	0.2	0.3	79.0	21.0	0.0
Cameroon	22.5	0.2	0.4	75.8	24.2	
Chad	30.3	0.1	0.7	87.6	12.4	0.0
Comoros	0.1	0.1	0.2			
Cote d'Ivoire	47.8	0.2	1.7	24.6	75.4	
Djibouti	1.0	0.1	50.6			
Egypt	3422.0	92.8	118.7	88.5	5.0	6.5
Gabon	3.2	0.1	1.0			
Gambia	2.1	0.3	0.5	100.0	0.0	0.0
Guinea	20.4	0.1	0.7	97.7	1.5	0.8
Guinea-Bissau	8.6	0.5	2.9	100.0		
Guyana	150.1	9.0	35.7	100.0	0.0	0.0
Indonesia	6722.0	12.5	28.5	100.0	0.0	0.0
Iran	8132.0	16.8	47.3	91.4	3.4	5.2
Iraq	3525.0	40.3	78.3			0.2
Jordan	78.9	7.7	39.3	17.6	1.3	81.2
Kazakhstan	1200.0	0.6	5.1	96.6	2.5	0.9
Kuwait	8.6	5.7	76.1	35.1	7.0	13.4
Kyrgyzstan	1077.0	10.1	84.4	96.6	3.4	0.0
Lebanon	90.0	13.1	62.1	63.6	27.9	8.6
Libya	470.0	3.0	26.9			
Malaysia	340.7	4.3	18.9	100.0	0.0	0.0
Maldives	0.0	0.0	0.0			
Mali	97.5	0.2	1.5	100.0	0.1	0.0
Mauritania	45.0	0.1	11.5			
Morocco	1459.0	4.9	18.1	82.9	10.4	6.7
Mozambique	118.1	0.2	2.3			
Niger	13.7	0.0	0.1			
Nigeria	238.2	0.3	0.7	100.0	0.0	
Oman	58.9	3.2	59.4	79.3	11.3	9.4
Pakistan	19270.0	73.3	94.3	100.0		
Palestine	20.1	5.5	20.1			
Qatar	12.9	19.9	107.8	75.0	14.0	10.9
Saudi Arabia	1731.0	1.0	54.1	31.6	59.4	1.8
Senegal	102.2	1.1	2.7	100.0	0.0	0.4
Sierra Leone	1.0	0.0	0.1	100.0	0.0	0.0
Somalia	50.0	0.1	5.0	100.0		
Sudan	1731.0	1.3	8.6			
Suriname	51.2	62.9	88.2	98.3	1.7	0.0
Syria	1439.0	10.3	30.8	86.9	9.0	4.0
Tajikistan	742.1	15.6	100.0	100.0	0.0	0.0
Togo	2.3	0.1	0.1	100.0		
Tunisia	367.0	3.7	13.6	58.6	24.5	16.9
Turkey	4970.0	12.8	23.3	92.0	6.0	2.0
Turkmenistan	1744.0	5.3	94.3	100.0	0.0	0.0
Uganda	5.6	0.0	0.1	95.9	4.1	
UAE	226.6	39.8	354.1	12.0	1.8	86.3
Uzbekistan	4281.0	16.1	99.5	99.9	0.0	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	2012	2000	2005	2012	2000	2005	2012	2000	2005	2012
Afghanistan	57.0	36.6	30.3	6.4	10.3	9.0	16.8	16.7	13.4	19.8	36.5	47.3
Albania	25.5	20.6	20.4	11.3	17.8	12.7	4.8	6.6	7.0	58.5	55.0	59.9
Algeria	8.8	8.0	8.8	50.7	55.1	46.0	6.0	4.6	4.2	34.5	32.3	40.9
Azerbaijan	17.0	9.8	5.5	39.5	56.2	58.4	5.6	7.0	4.4	37.9	27.0	31.7
Bahrain	0.6	0.3	0.3	30.3	29.9	32.9	10.9	12.9	15.2	58.2	56.9	51.6
Bangladesh	24.7	19.5	17.3	8.7	9.3	9.9	14.8	16.1	17.1	51.8	55.1	55.8
Benin	37.8	35.2	35.3	5.1	6.0	5.8	8.9	8.6	8.2	48.2	50.2	50.7
Brunei Darussalam	1.0	0.9	0.7	48.3	59.3	59.3	15.4	12.3	11.8	35.3	27.5	28.2
Burkina Faso	32.8	38.5	35.0	8.4	6.2	13.4	13.2	11.5	8.0	45.6	43.8	43.6
Cameroon	22.0	20.4	23.3	15.1	13.2	14.0	20.7	18.5	15.6	42.3	47.8	47.0
Chad	42.3	21.3	18.7	2.2	48.1	45.8	9.1	5.8	6.5	46.4	24.9	29.0
Comoros	47.7	48.5	50.9	6.9	6.3	6.5	4.5	4.1	3.7	41.0	41.0	38.9
Côte d'Ivoire	24.8	25.2	30.0	4.9	7.8	11.2	22.5	17.7	15.2	47.8	49.3	43.6
Djibouti	3.5	3.6	3.7	12.6	13.6	17.9	2.6	2.6	2.4	81.3	80.2	75.9
Egypt	13.8	14.4	14.8	15.3	19.6	21.7	18.0	17.3	16.2	52.9	48.8	47.4
Gabon	4.3	3.8	2.7	56.0	58.2	66.4	3.7	4.9	4.0	36.0	33.2	26.9
Gambia	23.8	28.6	23.0	7.8	7.9	9.2	6.6	7.0	6.0	61.7	56.5	61.8
Guinea	22.7	24.3	25.9	29.7	28.4	26.7	3.0	6.4	6.4	44.6	40.9	41.0
Guinea-Bissau	58.1	45.6	46.4	2.7	1.5	1.5	9.7	13.0	11.7	29.4	39.9	40.4
Guyana	27.7	25.7	18.0	26.0	21.3	29.2	6.6	7.4	6.1	39.7	45.6	46.7
Indonesia	15.6	13.1	14.4	18.2	19.1	23.0	27.7	27.4	23.9	38.5	40.3	38.6
Iran	13.4	9.0	9.3	22.9	33.3	28.4	13.2	11.3	10.4	50.5	46.5	51.9
Iraq	4.6	6.9	4.1	83.6	62.0	59.5	0.9	1.3	1.7	10.8	29.9	34.7
Jordan	2.3	3.0	3.0	9.7	10.3	10.6	14.8	16.6	17.8	73.3	70.1	68.6
Kazakhstan	8.6	6.6	4.5	22.6	26.6	27.3	17.5	12.5	11.9	51.3	54.2	56.3
Kuwait	0.3	0.3	0.3	50.5	53.2	63.4	6.7	7.0	5.2	42.5	39.5	31.1
Kyrgyzstan	36.6	31.3	19.5	11.9	7.8	11.2	19.4	14.1	13.9	32.1	46.7	55.5
Lebanon	6.4	5.3	5.0	8.8	7.3	12.0	12.0	10.7	7.4	72.7	76.8	75.6
Libya	6.5	2.2	2.3	42.2	71.0	60.5	5.4	4.7	4.6	45.9	22.2	32.6
Malaysia	8.5	8.4	10.2	16.4	19.0	16.8	28.7	27.9	24.5	46.4	44.7	48.5
Maldives	5.2	7.5	4.1	7.1	8.5	10.9	4.8	6.3	6.0	82.9	77.7	79.0
Mali	36.3	37.5	42.3	13.7	14.2	14.9	7.2	9.8	7.0	42.9	38.5	35.8
Mauritania	35.9	29.8	23.6	16.3	23.5	30.9	11.1	9.0	6.6	36.7	37.8	38.9
Morocco	14.2	14.0	13.7	10.3	11.1	13.7	17.5	15.8	15.2	58.1	59.1	57.4
Mozambique	23.6	26.4	30.0	12.1	9.6	9.0	12.0	15.1	13.4	52.3	48.9	47.6
Niger	41.2	45.5	40.4	6.3	5.8	15.2	6.4	5.9	6.4	46.1	42.7	38.0
Nigeria	26.0	32.8	33.1	48.5	40.7	38.7	3.7	2.8	1.9	21.8	23.7	26.3
Oman	2.0	1.5	1.1	52.9	54.0	55.7	5.7	8.3	9.6	39.4	36.2	33.6
Pakistan	29.0	24.3	24.4	7.3	7.7	7.6	10.5	13.4	14.4	53.2	54.6	53.6
Palestine	11.3	6.5	5.6	12.7	12.1	10.9	13.1	15.3	12.3	63.0	66.1	71.2
Qatar	0.4	0.1	0.1	64.2	64.1	61.7	5.3	9.8	9.7	30.1	26.0	28.5
Saudi Arabia	4.9	3.2	1.9	44.0	52.3	52.5	9.6	9.5	10.1	41.5	35.0	35.5
Senegal	19.1	16.8	17.0	8.6	8.6	9.1	14.7	15.1	15.2	57.6	59.6	58.7
Sierra Leone	48.3	51.0	45.8	6.1	9.0	24.2	3.3	2.6	1.9	42.2	37.4	28.1
Somalia	60.2	60.1	60.2	4.9	4.9	4.9	2.5	2.5	2.5	32.5	32.6	32.5
Sudan	37.1	34.5	41.8	11.7	14.0	6.7	5.7	7.8	9.9	45.6	43.7	41.6
Suriname	20.6	11.3	9.1	8.3	13.9	15.5	18.7	23.5	23.2	52.4	51.3	52.2
Syria	24.7	20.3	21.0	31.8	28.7	24.9	1.5	2.5	4.7	41.9	48.5	49.4
Tajikistan	27.3	23.8	23.1	2.3	5.1	10.6	36.1	25.6	16.2	34.3	45.6	50.1
Togo	37.8	43.3	47.1	10.5	9.6	13.5	9.2	9.5	7.7	42.4	37.6	31.6
Tunisia	11.1	10.0	8.9	11.7	11.7	13.1	18.1	17.0	16.8	59.1	61.3	61.2
Turkey	10.8	10.6	8.9	8.5	8.4	9.2	21.4	19.6	17.5	59.2	61.3	64.4
Turkmenistan	22.9	18.8	13.8	8.8	8.3	10.8	33.0	29.4	39.3	35.2	43.6	36.1
Uganda	28.5	25.5	24.2	14.9	17.1	17.6	7.5	7.3	8.5	49.1	50.1	49.7
UAE	2.2	1.4	0.7	38.6	43.6	49.4	12.8	10.3	8.6	46.4	44.8	41.3
Uzbekistan	34.4	29.5	19.8	9.5	9.3	11.3	13.6	19.8	21.9	42.5	41.4	47.0
Yemen	12.2	9.6	14.6	36.8	38.0	27.1	5.3	5.8	8.9	45.7	46.6	49.4
OIC Average	12.4	11.0	10.3	25.3	29.7	31.6	15.4	14.3	13.4	46.9	45.1	44.7
Other Dev'ing Average	9.1	9.5	9.1	12.9	15.3	15.6	19.0	22.3	22.0	59.0	52.9	53.3
World Average	3.1	3.4	4.4	10.3	11.8	13.2	17.6	16.9	16.5	69.1	67.9	65.8

Source: UN National Accounts Main Aggregates Database

Table A.7: Agricultural Production Index*

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Afghanistan	84.9	77.9	94.9	97.8	96.2	106.0	97.8	107.9	100.5	117.1	116.2	111.0	121.7
Albania	87.9	90.3	90.6	95.0	99.6	98.1	102.3	102.7	107.4	112.1	119.0	124.7	131.9
Algeria	69.4	74.7	76.3	88.9	98.0	99.1	102.9	93.3	95.2	119.2	125.1	135.8	143.5
Azerbaijan	74.2	81.1	85.2	90.2	91.9	104.0	104.1	105.5	111.1	120.5	118.1	125.8	132.5
Bahrain	122.8	105.1	106.8	102.4	89.7	91.8	118.5	114.2	111.4	126.4	114.8	164.8	168.7
Bangladesh	89.6	87.9	90.4	92.8	91.2	102.7	106.1	112.1	120.4	121.4	129.3	133.0	106.6
Benin	88.9	89.6	97.4	100.6	105.4	102.0	92.6	96.5	111.5	111.8	114.7	125.6	134.2
Brunei Darussalam	86.3	99.2	90.8	90.5	106.2	87.3	106.6	102.2	105.4	105.5	113.5	132.9	135.5
Burkina Faso	65.8	83.4	86.0	96.7	90.8	103.3	105.9	85.8	114.0	101.5	115.3	101.3	121.4
Cameroon	79.0	80.4	81.7	84.2	87.7	102.8	109.5	114.5	119.0	127.9	139.2	145.8	148.4
Chad	78.4	91.8	91.2	94.9	94.9	104.0	101.1	95.9	101.3	101.7	104.5	96.8	126.1
Comoros	95.5	97.1	96.9	98.8	102.1	95.8	102.1	102.2	99.6	107.8	113.5	109.4	112.1
Côte d'Ivoire	99.9	93.7	95.0	94.2	96.1	99.9	104.1	99.8	106.0	99.9	104.2	109.6	115.0
Djibouti	84.9	85.8	97.9	97.1	93.4	95.3	111.3	137.3	141.5	126.5	118.6	132.3	134.5
Egypt	85.5	83.6	88.0	92.1	95.6	98.5	105.8	110.7	115.1	116.4	109.3	113.6	118.6
Gabon	99.0	96.9	97.8	98.1	98.5	100.2	101.3	103.2	106.8	110.9	117.0	118.4	121.4
Gambia	98.2	105.5	69.4	87.7	107.5	94.1	98.4	73.1	102.9	120.9	133.5	88.3	107.3
Guinea	84.0	83.8	88.5	92.9	97.7	100.7	101.6	105.3	110.1	110.4	113.3	116.4	122.3
Guinea-Bissau	87.2	89.8	90.4	90.2	97.1	99.4	103.6	104.3	115.1	113.8	126.5	130.7	137.1
Guyana	96.5	101.3	101.9	109.2	108.1	94.2	97.7	98.4	97.8	104.4	105.9	108.1	112.8
Indonesia	78.2	80.9	85.9	91.4	95.5	98.1	106.4	109.2	113.3	119.2	120.5	125.6	132.2
Iran	78.0	82.4	90.0	93.4	94.6	102.9	102.6	106.9	98.9	106.9	107.4	107.9	111.5
Iraq	96.7	112.4	125.5	95.4	92.3	104.1	103.6	100.9	90.5	91.3	104.6	113.2	112.1
Jordan	80.9	71.6	93.2	88.5	99.5	97.5	103.0	103.8	107.9	115.4	129.3	134.1	127.6
Kazakhstan	78.4	91.4	93.5	94.7	93.5	100.1	106.4	115.5	107.7	122.9	106.8	142.6	112.5
Kuwait	80.1	92.1	86.4	94.5	99.8	96.9	103.3	107.0	100.2	133.5	134.4	161.6	167.5
Kyrgyzstan	96.2	101.1	96.2	98.8	102.2	97.8	100.0	101.2	102.4	104.8	104.7	107.0	105.8
Lebanon	99.1	90.5	98.7	96.2	104.1	97.3	98.6	100.0	103.8	94.8	92.5	98.2	102.3
Libya	94.8	91.4	98.0	101.5	98.4	101.4	100.2	106.1	104.8	111.2	110.1	110.3	112.7
Malaysia	78.2	82.0	83.6	90.7	95.3	99.7	105.0	103.9	110.4	109.3	110.4	119.0	120.3
Maldives	89.4	81.4	78.2	91.8	113.4	88.5	98.1	84.0	82.4	77.7	81.4	84.8	88.3
Mali	70.9	85.0	82.4	99.4	95.2	102.5	102.3	111.4	123.8	137.1	142.2	141.8	151.8
Mauritania	89.4	90.1	94.5	97.0	96.9	100.4	102.7	103.5	101.5	102.0	112.5	111.5	120.3
Morocco	72.1	77.6	84.3	96.3	97.4	93.0	109.6	93.2	103.1	122.0	126.4	130.7	124.1
Mozambique	80.9	86.8	91.5	95.9	100.4	95.7	104.0	109.6	110.0	118.6	147.9	157.4	159.3
Niger	71.7	84.2	91.5	96.4	88.2	101.8	110.0	116.4	138.7	113.9	145.1	127.8	138.1
Nigeria	80.0	80.2	84.4	88.9	95.5	99.9	104.6	97.2	103.6	90.7	101.7	102.8	108.0
Oman	90.2	90.4	81.2	75.7	92.9	111.8	95.3	97.6	97.3	98.6	121.5	114.1	111.5
Pakistan	87.8	85.7	87.1	90.4	97.5	100.4	102.1	106.0	110.1	112.8	110.5	118.6	119.3
Palestine	88.1	101.3	100.9	104.8	97.4	107.2	95.3	97.3	98.7	98.9	80.0	90.2	92.9
Qatar	110.7	88.4	106.1	94.8	102.2	94.8	103.1	113.6	106.7	114.8	120.0	132.0	132.7
Saudi Arabia	81.2	88.0	88.5	91.9	97.8	100.4	101.8	103.4	105.0	101.9	105.3	106.1	108.2
Senegal	107.3	102.6	70.8	95.9	95.3	109.6	95.1	86.3	127.2	138.8	150.3	108.1	131.9
Sierra Leone	44.8	49.8	58.6	83.7	92.8	93.5	113.7	99.6	106.4	130.5	148.7	154.8	161.1
Somalia	89.6	89.5	93.4	95.7	97.0	100.4	102.6	98.8	95.4	99.3	107.0	116.1	115.2
Sudan	78.6	87.0	88.8	97.6	96.6	101.4	102.1	101.3	101.0	103.7	98.9		
Suriname	95.1	104.5	83.7	90.6	95.4	98.6	106.1	113.2	115.5	130.7	136.9	133.3	130.8
Syria	79.6	81.3	95.9	90.8	95.3	99.6	105.1	92.3	88.1	94.3	88.8	98.5	87.7
Tajikistan	64.0	73.4	83.3	88.6	99.2	99.1	101.8	105.2	109.7	117.7	123.6	129.9	144.0
Togo	89.7	97.2	98.6	100.3	103.4	96.4	100.2	103.5	111.6	120.6	123.0	136.3	130.7
Tunisia	84.1	72.9	74.0	109.1	93.5	101.0	105.6	104.5	109.5	105.4	104.2	104.0	115.3
Turkey	94.9	88.0	93.6	94.6	95.7	101.2	103.2	99.0	102.8	105.5	109.9	115.6	121.9
Turkmenistan	70.6	83.4	85.4	91.7	98.4	106.9	94.6	118.0	113.5	111.4	108.2	102.0	103.6
Uganda	87.7	93.1	97.8	100.4	100.7	100.0	99.2	102.8	106.5	108.4	111.6	113.6	110.3
UAE	186.8	105.1	101.9	93.2	101.9	105.4	92.7	92.9	102.4	101.4	111.4	69.1	71.2
Uzbekistan	77.0	79.0	82.3	85.4	93.1	99.9	107.0	109.1	116.4	119.7	127.2	134.1	139.1
Yemen	82.8	89.5	89.3	92.9	96.0	97.6	106.4	116.7	121.7	126.6	136.3	134.3	141.4
OIC Average	84.1	84.6	88.8	92.7	95.7	100.3	104.2	104.8	108.6	111.5	114.2	119.4	121.3
Other Dev'ing Average	86.2	88.9	89.9	93.0	97.1	99.8	103.3	108.4	113.4	114.1	118.5	123.9	125.0
Developed Average	99.2	97.6	96.6	97.1	101.6	100.2	98.3	100.2	102.1	103.0	102.5	102.3	101.0
World Average	89.7	90.8	91.6	94.1	98.1	100.0	102.2	105.8	109.8	110.9	113.9	118.1	118.8

Source: FAOSTAT Online Database

* 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	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Afghanistan	102.4	90.6	106.1	105.0	99.4	105.9	94.7	101.7	92.3	104.9	101.6	94.7	101.3
Albania	85.0	87.8	88.8	93.8	99.0	98.1	102.9	103.7	108.7	113.7	120.8	126.4	133.3
Algeria	74.3	78.9	79.6	91.5	99.5	99.2	101.3	90.3	90.5	111.3	114.7	122.2	126.7
Azerbaijan	78.3	84.8	88.1	92.3	93.0	104.1	102.9	103.1	107.2	114.9	111.3	117.1	121.9
Bahrain	163.1	133.4	129.3	117.7	96.9	92.6	110.5	98.2	88.6	94.0	81.4	113.0	113.5
Bangladesh	96.9	93.4	94.5	95.5	92.4	102.8	104.9	109.6	116.5	116.2	122.5	124.6	98.6
Benin	104.4	102.0	107.3	107.2	108.6	101.8	89.6	90.5	101.5	98.8	98.5	104.9	109.1
Brunei	95.6	107.7	96.5	94.1	108.2	87.2	104.6	98.6	100.0	98.5	104.1	120.1	121.0
Burkina Faso	76.2	93.8	94.0	102.7	93.6	103.4	103.0	81.0	104.5	90.4	99.7	85.1	99.1
Cameroon	90.2	89.4	88.5	88.8	90.1	103.0	106.9	108.9	110.3	115.6	122.6	125.2	124.2
Chad	94.6	106.6	102.0	102.0	98.3	104.0	97.7	89.8	91.9	89.5	89.2	80.2	101.4
Comoros	108.7	107.6	104.7	104.2	104.9	95.7	99.4	96.9	92.2	97.3	99.8	93.8	93.8
Côte d'Ivoire	107.8	99.3	99.2	97.0	97.5	100.0	102.5	96.8	101.0	93.5	95.6	98.4	100.9
Djibouti	91.3	90.9	102.3	99.9	94.9	95.4	109.8	133.6	135.9	119.7	110.5	121.5	121.6
Egypt	92.8	89.4	92.5	95.3	97.3	98.6	104.1	107.1	109.5	108.9	100.5	102.7	105.6
Gabon	111.4	106.5	105.0	102.8	100.9	100.2	98.9	98.4	99.3	100.7	103.7	102.5	102.5
Gambia	114.6	119.4	76.1	93.3	110.8	93.9	95.3	68.6	93.5	106.6	114.0	73.0	85.9
Guinea	92.1	90.3	93.8	96.7	99.9	100.8	99.3	100.5	102.3	99.9	99.9	100.0	102.3
Guinea-Bissau	97.4	98.1	96.6	94.2	99.3	99.4	101.4	100.0	107.9	104.4	112.5	114.5	117.1
Guyana	98.7	103.1	103.2	110.2	108.7	94.2	97.2	97.2	95.9	101.7	102.5	103.9	107.9
Indonesia	84.1	85.7	89.7	94.1	96.9	98.2	105.0	106.2	108.6	112.8	112.5	115.7	120.3
Iran	83.1	86.4	93.3	95.6	95.7	102.9	101.4	104.5	95.5	102.0	101.2	100.4	102.4
Iraq	111.3	125.5	136.2	100.6	94.8	104.1	101.1	96.2	84.2	82.9	92.5	97.4	93.6
Jordan	89.1	77.7	99.8	93.3	102.6	97.8	99.6	96.4	95.9	98.1	105.2	104.7	95.6
Kazakhstan	81.1	94.6	96.3	96.7	94.6	100.2	105.3	113.1	104.3	117.6	101.1	133.5	104.2
Kuwait	96.7	106.9	97.0	102.8	104.6	97.1	98.3	96.4	85.3	107.8	103.4	119.0	118.6
Kyrgyzstan	98.0	102.3	97.1	99.6	102.8	97.9	99.3	99.5	99.5	100.5	99.0	100.0	97.5
Lebanon	121.6	107.0	111.4	103.5	107.2	96.8	95.9	95.9	98.4	88.6	84.5	87.1	87.4
Libya	102.5	97.2	102.7	104.8	100.0	101.4	98.6	102.6	99.8	104.3	102.0	101.2	102.5
Malaysia	86.3	88.6	88.5	94.2	97.2	99.7	103.1	100.2	104.6	101.7	101.0	106.9	106.4
Maldives	97.5	87.2	82.2	94.9	115.2	88.4	96.4	81.2	78.1	72.3	74.4	76.0	77.7
Mali	82.5	96.1	90.5	105.8	98.3	102.6	99.2	104.6	112.6	120.8	121.5	117.5	122.1
Mauritania	103.9	101.5	103.4	102.9	99.8	100.4	99.8	97.8	93.3	91.2	98.1	94.7	99.7
Morocco	75.7	80.5	86.7	98.1	98.3	93.1	108.7	91.6	100.3	117.6	120.4	122.9	115.0
Mozambique	93.0	97.0	99.5	101.4	103.2	95.7	101.2	103.8	101.5	106.6	129.7	134.6	132.8
Niger	86.3	97.6	102.3	104.0	91.8	102.0	106.2	108.4	124.3	98.3	120.6	102.3	106.4
Nigeria	91.0	88.9	91.2	93.7	98.0	100.0	102.0	92.2	95.7	81.5	89.0	87.5	89.3
Oman	103.4	101.5	88.4	79.6	94.8	111.5	93.8	95.5	94.3	93.1	109.0	94.8	84.6
Pakistan	96.4	92.2	91.9	93.7	99.3	100.4	100.3	102.2	104.2	104.8	100.8	106.4	105.2
Palestine	97.9	109.6	106.8	108.9	99.4	107.3	93.3	93.0	92.1	90.0	71.0	78.1	78.5
Qatar	153.7	119.1	138.9	118.5	117.0	95.2	87.8	81.3	64.7	60.5	56.6	57.0	53.4
Saudi Arabia	99.3	103.7	99.9	99.1	101.1	100.2	98.8	98.3	98.1	93.6	95.2	94.1	94.2
Senegal	122.6	114.3	76.8	101.2	97.9	109.5	92.5	81.7	117.1	124.2	130.8	91.4	108.3
Sierra Leone	55.4	59.3	66.7	90.9	96.4	93.4	110.2	94.1	98.4	118.4	132.3	135.1	137.9
Somalia	102.7	99.6	101.0	100.9	99.6	100.4	100.0	93.9	88.3	89.6	94.0	99.2	95.7
Sudan	90.7	97.6	96.7	103.4	99.4	101.4	99.2	95.7	92.7	92.6	86.0		
Suriname	101.7	110.3	87.1	93.0	96.7	98.5	104.9	110.9	112.0	125.5	130.2	125.6	122.1
Syria	88.6	88.7	102.8	95.7	98.3	99.9	101.9	86.0	78.9	81.7	75.1	82.3	73.0
Tajikistan	70.4	79.4	88.5	92.4	101.3	99.1	99.6	100.7	102.6	107.6	110.4	113.1	122.4
Togo	102.1	107.8	106.5	105.6	106.1	96.4	97.5	98.2	103.2	108.7	108.0	116.6	109.0
Tunisia	88.5	75.9	76.3	111.4	94.5	101.0	104.5	102.3	106.0	100.9	98.5	97.3	106.6
Turkey	101.8	93.0	97.5	97.2	97.0	101.2	101.8	96.5	99.0	100.3	103.2	107.2	111.6
Turkmenistan	74.5	87.0	88.1	93.6	99.5	106.9	93.6	115.3	109.6	106.2	101.9	94.9	95.1
Uganda	103.7	106.6	108.2	107.4	104.2	100.0	95.9	96.1	96.2	94.7	94.2	92.8	87.1
UAE	256.3	139.3	131.2	114.8	115.6	105.5	78.9	66.5	62.5	54.5	54.8	32.1	32.1
Uzbekistan	80.9	82.0	84.6	87.1	94.1	100.0	105.8	106.7	112.2	113.9	119.4	124.2	127.1
Yemen	95.2	100.0	97.0	98.1	98.6	97.7	103.8	111.0	113.0	114.7	120.6	116.1	119.4
OIC Average	92.5	91.2	93.9	96.2	97.5	100.3	102.4	101.2	102.9	103.9	104.4	107.7	107.4
Other Dev'ing Average	90.2	92.1	92.3	94.7	98.0	99.8	102.4	106.5	110.5	110.2	113.3	117.6	117.5
Developed Average	103.1	100.8	98.9	98.7	102.4	100.2	97.5	98.6	99.6	99.8	98.5	97.7	95.8
World	94.4	94.5	94.4	96.1	99.1	100.0	101.1	103.7	106.6	106.6	108.3	111.3	110.8

Source: FAOSTAT Online Database

* Relative level of the per capita 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	2012	2000	2012	2000	2012	2000	2012
Afghanistan	1.94	6.38	0.70	0.94	0.71	0.99	0.32	0.32
Albania	0.57	0.70	0.14	0.43	0.62	0.96	0.07	0.09
Algeria	0.93	5.14	1.43	3.84	2.58	6.04	0.56	0.71
Azerbaijan	1.50	2.71	0.53	0.92	1.04	1.65	0.11	0.29
Bahrain			0.02	0.02	0.01	0.02	0.01	0.02
Bangladesh	39.50	36.20	1.36	3.66	1.80	4.16	0.45	0.63
Benin	0.99	1.53	0.16	0.55	0.35	0.46	0.05	0.08
Brunei Darussalam	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02
Burkina Faso	2.29	4.90	0.09	0.10	0.36	0.29	0.16	0.26
Cameroon	1.27	2.96	1.99	5.26	1.27	2.38	0.21	0.34
Chad	0.93	3.47	0.10	0.12	0.11	0.11	0.11	0.15
Comoros	0.02	0.03	0.06	0.07	0.01	0.01	0.00	0.00
Côte d'Ivoire	1.29	1.50	2.35	2.17	0.84	0.69	0.20	0.26
Djibouti	0.00	0.00	0.00	0.00	0.02	0.04	0.01	0.01
Egypt	20.11	23.76	6.97	10.68	15.15	19.83	1.32	2.03
Gabon	0.03	0.05	0.29	0.32	0.04	0.05	0.03	0.04
Gambia	0.18	0.22	0.01	0.01	0.01	0.01	0.01	0.01
Guinea	1.80	3.26	1.00	1.26	0.52	0.54	0.05	0.08
Guinea-Bissau	0.18	0.25	0.08	0.10	0.03	0.04	0.02	0.03
Guyana	0.45	0.61	0.08	0.04	0.07	0.04	0.01	0.03
Indonesia	61.58	88.42	8.41	17.74	6.99	10.51	1.70	3.17
Iran	12.87	20.83	12.29	11.97	11.66	23.49	1.55	2.50
Iraq	0.90	3.51	1.74	1.17	3.47	3.98	0.15	0.20
Jordan	0.06	0.08	0.24	0.32	0.89	1.52	0.14	0.24
Kazakhstan	11.54	12.79	0.26	0.28	1.97	4.71	0.62	0.93
Kuwait	0.00	0.02	0.01	0.04	0.17	0.32	0.07	0.08
Kyrgyzstan	1.55	1.36	0.19	0.23	0.81	1.02	0.20	0.19
Lebanon	0.12	0.19	0.85	0.81	0.89	0.99	0.17	0.22
Libya	0.22	0.31	0.31	0.41	0.89	1.00	0.14	0.18
Malaysia	2.21	2.80	1.18	1.02	0.52	1.22	0.89	1.59
Maldives	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
Mali	2.31	6.67	0.25	0.44	0.63	0.91	0.19	0.38
Mauritania	0.18	0.30	0.02	0.03	0.01	0.00	0.08	0.11
Morocco	2.00	5.31	2.68	3.77	3.17	5.63	0.61	1.06
Mozambique	1.59	1.76	0.29	0.81	0.12	0.55	0.19	0.18
Niger	2.13	5.32	0.07	0.50	0.79	1.13	0.23	0.30
Nigeria	21.37	26.33	9.28	11.06	8.66	11.94	1.05	1.56
Oman	0.01	0.05	0.34	0.35	0.21	0.30	0.03	0.05
Pakistan	30.46	38.03	5.19	6.40	4.86	5.08	1.70	2.90
Palestine	0.07	0.02	0.24	0.10	0.57	0.72	0.09	0.10
Qatar	0.01	0.00	0.02	0.02	0.06	0.03	0.01	0.02
Saudi Arabia	2.17	1.47	1.19	1.72	1.55	2.36	0.64	0.79
Senegal	1.03	1.66	0.13	0.24	0.41	0.72	0.12	0.21
Sierra Leone	0.22	1.30	0.17	0.25	0.18	0.34	0.02	0.04
Somalia	0.39	0.30	0.19	0.22	0.08	0.11	0.17	0.19
Sudan	3.26	2.66	1.29	2.97	2.12	3.04	0.84	1.08
Suriname	0.16	0.22	0.07	0.12	0.03	0.02	0.01	0.01
Syria	3.51	4.60	1.88	2.01	1.78	2.28	0.35	0.40
Tajikistan	0.54	1.17	0.28	0.48	0.44	1.81	0.03	0.09
Togo	0.74	1.10	0.06	0.06	0.13	0.15	0.04	0.07
Tunisia	1.11	2.31	1.01	1.33	2.07	2.85	0.25	0.31
Turkey	32.25	33.37	10.86	14.97	24.61	27.82	1.40	2.86
Turkmenistan	1.75	1.46	0.24	0.43	0.59	0.99	0.15	0.31
Uganda	2.11	3.55	10.09	9.83	0.55	1.13	0.27	0.44
UAE	0.00	0.14	0.80	0.28	2.86	0.18	0.09	0.13
Uzbekistan	3.91	7.03	1.42	3.07	3.10	8.58	0.50	0.96
Yemen	0.67	0.91	0.66	1.00	0.59	0.87	0.17	0.36
OIC Total	279.0	371.0	91.6	127.0	114.0	166.6	18.6	29.6
Other Dev'ing Total	1099.5	1479.9	275.0	420.7	535.7	820.2	119.6	172.9
World Total	2058.2	2545.0	476.3	636.5	781.5	1106.1	229.9	302.4
OIC (% of Dev'ing)	20.2	20.0	25.0	23.2	17.5	16.9	13.5	14.6
OIC (% of World)	13.6	14.6	19.2	19.9	14.6	15.1	8.1	9.8

Source: FAOSTAT Online Database

Table A.10: Exports of Major Agricultural Product Groups (2000, 2011, US\$ million)

	Cereals		Dairy		Fruit & Vegetables		Meat	
	2000	2011	2000	2011	2000	2011	2000	2011
Afghanistan	0.00	0.05	0.00	0.22	34.93	141.03		
Albania	0.01	0.85	0.19	2.91	2.07	21.89	0.23	1.17
Algeria	0.00	0.01	0.00	1.03	16.80	37.00	0.07	0.10
Azerbaijan	0.64	0.04	0.00	0.01	25.76	254.50	0.00	7.11
Bahrain	0.83	1.08	0.82	177.14	3.24	13.25	0.93	2.46
Bangladesh	0.50	0.83	0.04	0.08	11.43	80.74	0.06	0.00
Benin	0.33	2.83	0.01	0.25	18.00	160.80	0.54	93.94
Brunei	0.00	1.99	0.00	0.01	0.06	0.02	0.23	0.09
Burkina Faso	2.55	6.50	0.01	0.09	3.33	75.37	0.01	0.01
Cameroon	0.20	0.84	2.21	4.01	51.74	99.41	0.01	0.01
Chad	0.00	0.00	0.00	0.00	0.84	0.01	0.62	0.00
Comoros	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Côte d'Ivoire	0.38	39.26	10.19	7.73	185.91	463.81	0.06	0.31
Djibouti	0.00	0.01	0.00	0.16	0.06	1.71	0.00	0.00
Egypt	113.64	78.63	5.88	512.88	138.21	2317.57	1.68	8.15
Gabon	0.08	0.00	0.46	0.02	0.08	0.02	0.01	0.00
Gambia	0.00	1.25	0.01	4.11	0.71	3.95	0.00	1.27
Guinea	0.11	3.75	0.00	0.05	1.14	28.74	0.00	0.03
Guinea-Bissau	0.00	0.00	0.00	0.00	49.05	203.86	0.00	0.00
Guyana	40.87	149.22	0.33	0.14	3.51	9.71	0.04	0.00
Indonesia	5.94	28.65	74.91	83.61	300.56	808.47	13.31	21.79
Iran	1.32	29.25	24.68	365.54	564.46	2891.06	2.06	31.84
Iraq	0.00	1.23	0.00	0.06	6.04	47.81	0.00	0.00
Jordan	1.19	7.27	11.05	42.80	105.54	654.46	3.46	122.18
Kazakhstan	542.63	1310.69	0.39	4.07	15.23	20.11	1.27	5.66
Kuwait	4.70	21.77	5.16	31.34	13.76	34.23	2.81	1.68
Kyrgyzstan	3.39	0.79	1.39	27.07	9.13	135.95	0.04	0.70
Lebanon	0.86	7.64	0.94	8.78	59.75	243.01	0.63	17.68
Libya	0.12	0.03	0.21	0.05	6.47	0.70	0.00	0.00
Malaysia	30.52	37.91	102.62	370.86	204.95	442.78	16.64	89.12
Maldives	0.00	0.00	0.00	0.00			0.00	0.00
Mali	1.20	0.10	0.00	0.09	0.50	5.70	0.00	0.10
Mauritania			0.03	0.00	0.06	0.00	0.00	0.00
Morocco	13.42	5.97	19.50	36.19	530.55	1716.06	0.66	2.63
Mozambique	0.00	21.23	0.00	0.07	15.93	117.92	0.00	0.00
Niger	0.06	2.98	0.20	0.36	24.30	51.59	0.04	0.00
Nigeria	1.89	0.39	0.00	2.95	2.85	30.23	0.00	0.00
Oman	36.01	35.14	32.01	240.01	21.49	98.50	1.08	32.84
Pakistan	544.10	3159.28	1.57	70.67	126.31	626.73	6.94	147.48
Palestine	1.27	1.12	2.92	1.53	51.84	11.75	1.36	3.49
Qatar	0.72	2.64	0.28	1.62	1.96	3.43	0.18	3.50
Saudi Arabia	2.66	17.76	137.66	1022.39	105.64	692.85	41.01	165.49
Senegal	0.17	59.52	1.26	20.94	11.71	49.52	0.31	0.55
Sierra Leone	0.00	0.00			0.18	0.00	0.00	0.00
Somalia	0.00	0.00	0.00	0.00	7.20	0.38	0.00	0.09
Sudan	4.87	13.66	0.59	0.00	34.59	19.41	20.99	22.75
Suriname	26.71	33.80	0.00	1.57	25.45	3.50	0.00	1.49
Syria	0.40	0.43	7.54	70.30	252.46	344.78	0.00	3.86
Tajikistan	0.00	2.74	0.00	0.00	24.97	50.38	0.00	0.00
Togo	5.40	1.21	1.58	12.41	0.52	3.96	0.19	1.22
Tunisia	33.25	77.07	8.57	64.16	72.78	393.11	0.65	8.00
Turkey	293.93	1043.65	18.32	478.83	1817.53	6699.68	12.50	423.85
Turkmenistan			0.00	0.00	1.72	1.04		
Uganda	2.15	42.29	0.30	18.19	7.00	30.39	0.02	1.44
UAE	84.28	72.66	10.70	272.20	134.47	320.21	4.16	74.39
Uzbekistan	0.68	35.85	0.47	0.04	108.82	581.42	0.15	0.00
Yemen	0.60	25.22	1.13	26.27	17.62	92.90	0.91	0.05
OIC Total	1805	6387	486	3986	5231	21137	136	1299
Other Dev'ing Total	8736	47425	1868	9761	21157	75769	7622	37511
World Total	35427	120051	26622	76654	67441	203403	41829	124549
OIC (% of Dev'ing)	17.1	11.9	20.6	29.0	19.8	21.8	1.8	3.3
OIC (% of World)	5.1	5.3	1.8	5.2	7.8	10.4	0.3	1.0

Source: FAOSTAT Online Database

Table A.11: Imports of Major Agricultural Product Groups (2000, 2011, US\$ million)

	Cereals		Dairy		Fruit & Vegetables		Meat	
	2000	2011	2000	2011	2000	2011	2000	2011
Afghanistan	113.77	488.48	0.56	51.79	4.43	92.09	0.10	72.33
Albania	48.12	156.88	5.00	24.32	43.05	96.31	19.30	69.01
Algeria	1074.99	4022.16	429.56	1543.74	194.32	840.80	35.55	165.94
Azerbaijan	108.76	368.64	11.80	76.28	11.61	99.12	18.42	29.45
Bahrain	32.76	101.30	50.64	218.87	107.01	212.78	43.96	213.40
Bangladesh	354.54	1875.88	86.96	265.27	152.65	712.89	0.16	1.25
Benin	18.85	127.23	12.72	30.97	12.55	57.88	35.55	295.73
Brunei	19.72	48.14	15.09	22.64	23.55	46.17	8.45	31.40
Burkina Faso	56.99	140.20	13.47	20.04	15.77	14.53	0.12	0.39
Cameroon	75.93	479.73	16.31	54.66	6.21	23.78	12.65	6.29
Chad	7.10	51.92	4.21	7.53	0.37	2.33	0.38	0.64
Comoros	6.33	25.89	0.93	3.30	0.52	2.05	3.19	18.48
Côte d'Ivoire	142.86	787.74	35.55	69.40	18.04	70.12	8.00	24.83
Djibouti	19.39	204.55	15.97	17.16	3.95	33.14	1.17	5.47
Egypt	1264.73	5455.06	179.90	630.63	217.83	961.27	251.61	781.43
Gabon	28.04	88.52	17.78	46.42	11.63	34.67	43.52	139.33
Gambia	22.40	46.62	3.76	7.94	6.13	8.99	1.15	2.73
Guinea	47.16	113.07	14.75	35.31	8.14	27.54	1.57	19.72
Guinea-Bissau	22.85	36.29	0.96	4.69	0.74	3.66	1.78	2.64
Guyana	9.90	41.61	17.24	38.89	9.08	24.45	7.53	5.21
Indonesia	1063.97	5037.73	258.39	1155.15	246.93	1535.20	54.77	251.35
Iran	1502.13	2545.21	50.80	410.36	112.46	816.29	35.48	987.57
Iraq	1177.27	2152.24	143.55	531.14	33.50	615.48	0.00	792.39
Jordan	239.80	558.00	66.09	222.64	90.61	360.91	51.31	344.78
Kazakhstan	3.57	51.61	42.00	377.28	24.14	845.61	26.08	329.82
Kuwait	169.52	612.30	167.45	253.49	293.79	390.37	121.23	374.31
Kyrgyzstan	34.77	124.90	1.68	17.48	1.78	37.73	1.66	72.21
Lebanon	116.09	357.74	148.95	297.95	156.27	326.90	58.53	224.00
Libya	544.99	799.01	74.27	305.09	107.95	328.56	8.50	31.95
Malaysia	636.88	2102.78	302.15	802.26	416.34	1384.64	188.29	630.88
Maldives	10.68	26.26	12.06	39.47	21.82	74.60	6.50	35.70
Mali	19.67	99.16	16.15	47.20	3.69	19.76	0.16	3.71
Mauritania	37.40	139.44	11.62	62.12	8.52	22.04	3.01	10.83
Morocco	731.39	1943.83	64.91	265.78	67.49	269.33	3.96	62.34
Mozambique	64.76	315.93	14.60	27.39	5.09	39.99	7.67	37.60
Niger	37.16	77.73	9.00	33.69	5.92	16.45	0.17	0.37
Nigeria	468.29	2724.25	133.85	622.61	20.15	234.57	0.61	10.33
Oman	112.28	363.33	103.78	451.59	96.10	351.90	47.50	300.11
Pakistan	152.30	112.85	16.93	123.75	211.85	717.59	0.68	9.10
Palestine	117.56	119.19	22.29	23.13	99.55	89.08	13.31	21.86
Qatar	38.13	166.79	67.12	147.99	78.34	199.67	45.84	241.01
Saudi Arabia	1342.81	4437.94	601.65	1822.83	690.35	2295.45	594.22	2586.73
Senegal	146.52	593.70	32.50	120.26	28.17	96.09	2.34	12.58
Sierra Leone	54.95	96.18	3.26	12.38	6.60	12.92	1.32	16.75
Somalia	74.25	206.33	1.41	3.30	2.91	20.93	0.00	0.14
Sudan	252.28	779.27	16.25	120.49	24.58	187.74	0.22	13.93
Suriname	14.24	18.54	7.66	15.37	11.10	21.23	9.77	30.01
Syria	229.80	873.80	51.02	165.72	55.36	454.78	0.06	20.07
Tajikistan	45.14	208.09	0.75	7.46	0.25	18.67	28.39	32.82
Togo	13.47	46.97	2.42	10.16	2.00	10.25	3.57	10.86
Tunisia	284.28	924.54	22.49	49.63	34.03	82.61	7.88	17.37
Turkey	390.64	1931.82	35.72	104.74	192.30	833.88	1.16	514.67
Turkmenistan	1.40	62.17	6.63	12.92	6.72	43.94	8.00	8.91
Uganda	46.82	207.67	0.86	5.01	2.45	16.81	0.25	3.24
UAE	438.51	1495.69	197.77	859.44	491.26	2553.85	143.67	1123.06
Uzbekistan	131.54	483.69	20.14	29.44	13.01	24.92	20.82	21.95
Yemen	285.96	1370.31	83.11	218.67	31.00	159.46	62.25	172.94
OIC Countries	14506	48827	3744	12945	4542	18875	2053	11244
Other Dev'ing Total	11243	33346	4235	15844	8129	40835	5392	24511
World Total	40872	127535	26571	76179	74962	208700	42361	120951
OIC (% of Dev'ing)	56.3	59.4	46.9	45.0	35.8	31.6	27.6	31.4
OIC (% of World)	35.5	38.3	14.1	17.0	6.1	9.0	4.8	9.3

Source: FAOSTAT Online Database

Table A.12: Food Production Index*

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Afghanistan	83.9	76.9	94.5	97.8	96.1	106.0	97.9	108.1	100.5	117.0	116.2	110.8	121.6
Albania	87.1	89.9	90.5	95.1	99.6	98.1	102.4	102.8	107.6	112.3	119.3	124.9	132.2
Algeria	69.2	74.5	76.2	88.9	98.1	99.0	103.0	93.2	95.0	119.2	125.1	136.0	143.7
Azerbaijan	73.5	81.8	86.8	91.3	92.0	103.0	105.0	107.4	114.4	124.7	122.0	129.4	136.5
Bahrain	122.8	105.1	106.8	102.4	89.7	91.8	118.5	114.2	111.4	126.4	114.8	164.8	168.7
Bangladesh	89.5	87.7	90.3	92.7	91.1	102.8	106.1	112.4	120.8	121.7	129.6	132.2	105.2
Benin	84.7	86.4	92.2	97.9	103.0	101.6	95.3	99.6	116.1	118.2	122.0	130.2	137.8
Brunei	86.3	99.3	90.8	90.5	106.2	87.1	106.7	102.3	105.5	105.7	113.7	133.2	135.8
Burkina Faso	69.6	89.9	89.4	101.9	93.6	102.9	103.5	90.2	114.4	106.0	121.9	108.3	127.8
Cameroon	76.6	78.3	80.9	84.1	88.0	102.2	109.8	116.1	121.7	132.1	142.9	149.9	152.1
Chad	77.7	90.8	90.1	96.3	92.9	103.5	103.6	98.3	104.0	106.5	110.1	101.2	131.3
Comoros	95.5	97.1	96.9	98.8	102.1	95.7	102.1	102.1	99.6	107.8	113.5	109.3	112.0
Côte d'Ivoire	94.9	91.1	93.9	93.8	97.9	98.1	104.1	101.0	107.8	101.5	105.9	113.3	117.5
Djibouti	84.9	85.8	97.9	97.1	93.4	95.3	111.3	137.3	141.5	126.5	118.6	132.3	134.5
Egypt	85.3	82.6	87.4	92.3	95.1	98.8	106.1	111.0	116.3	117.7	110.1	114.2	119.8
Gabon	99.7	98.0	99.4	100.0	99.4	100.3	100.3	101.8	103.2	109.5	114.5	115.5	118.7
Gambia	98.3	105.6	69.3	87.7	107.6	94.0	98.4	73.0	102.9	120.9	133.6	88.2	107.3
Guinea	82.2	83.5	88.4	92.7	97.7	100.8	101.5	105.1	109.9	110.2	113.2	116.2	122.1
Guinea-Bissau	87.2	89.7	90.2	89.9	97.1	99.3	103.6	104.1	115.1	114.1	125.9	131.1	137.6
Guyana	96.6	101.3	101.9	109.2	108.1	94.2	97.7	98.4	97.7	104.4	105.9	108.1	112.8
Indonesia	78.5	81.1	86.3	91.8	95.7	98.2	106.2	108.8	113.2	120.4	121.3	125.9	132.9
Iran	77.4	82.1	89.8	93.2	94.3	102.9	102.8	107.2	98.5	106.8	107.5	108.1	111.7
Iraq	96.7	111.7	124.8	95.0	92.1	104.2	103.8	100.9	90.7	91.2	104.4	113.3	112.2
Jordan	80.6	71.6	92.8	88.4	99.6	97.5	103.0	103.8	107.9	115.4	129.4	134.3	127.7
Kazakhstan	78.8	92.0	94.5	94.8	93.5	99.9	106.6	116.9	108.7	124.6	107.9	144.0	112.7
Kuwait	80.1	92.0	86.4	94.6	99.8	96.9	103.3	107.0	100.1	133.7	134.6	161.9	167.9
Kyrgyzstan	94.8	100.6	96.9	99.5	102.3	97.7	100.0	102.0	103.1	107.0	106.4	108.1	107.5
Lebanon	99.0	90.0	98.6	96.1	104.0	97.3	98.7	100.0	103.6	94.7	92.2	98.1	102.1
Libya	94.7	91.1	97.9	101.4	98.4	101.4	100.3	106.2	105.0	111.4	110.2	110.6	112.9
Malaysia	78.1	82.9	84.5	91.6	94.9	100.3	104.8	104.6	113.1	114.3	114.9	124.3	125.4
Maldives	89.4	81.4	78.2	91.8	113.4	88.5	98.1	84.0	82.4	77.7	81.4	84.8	88.3
Mali	72.7	79.7	80.6	94.7	91.3	102.7	106.0	119.7	134.0	148.5	153.7	150.8	160.5
Mauritania	89.4	90.1	94.5	97.0	96.9	100.4	102.7	103.5	101.5	102.0	112.5	111.5	120.3
Morocco	71.9	77.4	84.2	96.4	97.4	92.8	109.8	93.1	103.0	122.2	126.7	131.0	124.3
Mozambique	86.5	91.0	94.2	99.1	101.2	95.1	103.6	108.4	109.1	117.8	153.4	162.4	162.0
Niger	71.4	84.1	91.6	96.5	88.2	101.8	110.0	116.5	138.8	113.8	145.3	127.8	138.2
Nigeria	80.1	80.3	84.4	88.9	95.5	99.9	104.6	97.3	103.8	90.8	101.6	103.2	108.4
Oman	88.3	86.3	88.0	91.8	96.4	100.6	103.0	108.3	112.8	114.8	113.3	120.3	121.6
Pakistan	88.2	101.4	100.9	104.9	97.4	107.2	95.4	97.3	98.8	99.0	80.1	90.3	93.0
Palestine	90.2	90.4	81.1	75.6	92.8	111.9	95.3	97.6	97.4	98.6	121.7	114.3	111.7
Qatar	110.7	88.4	106.1	94.8	102.2	94.8	103.1	113.6	106.7	114.8	120.0	132.0	132.7
Saudi Arabia	81.2	88.0	88.5	92.0	97.8	100.4	101.8	103.4	105.1	102.1	105.5	106.2	108.3
Senegal	108.4	102.8	70.4	95.0	95.5	110.1	94.4	85.7	127.8	140.4	152.0	108.5	132.7
Sierra Leone	43.6	49.2	58.9	83.5	92.8	93.1	114.1	99.4	106.4	131.3	148.8	154.7	160.9
Somalia	89.6	89.5	93.4	95.7	97.0	100.4	102.6	98.8	95.3	99.3	107.0	116.1	115.2
Sudan	79.0	87.2	89.4	98.3	96.8	101.0	102.2	101.5	102.0	104.4	100.1		
Suriname	95.1	104.5	83.7	90.6	95.4	98.6	106.1	113.2	115.5	130.7	136.9	133.3	130.8
Syria	77.2	79.4	97.1	90.8	94.4	98.7	106.9	93.5	89.1	96.3	91.7	102.5	92.0
Tajikistan	64.0	68.5	77.8	83.8	96.4	99.3	104.3	108.7	117.4	130.9	137.5	143.9	158.8
Togo	84.7	90.2	91.0	93.1	96.0	99.1	104.9	107.7	118.0	127.6	129.2	140.5	135.7
Tunisia	84.0	72.7	73.8	109.2	93.5	100.9	105.6	104.5	109.6	105.5	104.2	104.1	115.4
Turkey	94.6	87.5	93.1	94.6	95.4	101.4	103.3	99.5	104.3	107.3	111.3	116.7	123.7
Turkmenistan	69.1	76.4	86.9	94.1	96.1	106.3	97.6	120.3	114.2	118.6	114.4	108.7	110.3
Uganda	87.5	92.3	96.3	100.3	100.2	99.9	99.9	102.7	105.5	108.2	111.6	112.9	109.9
UAE	186.8	105.0	101.7	93.1	101.9	105.4	92.7	92.9	102.4	101.4	111.4	69.1	71.2
Uzbekistan	75.6	77.2	81.4	86.7	92.2	98.8	109.0	112.6	119.5	125.5	134.8	146.5	151.4
Yemen	82.9	89.6	89.4	93.1	96.2	97.7	106.1	116.6	121.6	126.6	136.7	134.6	142.1
OIC Average	83.2	83.9	88.5	92.7	95.2	100.2	104.7	105.5	109.5	112.9	115.5	120.4	121.2
Other Dev'ing Av.	86.4	88.9	90.3	93.4	97.1	100.0	103.1	107.7	112.9	113.5	117.8	123.2	124.3
Dev'ed Avg.	99.0	97.3	96.5	97.3	101.6	100.1	98.4	100.7	102.9	103.6	102.9	102.3	101.9
World Average	89.5	90.5	91.8	94.3	98.1	100.0	102.2	105.5	109.8	110.9	113.8	117.8	117.2

Source: FAOSTAT Online Database

* 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	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Afghanistan	101.2	89.5	105.7	105.0	99.4	105.9	94.8	101.9	92.3	104.9	101.6	94.5	101.2
Albania	84.2	87.5	88.6	93.9	99.0	98.1	102.9	103.8	109.0	113.9	121.1	126.7	133.7
Algeria	74.2	78.8	79.5	91.5	99.6	99.0	101.4	90.2	90.4	111.4	114.7	122.4	126.9
Azerbaijan	77.6	85.5	89.9	93.5	93.1	103.1	103.9	104.9	110.5	118.9	114.9	120.5	125.7
Bahrain	163.1	133.4	129.3	117.7	96.9	92.6	110.5	98.2	88.6	94.0	81.4	113.0	113.5
Bangladesh	96.8	93.1	94.3	95.4	92.4	102.8	104.8	109.8	116.9	116.5	122.8	123.8	97.3
Benin	99.6	98.4	101.6	104.4	106.3	101.5	92.3	93.4	105.8	104.5	104.8	108.8	112.1
Brunei	95.6	107.8	96.6	94.0	108.3	87.1	104.7	98.7	100.1	98.7	104.3	120.4	121.3
Burkina Faso	80.5	101.1	97.7	108.2	96.5	103.0	100.5	85.1	104.8	94.3	105.3	90.9	104.3
Cameroon	87.4	87.0	87.5	88.7	90.5	102.4	107.1	110.5	112.8	119.4	125.9	128.8	127.3
Chad	93.8	105.5	100.7	103.6	96.3	103.5	100.2	92.1	94.5	93.9	94.1	83.9	105.6
Comoros	108.7	107.6	104.7	104.2	104.9	95.7	99.4	96.9	92.2	97.3	99.8	93.8	93.7
Côte d'Ivoire	102.4	96.6	98.0	96.5	99.3	98.1	102.5	98.0	102.8	94.9	97.1	101.7	103.1
Djibouti	91.3	90.9	102.3	99.9	94.9	95.4	109.8	133.6	135.9	119.7	110.5	121.5	121.6
Egypt	92.6	88.3	91.9	95.5	96.8	98.8	104.4	107.4	110.7	110.1	101.3	103.3	106.6
Gabon	112.1	107.7	106.7	104.8	101.8	100.3	97.9	97.0	96.0	99.4	101.5	100.0	100.2
Gambia	114.7	119.6	76.1	93.2	110.9	93.9	95.3	68.5	93.6	106.6	114.0	72.9	85.9
Guinea	90.1	90.0	93.6	96.5	99.9	100.9	99.3	100.2	102.1	99.7	99.7	99.8	102.2
Guinea-Bissau	97.4	97.9	96.4	93.9	99.3	99.3	101.4	99.8	107.9	104.6	112.8	114.9	117.6
Guyana	98.7	103.1	103.2	110.2	108.7	94.2	97.2	97.2	95.8	101.7	102.5	104.0	107.9
Indonesia	84.4	85.9	90.1	94.5	97.1	98.2	104.7	105.8	108.5	113.9	113.1	116.0	120.9
Iran	82.4	86.1	93.1	95.4	95.5	102.9	101.6	104.7	95.1	101.9	101.3	100.6	102.5
Iraq	111.2	124.8	135.4	100.3	94.5	104.2	101.3	96.2	84.4	82.8	92.3	97.5	93.7
Jordan	88.8	77.7	99.4	93.2	102.7	97.7	99.6	96.4	95.9	98.1	105.3	104.8	95.7
Kazakhstan	81.4	95.2	97.4	96.9	94.5	100.0	105.5	114.4	105.2	119.3	102.1	134.8	104.4
Kuwait	96.6	106.9	97.1	102.8	104.6	97.1	98.3	96.4	85.3	107.9	103.5	119.2	118.9
Kyrgyzstan	96.5	101.8	97.8	100.2	102.9	97.8	99.3	100.2	100.1	102.6	100.7	101.0	99.2
Lebanon	121.5	106.3	111.4	103.4	107.1	96.9	96.0	95.9	98.3	88.5	84.3	86.9	87.2
Libya	102.4	97.0	102.6	104.6	99.9	101.4	98.7	102.8	99.9	104.5	102.1	101.4	102.7
Malaysia	86.2	89.5	89.5	95.1	96.8	100.4	102.9	100.8	107.1	106.3	105.1	111.8	110.9
Maldives	97.5	87.2	82.2	94.9	115.2	88.4	96.4	81.2	78.1	72.3	74.4	76.0	77.7
Mali	84.8	90.3	88.5	100.9	94.3	102.9	102.9	112.5	122.0	131.0	131.4	125.1	129.2
Mauritania	103.9	101.5	103.4	102.9	99.8	100.4	99.8	97.8	93.3	91.2	98.1	94.7	99.7
Morocco	75.5	80.4	86.6	98.2	98.3	92.9	108.9	91.5	100.3	117.8	120.6	123.1	115.2
Mozambique	99.5	101.8	102.5	104.8	104.0	95.1	100.9	102.7	100.7	105.9	134.4	138.8	135.0
Niger	85.8	97.5	102.4	104.0	91.8	102.0	106.2	108.4	124.4	98.2	120.8	102.3	106.4
Nigeria	91.0	89.0	91.3	93.7	98.1	100.0	102.0	92.3	95.9	81.7	88.9	87.8	89.7
Oman	103.4	101.5	88.4	79.5	94.7	111.5	93.7	95.5	94.4	93.1	109.1	95.0	84.7
Pakistan	97.1	92.8	93.0	95.2	98.2	100.6	101.2	104.4	106.7	106.7	103.4	107.9	107.2
Palestine	98.0	109.7	106.9	109.0	99.4	107.3	93.3	93.1	92.1	90.1	71.1	78.1	78.5
Qatar	153.7	119.1	138.9	118.5	117.0	95.2	87.8	81.3	64.7	60.5	56.6	57.0	53.4
Saudi Arabia	99.3	103.7	99.9	99.1	101.1	100.1	98.8	98.3	98.2	93.8	95.3	94.2	94.3
Senegal	123.8	114.5	76.3	100.3	98.1	110.1	91.9	81.1	117.6	125.7	132.2	91.7	109.0
Sierra Leone	54.0	58.6	67.1	90.7	96.4	93.1	110.5	93.9	98.4	119.1	132.4	135.0	137.8
Somalia	102.7	99.6	101.0	100.9	99.6	100.4	100.0	93.9	88.3	89.6	94.0	99.2	95.7
Sudan	91.0	97.7	97.5	104.1	99.7	101.0	99.3	95.9	93.6	93.2	87.1		
Suriname	101.7	110.3	87.1	93.0	96.7	98.5	104.9	110.9	112.0	125.5	130.2	125.6	122.1
Syria	86.0	86.6	104.2	95.7	97.3	99.1	103.6	87.1	79.8	83.5	77.6	85.7	76.6
Tajikistan	70.4	74.2	82.7	87.4	98.5	99.4	102.1	104.1	109.9	119.7	122.8	125.4	135.1
Togo	96.5	100.2	98.5	98.2	98.6	99.1	102.3	102.3	109.2	115.1	113.5	120.4	113.2
Tunisia	88.4	75.7	76.1	111.5	94.5	101.0	104.5	102.3	106.1	100.9	98.6	97.3	106.7
Turkey	101.5	92.5	97.0	97.2	96.7	101.4	101.9	97.0	100.4	102.1	104.5	108.2	113.3
Turkmenistan	72.9	79.7	89.7	96.1	97.2	106.3	96.5	117.6	110.2	113.1	107.7	101.1	101.3
Uganda	103.5	105.7	106.5	107.3	103.7	99.8	96.5	95.9	95.3	94.6	94.3	92.2	86.8
UAE	256.3	139.2	130.9	114.8	115.6	105.5	79.0	66.5	62.5	54.6	54.8	32.1	32.1
Uzbekistan	79.4	80.2	83.7	88.4	93.3	98.9	107.9	110.1	115.3	119.5	126.5	135.7	138.3
Yemen	95.3	100.1	97.1	98.3	98.8	97.8	103.4	110.9	112.9	114.8	121.0	116.3	120.0
OIC Average	91.2	90.3	93.5	96.1	97.0	100.3	103.0	102.0	104.0	105.6	106.1	109.2	109.8
Other Dev'ing Av.	90.4	92.1	92.6	95.0	97.9	100.0	102.3	105.8	110.1	109.8	112.9	117.2	118.9
Dev'ed Avg.	103.0	100.4	98.9	98.9	102.5	100.1	97.6	99.1	100.5	100.4	99.0	97.7	97.7
World Average	94.2	94.2	94.5	96.3	99.0	100.0	101.2	103.5	106.7	106.8	108.4	108.9	107.8

Source: FAOSTAT Online Database

* 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	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Afghanistan									284	221	156	147	75
Albania	17	18	12	25	35	38	45	57	54	62	70	81	91
Algeria	36	28	44	52	62	70	88	98	127	116	320	359	320
Azerbaijan	55	54	66	125	154	325	320	505	531	525	592	714	829
Bahrain	56	33	52	63	55	59	57	65	284	289	306	438	441
Bangladesh	418	327	370	371	511	581	693	857	1057	576	776	944	970
Benin	38	39	75	52	54	70	88	104	127	210	264	291	289
Brunei		1	1	2			7			7	9	12	6
Burkina Faso	35	39	33	58	64			107	116	111	135	201	186
Cameroon	272	293	373	449	465	418	430	488	687	829	948	861	1099
Chad													
Comoros	6	7	9	6	8	3	2	1					
Cote d'Ivoire	1806	1941	2906	3057	2978	2770	2856	3185	3936	4851	5001	5307	4727
Djibouti													
Egypt	375	413	408	524	750	932	896	1273	2786	4058	4356	4487	4038
Gabon	22	21	15	20	35	57	50	40	39	40	36	40	40
Gambia	12	6	3	3	6	4	9	10	8	35	27	31	77
Guinea	13	11	8		17	73	84	34	24	19	27	29	22
Guinea-Bissau				59	53	23							
Guyana	226	212	214	239	254	287	289	338	376	340	356	434	577
Indonesia	5526	5002	6254	6729	8572	9872	11453	16681	24090	19998	25630	32865	33692
Iran	818	906	1050	1432	1394	2108	2690	3695	4243	3592	4738	4318	5600
Iraq	114	185	138		54	52	52	42	30	13	131	69	80
Jordan	182	314	409	436	557	642	690	745	1050	1032	1111	1257	1245
Kazakhstan	600	454	465	771	805	669	1055	2033	2972	1625	1969	1826	3087
Kuwait	54	58	78	96	103	138	119	142	194	183	209	229	262
Kyrgyzstan			52	51	79	76	96	156	178	155	192	221	222
Lebanon	131	160	170	229	250	285	288	369	441	432	511	570	607
Libya				11	13	18	18	26	142	100	117	128	140
Malaysia	5440	5329	7037	8998	10066	9830	11175	16220	23121	17627	23609	31716	28486
Maldives	41	44	56	76	91	103	134	106	124	75	71	81	73
Mali	8	71	45	52	67	64	89	101	135	114	110	134	156
Mauritania	71	82	74	96	143	138		175	188	237	278	434	582
Morocco	1596	1502	1680	1885	1888	2370	2414	2790	3542	3232	3347	3751	3692
Mozambique	156	160	219	178	241	245	365	268	390	498	485	739	572
Niger	101	98	74	80	173	146	160	166	369	188	89	123	148
Nigeria	38	3	119	6	11	34	33	876	1054	2264	2891	2256	2083
Oman	399	681	706	565	508	508	464	541	966	808	980	1102	1125
Pakistan	964	1003	1064	1282	1322	1933	2002	2116	3621	2888	3531	4901	4187
Palestine													
Qatar	9	6	12	15	21	33	21	23	27	49	70	56	60
Saudi Arabia	474	440	530	878	1038	1256	1497	2119	687	1018	3086	3528	4959
Senegal	363	363	402	429	460	424	495	569	443	542	559	776	680
Sierra Leone													
Somalia													
Sudan	508	189	284	259	357	296	299		300	452	820	482	178
Suriname	21	23	33	39	43	67	42	46	69	63	49	98	102
Syria	408	314	853	803	791	864	1899	2401	3157	2651	2386	2102	841
Tajikistan	29												
Togo	38	40	58	78	93	77	74	44	101	81	73	83	122
Tunisia	510	521	468	608	1072	1088	1384	1444	1716	1334	1269	1801	1851
Turkey	3521	3997	3620	4735	5892	7714	7932	9007	10704	10582	11878	14209	15033
Turkmenistan	7												
Uganda	1128	1187	1317	1451	1672	2299	2479	2731	3615	3766	4701	5358	6209
UAE	241	276	297	103	372	473	523	739	923	802	887	1163	1092
Uzbekistan													878
Yemen		122	165	182	195	247	277	332	390	370	459	521	415
OIC Total	26883	26971	32318	37658	43844	49779	56134	73868	99416	89060	10961	13127	13224
Other Dev'ing T.	10881	11623	12272	14488	16835	19346	21926	26896	33560	30818	35740	45356	47608
Dev'ed Total	29551	30092	31766	36952	41668	43866	47810	57049	67965	60125	64977	76369	76534
World Total	43121	44412	47270	55206	62888	68190	75349	91332	11146	99850	11167	13485	13736

Source: WTO Online Database

Table 15: Import of Food (Million USD)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Afghanistan									525	610	706	897	265
Albania	238	258	303	366	443	455	540	690	863	777	826	897	845
Algeria	2578	2600	2977	3034	4012	3935	4121	5480	8457	6414	6683	10762	9998
Azerbaijan	218	231	236	309	411	441	551	903	1118	963	1223	1373	1408
Bahrain	449	504	548	541	534	635	513	595	944	806	934	969	1060
Bangladesh	1254	1398	1387	1918	1747	1755	2620	3946	5059	4431	4859	6684	7243
Benin	120	122	173	216	220	269	308	508	619	482	477	511	511
Brunei		197	201	219			285			417	419	508	501
Burkina Faso	77	120	124	136	151			249	313	294	310	399	523
Cameroon	269	286	337	381	441	493	556	692	984	1016	906	1273	1288
Chad													
Comoros	16	14	15	17	29	29	29	23					
Cote d'Ivoire	427	537	587	769	811	858	1006	1163	1546	1613	1511	1689	1930
Djibouti													
Egypt	3519	3315	3479	2725	2895	3979	3926	5521	8916	7726	10145	14794	15666
Gabon	174	183	180	189	327	278	287	382	450	429	523	643	637
Gambia	65	55	60	61	93	98	81	100	96	104	100	111	122
Guinea	148	141	154		185	261	273	217	243	140	186	279	304
Guinea-				40	22	51							
Guyana	80	93	89	87	90	118	113	143	192	168	215	245	287
Indonesia	3336	3053	3365	3818	4537	4841	5455	7857	9383	8639	11470	16730	15828
Iran	2585	2599	2016	2601	2946	3051	3177	3884	6304	9188	8156	9654	12442
Iraq	203	149	153				4287	4415	6772	7592	9191	12997	13163
Jordan	851	857	846	998	1386	1424	1523	2029	2809	2395	2476	2948	3333
Kazakhstan	459	520	533	671	912	1263	1644	2241	2938	2415	2827	3938	4165
Kuwait	1249	1206	1383	1667	1770	2195	2487	2757	3630	2909	2949	3780	3676
Kyrgyzstan			76	92	127	166	247	371	533	502	544	708	780
Lebanon	1107	1236	1206	1296	1456	1385	1410	1900	2246	2422	2799	3113	3229
Libya				736	1060								
Malaysia	3526	3865	4088	4201	5755	5866	6841	8536	10966	9920	12786	16524	16523
Maldives	92	89	89	99	117	116	148	182	220	215	245	296	329
Mali	122	141	164	228	187	255	314	323	416	368	331	460	424
Mauritania	66	69	78	94	144	137	269	364	462	389	335	355	459
Morocco	1585	1586	1664	1568	1945	2195	2168	3883	4993	3695	4057	5593	5581
Mozambique	162	147	186	238	300	360	395	542	570	581	700	778	800
Niger	126	174	164	189	207	252	240	226	301	253	346	301	323
Nigeria	1159	1727	1715	2308	2196	2864	4112	6490	5908	4010	4535	5741	5228
Oman	1122	1290	1261	1149	1173	1060	1167	1562	2494	1953	2394	2617	2913
Pakistan	1524	1245	1319	1472	1856	2606	3061	2889	5014	3583	4893	5203	4846
Palestine													
Qatar	382	425	484	486	456	662	857	1123	1688	945	1974	2539	2905
Saudi Arabia	5375	4740	5204	5925	6637	8716	9388	11827	12541	10785	16690	19770	18600
Senegal	362	463	509	710	802	984	858	1221	1693	1140	1072	1356	1554
Sierra Leone	360		466	475	511	907	1053	519	1229	1283	2353	2136	2430
Somalia	74	65	74	94	82	100	98	117	152	198	212	235	256
Sudan													
Suriname													
Syria	726	562	731	968	1178	1404	1519	1848	2538	3530	3695	3534	1536
Tajikistan	66												
Togo	59	81	90	97	101	92	83	115	135	142	155	204	251
Tunisia	706	793	973	989	1097	1114	1231	1873	2515	1634	2077	2712	2986
Turkey	2128	1487	1903	2791	3090	3284	3486	5167	8502	6104	7411	10653	10420
Turkmenistan	210												
Uganda	132	123	151	197	280	308	348	436	587	528	579	758	652
UAE	3026	3009	3308	3847	4625	5371	6263	7641	10629	10062	11198	13744	15572
Uzbekistan								485	786				1188
Yemen		818	840	1019	1136	1522	1509	2125	2605	2556	2845	3163	4114
OIC Total	42508	42577	45888	52031	60479	68152	80847	105563	141882	126327	151317	194570	199093
Other Dev'ing	64902	72362	76172	92232	110380	123114	140870	182493	247900	216299	258024	315904	340908
Dev'ed Total	341272	345636	367494	428100	485260	514756	555951	650379	755655	675703	717665	846947	833613
World Total	448682	460574	489554	572362	656119	706022	777668	938435	1145437	1018329	1127007	1357422	1373613

Source: WTO Online Database

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

	1990-92	1995-1997	2000-02	2005-07	2010-2012
Afghanistan	0.05	0.15	0.30	0.12	0.07
Albania	0.24	0.01	0.02	0.00	
Algeria	0.02	0.02	0.02	0.02	0.01
Azerbaijan		0.13	0.01	0.04	
Bahrain					
Bangladesh	1.07	0.61	0.43	0.20	0.14
Benin	0.01	0.01	0.01	0.01	0.01
Brunei					
Burkina Faso	0.04	0.02	0.02	0.03	0.03
Cameroon	0.00	0.00	0.00	0.01	0.01
Chad	0.02	0.02	0.02	0.06	0.07
Comoros	0.00	0.00		0.00	0.00
Côte d'Ivoire	0.05	0.03	0.01	0.01	0.02
Djibouti	0.01	0.01	0.01	0.01	0.01
Egypt	1.26	0.12	0.02	0.01	0.00
Gabon			0.00		
Gambia	0.01	0.00	0.00	0.01	0.01
Guinea	0.02	0.01	0.02	0.02	0.00
Guinea-Bissau	0.01	0.00	0.01	0.01	0.00
Guyana	0.05	0.04	0.03	0.00	
Indonesia	0.05	0.01	0.28	0.03	0.00
Iran					
Iraq	0.04	0.07	0.00	0.02	0.00
Jordan	0.30	0.10	0.28	0.04	0.03
Kazakhstan	0.00	0.00			
Kuwait					
Kyrgyzstan	0.02	0.09	0.05	0.06	0.01
Lebanon	0.02	0.00	0.08	0.01	0.00
Libya					0.01
Malaysia	0.00				
Maldives	0.00	0.00	0.00	0.01	0.01
Mali	0.03	0.02	0.00	0.03	0.03
Mauritania	0.05	0.02	0.03	0.05	0.02
Morocco	0.19	0.00	0.10		
Mozambique	0.61	0.18	0.20	0.09	0.10
Niger	0.04	0.01	0.02	0.08	0.10
Nigeria	0.00	0.00	0.00		
Oman					
Pakistan	0.35	0.08	0.09	0.02	0.08
Palestine	0.02	0.01	0.05	0.01	0.01
Qatar					
Saudi Arabia					
Senegal	0.06	0.01	0.02	0.02	0.02
Sierra Leone	0.04	0.05	0.04	0.03	0.02
Somalia	0.15	0.02	0.02	0.09	0.09
Sudan					0.09
Suriname	0.01	0.01			
Syria					
Tajikistan	0.02	0.12	0.11	0.07	0.00
Togo	0.01	0.00	0.00	0.00	0.01
Tunisia	0.20	0.02	0.00		
Turkey	0.01	0.00			
Turkmenistan	0.00	0.03	0.00		
Uganda	0.02	0.03	0.05	0.10	0.03
UAE					
Uzbekistan			0.07		
Yemen	0.07	0.03	0.15	0.04	0.03
OIC Total	5.68	2.20	2.79	1.89	1.31
OIC-LIFDCs Total	4.19	1.71	2.05	1.69	1.09
All LIFDCs Total	7.65	4.04	5.74	4.15	2.53

Source: WTO Online Database

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

	1990-92	1995-97	2000-02	2005-07	2011-13
Afghanistan					
Albania					
Algeria	1	2	2	ns	ns
Azerbaijan		2	1	ns	ns
Bahrain					
Bangladesh	37	40	23	22	25
Benin	1	1	1	1	1
Brunei	ns	ns	ns	ns	ns
Burkina Faso	2	2	4	4	4
Cameroon	5	5	5	4	3
Chad	4	4	4	4	4
Comoros	0	0	0	0	1
Côte d'Ivoire	2	2	4	3	4
Djibouti	0	0	0	0	0
Egypt	ns	ns	ns	ns	ns
Gabon	0	0	0	0	0
Gambia	0	0	0	0	0
Guinea	1	2	2	2	2
Guinea-Bissau	0	0	0	0	0
Guyana	0	0	0	0	0
Indonesia	42	33	43	38	22
Iran	ns	ns	ns	4	ns
Iraq	2	5	5	7	9
Jordan	0	0	0	ns	ns
Kazakhstan		ns	1	ns	ns
Kuwait	1	ns	ns	ns	ns
Kyrgyzstan		1	1	1	0
Lebanon	ns	ns	ns	ns	ns
Libya	ns	ns	ns	ns	ns
Malaysia	ns	ns	ns	ns	ns
Maldives	0	0	0	0	0
Mali	2	3	3	2	1
Mauritania	0	0	0	0	0
Morocco	2	2	2	2	ns
Mozambique	8	8	8	9	9
Niger	3	3	3	3	2
Nigeria	21	13	14	11	12
Oman					
Pakistan	31	31	38	34	31
Palestine			1	1	1
Qatar					
Saudi Arabia	ns	ns	ns	ns	ns
Senegal	2	2	2	2	3
Sierra Leone	2	1	2	2	2
Sudan	11	10	10	13	
Suriname	0	0	0	0	0
Syria	ns	ns	ns	ns	1
Tajikistan		2	3	2	2
Togo	1	1	1	1	1
Tunisia	ns	ns	ns	ns	ns
Turkey	ns	ns	ns	ns	ns
Turkmenistan		0	0	0	ns
Uganda	ns	ns	ns	ns	ns
UAE	5	7	7	9	11
Uzbekistan		1	4	3	2
Yemen	4	5	6	7	7
OIC Total	191	190	198	189	161
Other Dev'ing Total	712	661	658	625	566
World Total	1015	949	957	907	842

Source: FAOSTAT Online Database, Food Security Indicators

Table 18: Prevalence of Undernourishment in Total Population

	1990-92	1995-97	2000-02	2005-07	2011-13
Afghanistan					
Albania					
Algeria	6	7	6	<5	<5
Azerbaijan		29	10	<5	<5
Bahrain					
Bangladesh	34	33	17	15	16
Benin	22	19	17	13	6
Brunei	<5	<5	<5	<5	<5
Burkina Faso	23	19	28	25	25
Cameroon	38	38	30	20	13
Chad	60	53	42	38	29
Comoros	41	48	66	58	65
Côte d'Ivoire	13	13	22	19	21
Djibouti	70	58	47	33	21
Egypt	<5	<5	<5	<5	<5
Gabon	10	7	7	6	6
Gambia	18	23	20	20	16
Guinea	18	22	21	17	15
Guinea-Bissau	22	23	21	19	10
Guyana	22	12	8	9	5
Indonesia	22	16	20	17	9
Iran	<5	<5	<5	6	<5
Iraq	10	22	20	25	26
Jordan	6	9	6	<5	<5
Kazakhstan		<5	8	<5	<5
Kuwait	39	<5	<5	<5	<5
Kyrgyzstan		14	18	10	6
Lebanon	<5	<5	<5	<5	<5
Libya	<5	<5	<5	<5	<5
Malaysia	<5	<5	<5	<5	<5
Maldives	11	11	10	10	5
Mali	25	26	22	15	7
Mauritania	13	10	10	9	8
Morocco	7	7	6	5	5
Mozambique	58	47	45	40	37
Niger	36	36	26	21	14
Nigeria	21	12	11	8	7
Oman					
Pakistan	27	23	25	21	17
Palestine	15		22	18	32
Qatar					
Saudi Arabia	<5	<5	<5	<5	<5
Senegal	22	26	25	17	22
Sierra Leone	43	36	41	35	29
Somalia					
Sudan	42	32	28	32	39
Suriname	18	16	18	15	10
Syria	<5	<5	<5	<5	6
Tajikistan	30	36	42	35	30
Togo	35	27	26	21	16
Tunisia	<5	<5	<5	<5	<5
Turkey	<5	<5	<5	<5	<5
Turkmenistan		10	8	6	<5
Uganda	27	32	26	29	30
UAE	<5	<5	<5	<5	<5
Uzbekistan		5	16	10	6
Yemen	29	32	32	32	29
OECD Average	22	20	18	17	14
Other Dev'ing Average	25	21	20	18	15
World Average	19	16	16	14	12

Source: FAOSTAT Online Database, Food Security Indicators

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 Constraints	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 Constraints	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 affect 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 Cellphones: 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)
Does Poor-Quality Hinder Agricultural Technology Adoption? Evidence from the Market for Fertilizers in Uganda	Uganda	Information Inefficiencies	To what extent to adoption of fertilizer limited by poor quality and counterfeit products in the market?	(Ongoing work)

Source: MIT J-PAL