**Economic and Social Commission for Western Asia** 





# Pathways towards Food Security in the Arab Region

An Assessment of Wheat Availability

### ECONOMIC AND SOCIAL COMMISSION FOR WESTERN ASIA (ESCWA)

# PATHWAYS TOWARDS FOOD SECURITY IN THE ARAB REGION: AN ASSESSMENT OF WHEAT AVAILABILITY

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ECONOMIC AND SOCIAL COMMISSION FOR WESTERN ASIA (ESCWA)

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#### Introduction

Food and nutrition are important to humans, given that they are major determinants of their health status and hence of their ability to carry out various social, economic and physical activities that impact their lives. Seen from this angle, it is apparent that food and nutrition go well beyond the issues of fighting hunger and famine. Over the years, policymakers and development planners have moved towards the concept of food security, culminating with the organization of the World Food Summit in 1996 under the aegis of the Food and Agriculture Organization (FAO) of the United Nations. Food security was defined and later refined so as to be understood as a situation "when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food, which meets their dietary needs and food preferences for an active and healthy life".<sup>1</sup> Viewed as a multidimensional developmental issue, food security has moved to the top of the international development agenda.

Food security as defined above is a complex concept that cannot be captured by just one measure, whether for an individual, a community, a country or a region. Rather, it can only be characterized by taking into account a range of interrelated factors that include both agro-environmental and socio-economic factors. As such, the concept of food security has been developed to encompass four major dimensions, namely: food availability, food accessibility, food utilization and food stability. Each of these dimensions has been disaggregated into more easily describable and measurable indicators as detailed in chapter II.

Measuring food security has been a complex issue so far, given the inability of experts and institutions to agree fully on a specific set of indicators, thereby leaving the door open for numerous suggestions. In this regard, FAO proposes up to 30 indicators spread over the four main dimensions of food security. Breisinger and others (2012) employed six indicators to assess the risk of food insecurity in Arab countries;<sup>2</sup> and in another report, four indicators are used to measure food security,<sup>3</sup> which are further reduced to two indicators by Ahmed and others (2013).<sup>4</sup> The Economist Intelligence Unit (EIU), on the other hand, computes a single food security index based on 32 sub-indicators.<sup>5</sup> Consequently, determining food security remains a complex endeavour, which will hopefully be clarified during the ongoing debate of the post-2015 development agenda.

Generally, the Arab region is unable to produce all the food it needs internally owing to various constraints, among which are the rising scarcity of its natural resources and the relatively low productivity of its agricultural sector.<sup>6</sup> As a result, Arab countries are heavily reliant on imports to meet their food need, which makes them susceptible to both price and supply risks.<sup>7</sup>

<sup>&</sup>lt;sup>1</sup> FAO, International Fund for Agricultural Development (IFAD) and World Food Programme (WFP), *The State of Food Insecurity in the World 2013: The Multiple Dimension of Food Security* (Rome: FAO, 2013).

<sup>&</sup>lt;sup>2</sup> C. Breisinger and others, *Beyond the Arab Awakening: Policies and Investments for Poverty Reduction and Food Security* (Washington D.C.: IFPRI, 2012), available from http://www.ifpri.org/sites/default/files/publications/pr25.pdf (accessed 30 March 2015).

<sup>&</sup>lt;sup>3</sup> C. Breisinger and others, "Food security and economic development in the Middle East and North Africa: Current state and future perspectives", IFPRI Discussion Paper 985 (Washington D.C.: IFPRI, 2010).

<sup>&</sup>lt;sup>4</sup> G. Ahmed and others, "Wheat value chains and food security in the Middle East and North Africa region", Center on Globalization, Governance and Competitiveness (2013).

<sup>&</sup>lt;sup>5</sup> Economic Intelligence Unit (EIU), "Global food security index 2013: An annual measure of the state of global food security" (2013).

<sup>&</sup>lt;sup>6</sup> Arab countries are defined as all 22 member states of the League of Arab States (LAS, namely: Algeria, Bahrain, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates, and Yemen.

<sup>&</sup>lt;sup>7</sup> The World Bank, FAO and IFAD, "Improving food security in Arab countries" (Washington D.C.: the World Bank, 2009).

Some middle- and low-income countries of the region have not been able to recover fully from the global financial crises of 2008, and several have registered their own share of civil unrest or have become home to increasing numbers of refugees from neighbouring countries. In turn this has affected their overall food situation making it a major cause for concern. However, even the high-income countries are increasingly concerned about their food security largely because they seem to anticipate potential food supply difficulties that could result from embargoes, export bans or other restrictions.<sup>8</sup> This is pushing these countries to look for alternative ways to secure their food supply, in some cases seeking to offshore their food production.

No other crop embodies better the concerns over food security in the Arab region than wheat. On average, wheat consumption in the region has been high for the past few decades, and at currently around 130 kg per capita annually, it is double that of the world average. Moreover, it contributes to more than one-third of the calorie and protein intake of the population, reaching as much as 50 per cent in some countries. Given this prime role of wheat in their diet, Arab countries have exerted efforts during the past few decades to secure wheat availability through mixed measures, ranging between higher production and greater imports. Wheat production in the region has increased over the years to reach a production of about 28 million tons in 2013, which represents a fivefold increase compared to the early 1960s. Nevertheless, more than 85 per cent of the current regional production can be traced back to only five countries, namely: Algeria, Egypt, Iraq, Morocco and Syrian Arab Republic. Given the limitations faced by the region's agricultural sector in terms of resource availability, degradation and/or depletion and the adversity of the weather, Arab countries have to import a large share of their wheat demand. As a result, the region is the largest net importer of wheat in the world, importing up to 30 per cent of the global traded wheat in 2010.<sup>9</sup>

Wheat import is expected to increase in the future owing to, among others, the combined effect of the continued population increase set against the rising water scarcity, limited arable land and the advent of climate change. Given the cultural importance of wheat in the region that makes its demand quite inelastic; there is little prospect that there will be a significant decrease in consumption soon even with higher prices. Ensuring the continued supply of wheat in Arab countries is a challenge, which is not expected to abate in the foreseeable future.

While wheat security is a multidimensional issue like food security, it needs to be noted that the scope of this study is limited to assessing wheat security through its availability at the national level and not at the household level, which would require the inclusion of other limiting factors, including, among others, the state of the transport infrastructure, marketing, poverty, and social and economic policies. Given the contribution of wheat to improving food security in the Arab region, this study aims to assess wheat security by examining the prospects for higher wheat availability. This is achieved by developing a methodology that assesses the current production capacity, with a view on land and water availability as limiting factors as well as assessing the economic capacity to sustain wheat imports. In doing so, a number of indicators were selected to clarify the current state of availability in each country. Benchmarks for each of the proposed indicators are identified, thereby facilitating comparison between countries and classifying them according to their level of wheat security.

While the study highlights the potential for increased production, it should not be interpreted as a call for self-sufficiency at any cost. Moreover, while the scope here is limited to assessing wheat availability through production and import indicators at the national level, it can be complemented, in collaboration with other departments within ESCWA or other institutions, with another study on the financial, economic and

<sup>&</sup>lt;sup>8</sup> E. Woertz, "The governance of Gulf agro-investments", *Globalizations*, vol. 10, No. 1 (2013), pp. 87-104, available from <a href="http://dx.doi.org/10.1080/14747731.2013.760932">http://dx.doi.org/10.1080/14747731.2013.760932</a> (accessed 30 March 2015).

<sup>&</sup>lt;sup>9</sup> The World Bank and FAO, "The Grain Chain: Food security and managing wheat imports in Arab countries" (2012). Available from <u>http://www.fao.org/fileadmin/templates/tci/pdf/MENA-WB-The\_Grain\_Chain\_ENG\_.pdf</u> (accessed 30 March 2015).

social feasibility of increasing wheat production. On the basis of field data, such an exercise will entail scenario-building coupled with cost-benefit analysis to determine the tipping point where imports become more feasible than investing in increasing the production capacity.

To reflect the results of the assessment of wheat availability into useful regional policy directions that help the region enhance wheat availability, a review of the various regional initiatives that relate to wheat is included in the study. The outcome of the review coupled with the results of the assessment can shed light on the pathways that the countries of the region, collectively or individually, can follow to secure higher wheat availability levels and, as such, contribute to enhanced food security for their population.

The study is divided into five chapters. The first chapter establishes the links between wheat and food security in the Arab region and details the supply and demand patterns of wheat during the past few decades with projections into the near future. Chapter II reviews assessment methodologies for measuring food security globally, with an emphasis on the Arab region. The aim of the review is to draw on these approaches in developing an assessment methodology for wheat security. Chapter III defines the conceptual framework for wheat security and proposes an approach to measure determinants of wheat availability in both production and imports. The indicators of the assessment procedure are selected and the standings of Arab countries in each of the indicators are discussed separately. Chapter IV reviews some of the major food initiatives that have been adopted by the Arab region during the past five decades, especially those related to wheat. The chapter highlights the success and failure of these initiatives in an effort to assist in identifying appropriate measures and policies to enhance regional cooperation on improving wheat availability. On the basis of the first four chapters, the last chapter intends to propose a number of policy directions on enhancing wheat availability in the region.

#### I. WHEAT AND FOOD SECURITY IN THE ARAB REGION

Wheat is an important agricultural commodity in the Arab region. It is widely cultivated and is the most traded crop in the region. It also plays a major role in ensuring food security given that it is a major source of calories and proteins and that millions of people depend on it for their livelihood. However, degrading and depleting natural resources, namely, land and water, combined with the potential impacts of climate change are major risk factors that threaten sustainable production. At the same time, the high population growth and rapidly changing lifestyles and diets are leading to growing demand for wheat. This increasing demand for wheat is not only an Arab phenomenon; rather it is a worldwide occurrence indicating, therefore, that ensuring wheat availability will remain at the top of the regional agenda for the foreseeable future.

According to the latest FAOSTAT data records, while wheat is grown on about 219 million hectares worldwide, covering more agriculture land than any other crop, it produces some 716 million tons of grain, which is less than rice (741 million tons) and maize (1,118 million tons) among other cereals.<sup>10</sup> Together with rice, wheat is one of the most favoured staple food crops, and its cultivation is adapted to almost all environments from the arctic to the equator and from the plains to high mountain ranges (up to altitudes of 4,000 m). It is easily stored and processed into flour that can be used in many culinary preparations, making it one of the most important sources of carbohydrates. It contains proteins and a wide diversity of minerals, vitamins and lipids, which makes it highly nutritious especially when combined with other food items (such as, for example meat, legumes and vegetables). On average, agriculture at the Arab regional level uses 85 per cent of total water withdrawals, and depending on climate and length of the growing period, FAO reports a crop water requirement for high wheat yield ranging from 450-650 mm, or 4,500 to 6,500 m<sup>3</sup> per hectare.<sup>11</sup>

Wheat is classified into various subcategories that can be grouped into two main types, both of which play a major economic impact, namely: hard wheat, which is processed into semolina and pasta and is mostly produced in hot and dry areas; and soft wheat, which is processed into flour for bread, among others, and is produced in more temperate areas. Both types can be adapted to most climatic conditions.

#### A. CONSUMPTION OF WHEAT IN THE ARAB REGION<sup>12</sup>

The Arab region is one of the largest consumers of wheat in the world. In 2011, the average wheat domestic consumption stood at about 130 kg/person/year, which was higher than the average in the OECD countries, at 85 kg/person/year, and double the world average, at 65 kg/person/year (see figure I). Wheat consumption increased almost exponentially from the 1960s to the late 1980s before levelling off over the past two decades. On the other hand, wheat consumption has remained almost constant in the OECD countries throughout the same period. The high consumption level can be attributed to consumer preferences connected to cultural grounds and, more importantly, economic incentives in the form of subsidies that could result in wasteful consumption practices.

Across the Arab region, wheat consumption differs from one subregion to the other. With consumption exceeding 160 kg per capita annually, countries in the Maghreb subregion are considered the leading consumers in the world. While domestic wheat consumption in the Mashreq countries is slightly lower, it is still relatively high, hovering around 120-150 kg/person/year. In the countries of the Gulf Cooperation Council (GCC), consumption is in the upper range of the 90 kg/person/year, which, although

<sup>&</sup>lt;sup>10</sup> FAOSTAT (2014), available from <u>http://faostat3.fao.org/download/Q/QC/E</u> (accessed 30 March 2015).

<sup>&</sup>lt;sup>11</sup> FAO, "Crop water information: Wheat", available from <u>http://www.fao.org/nr/water/cropinfo\_wheat.html</u> (accessed 30 March 2015).

<sup>&</sup>lt;sup>12</sup> While in principle total wheat consumption includes its use as food, feed for livestock and seeds, in the context of this study, wheat consumption is confined to its use as human food.

still high, is much closer to the OECD level. On the other hand, low-income Arab countries, including Somalia and Sudan, have lower consumption levels, similar to those of other developing countries, owing largely to supply constraints (production and import) and to a culture that is not as entrenched towards wheat-based food products.

Between 1960 and 2010, average wheat consumption increased by about 80 per cent in the Arab region compared to an increase of 20 per cent for the world and only 2 per cent for OECD countries. However, during these four decades, two distinct time periods can be observed. The first is between 1960 and the early 1980s, which can be characterized as a period of sustained growth. During this period, the GCC countries recorded the highest growth as consumption more than doubled, though it was starting from a relatively low level of around 42 kg/capita/year which was well below the world average of about 55 kg/capita/year. Equally, wheat demand in the Maghreb and Mashreq subregions increased at a fast rate, though they were already starting from relatively high levels, at 118 and 90 kg/capita/year, respectively, both of which were above the world and OECD consumption levels. The rapid increase in consumption during this time period can be attributed to both the relatively low prices of wheat,<sup>13</sup> and the rapid income growth.<sup>14</sup>

The second period between 1980 and 2000 was a period of stabilized demand, with the Maghreb and Mashreq countries recording a slight decrease in demand while the GCC recorded a period of fluctuating consumption. According to Sala-i-Martin and Artadi (2003), Arab countries were also in a period of economic stagnation characterized as highly volatile, with an overall tendency towards lower economic growth. To add to this predicament, wheat prices entered a period of volatility that culminated with a sharp price increase towards the mid- to late-1990s (IMF data, 2014). Consumption since 2000 can be characterized by a slight increasing trend, though the past few years of political instability in some countries of the region is not taken into account. Since the advent of the turmoil it may be assumed that wheat supply has decreased as result of disruptions in both production and trade in some of the major producers and consumers of the region, notably Egypt, Iraq, Syrian Arab Republic, Tunisia and Yemen.





*Notes:* Maghreb includes Algeria, Libya, Morocco and Tunisia; Mashreq includes Egypt, Iraq, Jordan, Lebanon and Syrian Arab Republic; and Arab covers all 22 member countries of the League of Arab States.

Owing to the prevailing high consumption for wheat, a rise in price or a decrease in supplies on the global markets will have an immediate negative impact on countries and consumers of the region, especially

Source: Based on FAOSTAT data (2014).

<sup>&</sup>lt;sup>13</sup> International Monetary Fund, "IMF primary commodity prices: Monthly data", available from <u>http://www.imf.org/external</u> /np/res/commod/index.aspx (accessed 30 March 2015).

<sup>&</sup>lt;sup>14</sup> X. Sala-i-Martin and E.V. Artadi, "Economic growth and investment in the Arab world" (2003), paper prepared for the Arab Competitiveness Report, World Economic Forum, New York.

low-income countries. People living in poverty and low-income countries tend to spend a larger share of their income on food and, given that wheat is an important staple in the region, it accounts for a larger share of expenditures, both at the household and at the national levels.<sup>15</sup> The region is unable to produce internally all the wheat it requires, and as such has to resort on wheat import, which is usually purchased at prevailing world prices and in hard currencies.

In order to meet the growing demand for wheat, there is a need to secure a constant source of hard currencies from increased exports, or rely on food aid or on other forms of donor assistance for budget support. While the last two options are suited for the low-income countries of the region, they do not apply for other countries considered among the upper middle to high-income countries.

Any decline in import capacity, due to either higher prices of imported goods or lower prices for exported ones, will have an impact on securing food through imports, especially for low-income countries, which could contribute to social unrest. It has been argued that the most recent global price hike in food commodities was among the factors in the advent of the social unrests that have swept across the region. In fact, among other measures to provide early remedies to the crises, the countries of the region sought to enhance wheat availability by announcing plans aimed at increasing production.<sup>16</sup>

#### B. NUTRITIONAL CONTRIBUTION OF WHEAT TO THE DIET IN ARAB COUNTRIES

Wheat is a major determinant of Arab nutrition, given that more than 80 per cent of the wheat available is used for food, with the remaining being used as feed, seed or is lost. While around 18-20 per cent of the global average domestic supply of wheat has been dedicated for feed, until the mid-2000s, wheat as feed in the Arab region constituted only less than 10 per cent of the total supply (see figure 2). Wheat is closely associated with the Arab diet not only because it has a high and relatively wide nutritional value, but also because it is embedded within the traditional diet of the region. In addition, wheat is not easily perishable, which is important given the harsh climate of the region; and can be easily transported, stored and processed into many sub-products.



Figure 2. Wheat used as feed in the Arab region

Source: Based on FAOSTAT data (2014).

<sup>&</sup>lt;sup>15</sup> At the national level, household budget surveys show a total spending on food and non-alcoholic drinks of 45 per cent in Yemen (2010), 38 per cent in Egypt (2012), 36 per cent in Palestine (2011), 35 per cent in Jordan (2010), 35 per cent in Tunisia (2005), 32 per cent in Iraq (2012), 24 per cent in Oman (2012), 21 per cent in Lebanon (2012), 18 per cent in Saudi Arabia (2013), 18 per cent in the United Arab Emirates (2007), and 12-17 per cent in Kuwait (2013).

<sup>&</sup>lt;sup>16</sup> See M. Lagi, K.Z. Bertrand and Y. Bar-Yam, "The food crises and political instability in North Africa and the Middle East" (2011), available from <u>http://necsi.edu/research/social/foodcrises.html</u> (accessed 30 March 2015); and J. Helland and G.M. Sørbø, Food security and social conflict", CMI report R2014:1 (2014), available from <u>http://www.cmi.no/publications/file/5170-food-securities-and-social-conflict.pdf</u> (accessed 30 March 2015).

Wheat enters in various culinary preparations, including, chiefly, importantly bread; and as such, wheat provides a large percentage of the daily caloric and protein supply of the typical diet of the region sometimes reaching up to 50 per cent in some countries (see table 1).

	Wheat	Daily	Daily	
	consumption	calories	protein	
Country	(kg/cap/yr)	(%)	(%)	Main products
				Bread (matlowa, French baguette, khobz el-daar,
				European); Semolina products, especially couscous;
Algeria	185	44	47	pasta; bulgur; cookies/pastries;
Bahrain				Bread ( <i>khubz</i> ); fried snacks ( <i>samboosa</i> ); pastries
Comoros				
Djibouti				
				Bread (baladi, shami, samoon, French, fatier, shamsi,
				bataw, mehrahrah, European); semolina products,
Egypt	146	33	35	especially couscous; bulgur; pasta; cookies/pastries
Iraq	140	47	57	Bread ( <i>khobz, samoon</i> ); bulgur; cookies/pastries
				Bread (French, flat bread, sfiha, fatayer, sambusak,
				<i>ka'ak</i> ); bulgur semolina (couscous); pastries
Jordan	143	38	43	(manaqeesh, kahi, baklawa)
Kuwait	98	24	23	Bread ( <i>khubus</i> ); bulgur; pastries
				Bread (pita, French); sambusacs, manaeesh, shish
				barak zahle, hareeseh, Baalbek; desserts (baklava,
Lebanon	122	31	33	French)
				Bread (French, Arabic); semolina products, especially
Libya	161	38	41	couscous; bulgur; cookies/pastries
Mauritania	99	28	30	
				Bread (Moroccan <i>khobz el-daar</i> , French, European);
				semolina products, especially couscous; bulgur;
Morocco	177	41	44	cookies/pastries
Oman				Bread (rukhal); desserts (halwa)
Palestine	117	41	43	
Qatar				Bread (hareis); desserts (umm ali, esh asaraya)
Saudi Arabia	91	24	26	Bread ( <i>khobz</i> ); Western fast food; desserts ( <i>baklava</i> )
				Bread (canjeero, rooti, malawax, sabaayad); qamadi
Somalia	22	10	10	pasta; snacks (sambuusa, xalwo, buskud, doolshe)
				Bread ( <i>shamsi, baladi</i> ); bulgur semolina products,
Sudan	36	13	12	especially couscous; cookies/pastries
				Bread ( <i>khubz</i> ); <i>kibbeh, manaeesh</i> ; pastries/cookies
				(ba'lawa, halva, ka'ak); semolina desserts (mamuniyeh,
Syrian Arab Republic	151	38	45	qada'ef)
				Bread ( <i>trabilsi</i> , French); semolina products, especially
Tunisia	205	49	50	couscous; bulgur; cookies/pastries
				Bread ( <i>ragag, khameer, chebab</i> ); semolina ( <i>bethitha</i> );
United Arab Emirates	96	24	23	desserts (luqeymat, khabeesa); Western products
Yemen	114	42	48	Bread (roti, maloug); bulgur; cookies/pastries

#### TABLE 1. WHEAT USE IN THE ARAB REGION

*Sources:* FAOSTAT data (2014); and International Maize and Wheat Improvement Center (CIMMYT, 2014), available from <u>http://wheatatlas.org/resources/</u> (accessed 30 March 2015).

Note: Data are not available for Bahrain, Comoros, Djibouti, Oman and Qatar.

Wheat is also rich in other nutrients and, in terms of nutritional value, surpasses many of the other cereals and crops, such as maize/corn, rice or potatoes (see table 2).

Nutrients per 100g	Wheat	Maize/corn	Rice	Potatoes	Daily intake levels
Energy (cal)	327	365	365	77	2 000
Protein (g)	12.6	9.4	7.1	2.0	50
Fat (g)	1.54	4.74	0.66	0.09	65
Saturated fatty acids (g)	0.26	0.67	0.18	0.03	20
Carbohydrates (g)	71	74	80	17	300
Fiber (g)	12.2	7.3	1.3	2.2	25
Sugar (g)	0.41	0.64	0.12	0.78	90
Sodium (mg)	2	35	5	6	2 400
Potassium (mg)	363	287	115	421	4 700
Calcium (mg)	29	7	28	12	1 000
Iron (mg)	3.19	2.71	0.8	0.78	18
Magnesium (mg)	126	127	25	23	400
Vitamin A (IU)	9	214	0	2	5 000
Vitamin C (mg)	0	0	0	19.7	60

TABLE 2. NUTRITIONAL FACTS FOR SELECTED CROPS AND RECOMMENDED DAILY INTAKE

*Sources:* USDA National Nutrition Database for Standard Reference, available from <u>http://ndb.nal.usda.gov/ndb/search/list.</u> (accessed 30 March 2015); and Food and Drug Administration (FDA), "A food labeling guide: Guidance for industry", Center for Food Safety and Applied Nutrition, FDA, U.S. Department of Health and Human Services, available from <u>www.fda.gov</u> /<u>FoodLabelingGuide</u> (accessed 30 March 2015).

Note: Daily intake levels are based on 2,000 calories for adults and children aged 4 years or older.

#### C. DEMAND TREND FOR WHEAT

The Arab region has witnessed rapid population growth over the past few decades, increasing from around 94 million in 1960 to nearly 370 million in 2013, representing a fourfold increase. Under a medium population growth scenario, it is projected that the Arab population will reach 450 million by 2025 and 600 million by 2050.

The implication of this population growth is a parallel rise in demand for wheat whereby, based on current consumption rates, the region will need more than 60 million tons by 2025 and more than 80 million tons by 2050, which will have to be met from both domestic production as well as imports. The projected wheat demand of 80 million tons by 2050 represents well above half of the world's total wheat export in 2011.<sup>17</sup>



(Tons)



Source: Based on FAOSTAT data (2014).

<sup>&</sup>lt;sup>17</sup> FAOSTAT (2014), available from <u>http://faostat3.fao.org/faostat-gateway/go/to/home/E</u> (accessed 30 March 2015).

Figure 3 shows linear wheat demand projections for the Arab region based on few simple assumptions. The scenarios assume five pathways based on the annual prevailing per-capita wheat consumption for the Arab region, the Maghreb and the Mashreq regions, which are compared to those of the OECD and the GCC region, and the world average. Consequently, the scenarios show that if the region continues on its current consumption level, it will require close to 80 million tons of wheat by 2050. Consuming at the prevailing Mashreq level, or worse at the Maghreb level, would lead to elevated levels of wheat demand; while moving closer to the consumption levels of the OECD/GCC, or even better to the world average, would result in more manageable yearly wheat demand.

As income levels increase, changes in the diet occurs and people tend to consume more animal-based products (such as meat, milk and eggs, among others), which requires also cereals, including wheat, for their production. As the region continues to aim for self-sufficiency in most animal-based products, it is expected that the demand for wheat will continue unabated for the foreseeable future. Thus, whichever pathways prevail among the five scenarios presented above, the current wheat demand and consumption pattern will continue to exert pressure on the limited available natural and financial resources. Basic mitigation will involve finding ways to manage demand for wheat, notably through changes in diet choices. Better management of resources and assets and choosing wisely the kind of investments to make will also provide alternative ways of ensuring overall sustainability.

#### D. FACTORS AFFECTING WHEAT DEMAND

A shortfall in food availability or a sudden price increase in food prices is always a cause of concern for most governments, including those in the Arab region. This is because food is a basic necessity, which causes hardship to the population, particularly the less well-off and the poorest segments of society, and also the lowest strands of the middle class. As a result, food shortages or food price hikes are socially and politically sensitive. This is one of the reasons why most Arab countries are heavily focused on the issues of food security, despite the fact that the region is not a major food insecurity hotspot.

A number of factors determine the demand for wheat in the region. One often cited factor is population size and growth. While, generally, the annual population growth rate in the region decreased from 3.2 per cent to 2.2 per cent between 1980 and 2010, the region's population is nevertheless still increasing by some 7 million people per year. This rising population adds to the overall demand for agricultural products and for wheat in particular.

The other determinant is the increasing affluence being recorded in the region. The Arab region has witnessed one of the strongest growths in average income in the world, which, combined with a continuing rise in population, translates into increasing overall demand for food and wheat products in particular. However, not all the increased food is consumed, as it has been shown that with increases in income the amount of food wasted and discarded at consumer level increases significantly. In addition, while Arab consumers are increasingly demanding high-end delicacies, such as cakes, pastries and other wheat-based desserts, they are also demanding more bread, especially as some traditional meals are gradually being replaced by easily prepared "Arab fast-foods". The changing lifestyle and eating habits increase the demand for cereal-based products and notably wheat.

Overall and until the onset of the recent wave of socio-political upheavals, the region had experienced strong economic growth for the past few decades. Currently, all GCC countries are classified among the high-income countries, with a number of them among the top 10 countries in the world in terms of per-capita income. According to the World Bank, six Arab countries (Algeria, Jordan, Iraq, Lebanon, Libya, and Tunisia) are among the upper middle-income countries. While Comoros and Somalia are the only Arab countries classified as low-income economies, with the remaining countries in the region falling within the lower middle-income category. This overall strong economic growth has been one of the leading factors behind the resilient and sustained demand for food products in terms of quantity consumed per capita.

Wheat and other cereals play a crucial role in food supply, accounting for a substantial share of the energy and key nutrient supply (for example, proteins). As table 1 above suggests, wheat accounts for more than 40 per cent of energy and protein supply in a number of countries in the region. A big part of the wheat produced globally is actually used to produce animal-based foods and, given that the region has a substantially high self-sufficiency level in most of these products, it could be assumed that in the near future the demand for wheat and other cereals would even increase as they start adopting more intensive production techniques in a bid to maintain their self-sufficiencies levels. By 2050, about 50 per cent of the cereals available domestically will be used as feeds for animals in the region as well as elsewhere in the world, which in turn will add pressure for more wheat.<sup>18</sup>

These are the major factors determining the demand for wheat and derived products. While some play a bigger role than others, in the end their combined effect point to an increased demand, which will have to be met both from domestic and non-domestic sources.

#### E. IMPACTS OF THE GLOBAL WHEAT MARKET DYNAMICS ON SECURING WHEAT AVAILABILITY

World wheat production is relatively concentrated in a handful of producers, with about 70 per cent of the wheat traded being supplied by Australia, Canada, France, Germany, the Russian Federation and the United States of America. However, their hegemony is increasingly being challenged by a few newcomers that include such countries as Argentina, Brazil, Kazakhstan and Ukraine, in addition to China and India, both of which have registered increases of several thousand percentage points in wheat export in recent years, albeit remaining small in global markets (FAOSTAT, 2014).

Based on FAOSTAT data (2014), wheat production in the region has increased over the years to reach a production of some 28 million tons in 2013, which represents a fivefold increase compared to that of the early 1960s. However, three distinct periods are apparent during this evolution (see figure 4). Up to the mid-1980s, wheat production was almost flat, hovering just below 10 million tons a year. This flat period was followed by a decade of rapid growth that culminated to an annual production of around 20 million tons a year. From the mid-1990s, wheat production can be characterized by high fluctuations that oscillate between 15-30 million tons a year. The increased production was made possible by expanding the cultivated land as well as generating higher yields, both of which benefited from technological advances and best practices of the green revolution.





Source: Based on FAOSTAT data (2014).

<sup>&</sup>lt;sup>18</sup> C. Nellemann, The Environmental Food Crisis – The Environment's Role in Averting Future Food Crises: A UNEP Response Assessment (Arendal, Norway: UNEP, 2009).

In 2012, more than 85 per cent of the regional production can be traced back to only five countries, namely, Algeria, Egypt, Iraq, Morocco and Syrian Arab Republic; while the other two big agricultural countries (in terms of labour availability and or contribution of agriculture to GDP), Sudan and Yemen, were not contributing much.

The area under wheat has oscillated between 8-12 million hectares during the period 1961-2013, with two distinct periods of less than 10 million hectares up until the early 1990s and a highly fluctuating period since the 1990s, with an average of around 10.5 million hectares (see figure 5).





As shown in figure 5, the area harvested has increased on average by around 25 per cent over the past 50 years, which adds up to an average increase of about 0.5 per cent per year. This slow increase might have been the result of low global wheat prices that prevailed over the period considered, which did not entice farmers to devote more land to wheat, particularly given that most countries of the region do not have strong support systems and effective extension services to induce producers to devote more resources to enhance their wheat production. Producers had other, more lucrative cash crops, including fruit and vegetables, tobacco and cotton.<sup>19</sup>

The increase in wheat production noted above was not a result of a dramatic increase in the area devoted to the crop, but rather to higher yields as can be seen from figures 6 and 7 below. Yields have more than tripled during the considered period, increasing from about 1,000 kg/ha in the early 1960s to a current yield of around 2,500 kg/ha. The increase in yield could be attributed to better agricultural practices and technical progress in wheat cultivation.

Improvement in land productivity as measured in terms of yield has been one of the determinant factors in increased wheat production in the region compared to expansion in area planted (see figure 8). While the increased average yield is commendable, it is not comparable to achievements made in other regions, and still falls below the overall global average (see table 14).

Source: Based on FAOSTAT data (2014).

<sup>&</sup>lt;sup>19</sup> An exception is the financial and technical support systems adopted by Saudi Arabia during the 1980s and1990s aimed at expanding wheat production through both expansion in cultivated area and higher yields.



Figure 6. Wheat yield variation in the Arab region

Source: Arab Spatial, which is an online food security information tool developed by IFPRI in collaboration with other institutions, available from http://www.arabspatial.org/ (accessed 30 March 2015).





Source: Based on FAOSTAT (2014).

Figure 8. Wheat supply in the Arab region

(Correlation between area harvested, production, yield and per capita production)



Source: Based on FAOSTAT (2014).

A closer examination of the wheat sector in the region shows that since the 1980s, yield and production have generally increased over the years, while both the area harvested and per-capita production have stagnated. Thus, increases in wheat production and yield have not kept with population and per-capita consumption growth, thereby suggesting that countries have had to rely progressively more on imports in order to keep feeding their populations.

Until 2008, wheat global prices have long been stable and below their early 1980s levels, and this may have contributed to a sense of complacency where countries took these low prices for granted (see figure 9). They did not feel the urge to invest aggressively in increasing production or improving productivity as was being done in countries that have since experienced green revolutions (notably China and India). In addition, there was a decrease in land resource availability as a result of increasing land degradation and desertification, and owing to urban encroachment on prime agricultural land together with a rising water scarcity, which led to decreasing water availability for irrigation. The combination of these unsupportive factors led, for example, to the decision by Saudi Arabia to opt for phasing out the production of wheat altogether. While it has not been well documented, the impacts of climate change might also have contributed towards lowering the overall agricultural production growth rate. The exact impact of climate change on wheat production has yet to be clearly substantiated.





It can therefore be concluded that the combination of favouring a global wheat market dynamic, the rising scarcity of resources in the region and insufficient technological capacity in some countries have hindered the development of a striving Arab wheat production system. The recent global crisis, however, is a sharp reminder that this was not an optimal option. Countries are now scrabbling again to seek ways to enhance local or domestic wheat production as it has become apparent that wheat availability has strong socio-political implications, linked indirectly to the issue of national security. However, it will not be an easy journey given the challenges ahead, notably those related to the scarcity of natural resources.<sup>20</sup> In order to move forward systematically, countries of the region would have to start by identifying appropriate and comprehensive indicators to estimate levels of food and wheat security as these could provide a good benchmark from which to design targeted policies and programmes aimed at ensuring food and wheat security in a sustainable manner. The issue of assessing wheat availability and the selection of indicators is further discussed in chapter III.

Source: Based on IMF data (2014).

<sup>&</sup>lt;sup>20</sup> This means that strong agricultural production systems translated into higher production contribute to social stability and livelihoods of the rural, mostly poor regions of the countries. It should not, however, be mistakenly interpreted as a call for wheat self-sufficiency, or that higher domestic production alone lead to national security, given that this is influenced by many other socio-economic and political factors.

#### **II. METHODOLOGIES TO MEASURE FOOD SECURITY**

#### A. DEFINITION AND INDICATORS

The current definition of food security at the international level has evolved from a narrow focus on volume and stability of food supply in the mid-1970s, with discussions at that time focusing on assuring the availability and to some extent stability in the price of basic foodstuff. The 1974 World Food Summit defined food security as "availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices".<sup>21</sup> The discussions in the subsequent two decades introduced an economic element to access food and thus made a distinction between chronic food insecurity, related to poverty, and transient food security, associated with natural disasters, conflicts or economic downturn. By the mid-1990s, the concept of food security was transformed to include concerns of malnutrition, food safety and preferences.<sup>22</sup> The 1994 *Human Development Report* introduced the concept of human security, which included food security as one of its pillars.<sup>23</sup> Subsequently, the 1996 World Food Summit adopted an updated definition of food security that reflects the ongoing discussions and states that food security at the individual, household, national, regional and global levels is achieved when "all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life".<sup>24</sup> As such, food insecurity is the state when people do not have adequate physical or economic access to food.

It becomes clear that food security is a multidimensional concept that incorporates economic and gender as well as social and agricultural/production considerations. This cross-cutting nature of food security poses a difficulty in trying to measure it. In fact, while the first of the Millennium Development Goals (MDGs) aims to "eradicate extreme poverty and hunger", the concomitant nine indicators identified to monitor achievements range from income, growth rate of GDP and employment, to malnutrition and dietary intake. It needs to be noted that the nine indicators represent only the links between poverty and hunger, and as such do not cover all the elements incorporated within the current definition of food security. Within the development process of post 2015 (the target deadline of MDGs), the proposed Sustainable Development Goals (SDGs) have actually divided the original MDG on poverty and hunger into two separate goals, namely: the first on ending poverty, which incorporates five targets; and the second on ending hunger, achieving food security and improving nutrition, and promoting sustainable agriculture, which include another five targets. The targets of the goal on food security reflect a rights-based approach by proposing to end hunger and ensure access by all people to safe, nutritious and sufficient food all year round; and by ending all forms of malnutrition by the year 2030. By viewing the issue of food security from a wider angle, this SDG identifies food production as an important complementary element for achieving food In that regard, two targets are proposed aimed at the following: (a) doubling agricultural security. productivity and the incomes of small-scale food producers; and (b) ensuring sustainable food production systems and implementing resilient agricultural practices that increase productivity and production. With the additional elements that have been added to the current MDG on poverty and hunger, the SDG on food security will need additional indicators to monitor and assess the progress achieved on the proposed targets beyond 2015.<sup>25</sup>

<sup>&</sup>lt;sup>21</sup> United Nations, Report of the World Food Conference, Rome, 5-16 November, 1974 (New York: United Nations, 1975).

<sup>&</sup>lt;sup>22</sup> The World Bank, Poverty and Hunger: Issues and Options for Food Security in Developing Countries (Washington D.C.: the World Bank, 1986).

<sup>&</sup>lt;sup>23</sup> The list of threats to human security is long. However, most threats can be considered under seven main headings, as follows: economic security, food security, health security, environmental security, personal security, community security and political security. See UNDP, *Human Development Report 1994* (New York: Oxford University Press for the United Nations Development Programme, 1994).

<sup>&</sup>lt;sup>24</sup> FAO, Rome Declaration on World Food Security and World Food Summit Plan of Action: World Food Summit 13-17 November 1996, Rome, Italy (Rome: FAO, 1996).

<sup>&</sup>lt;sup>25</sup> United Nations, "Open working group proposal for Sustainable Development Goals", available from <u>http://sustainabledevelopment.un.org/focussdgs.html</u> (accessed 30 March 2015).

#### B. THE FAO INDICATORS ON FOOD SECURITY

As can be seen from the evolution of the concept of food security since the 1970s, it has matured into a multidimensional concept that incorporates four elements, namely, availability, access, utilization and stability. In order to facilitate measuring food security in a structured manner, a consultative process led by the Committee on World Food Security (CFS) has identified a number of indicators that aim to capture the multiple aspects of food insecurity. These indicators are classified along the four dimensions as shown in table 3. Given that CFS is hosted by the United Nations Food and Agriculture Organization (FAO), these indicators will be referred to in this study as the FAO food security indicators.

Dimension	Indicators
	Average dietary energy supply adequacy
	Average value of food production
Availability	Share of dietary energy supply derived from cereals, roots and tubers
	Average protein supply
	Average supply of protein of animal origin
	Percentage of paved roads over total roads
	Road density
	Rail lines density
	Gross domestic product per capita (in purchasing power equivalent)
Access	Domestic food price index
	Prevalence of undernourishment
	Share of food expenditure of the poor
	Depth of the food deficit
	Prevalence of food inadequacy
	Cereal import dependency ratio
Stability	Percentage of arable land equipped for irrigation
Stability	Value of food imports over total merchandise exports
	Political stability and absence of violence/terrorism
	Domestic food price volatility
	Per-capita food production variability
	Per-capita food supply variability
	Access to improved water sources
	Access to improved sanitation facilities
	Percentage of children under 5 years of age affected by wasting
Utilization	Percentage of children under 5 years of age who are stunted
	Percentage of children under 5 years of age who are underweight
	Percentage of adults who are underweight
	Prevalence of anaemia among pregnant women
	Prevalence of anaemia among children under 5 years of age
	Prevalence of vitamin A deficiency in the population
	Prevalence of iodine deficiency

TABLE 3. ADOPTED FAO FOOD SECURITY INDICATORS

*Source*: Based on FAO, Food Security Indicators. Available from <u>http://www.fao.org/economic/ess/ess-fs/ess-fadata/en/#.VE9x6fmUd8E</u> (accessed 30 March 2015).

The multiplicity of the indicators can be viewed to reflect the attractiveness of food security as a hub for measuring social and economic development. The list of indicators has been growing, where new indicators are proposed periodically, which, while they tackle the issue from its various angles, may risk losing clarity on the essence of the policies and actions that need to be adopted to achieve food security. Although the indicators have been grouped along the four dimensions of availability, access, stability and utilization, they have not been classified in a manner that show first-order and second-order connection to food security, neither within each group nor between groups. An example of this is the rail line density and prevalence of undernourishment. Specifically, while both indicators contribute to clarify the state of food security in a country, it can be argued that the indicator on undernourishment provides a stronger connection to food security. While the indicator list is not final and the efforts to assess food security is still work in progress, some important elements, including availability of water resources and climate factors, have not been considered yet.

One of the main functions of an indicator system is to highlight the areas of development that need improvements in cases where a country's scores are low. Without setting priorities between the indicators or within the indicators system, the wide spectrum of issues that need to be tackled could be viewed as challenging or even counterproductive, leaving food insecure countries without a clear roadmap towards achieving food security. It is understandable that the list of indicators should not be taken as a prescription to achieve food security and that it is merely a guideline and an eye opener to help countries to expand their conceptions on food security and assist them in identifying national priorities within the socio-economic development planning process. Nevertheless, these indicators have high legitimacy given that they are being proposed by the highest international expertise on food security. It is therefore worth putting the indicator system in a structure that facilitates their direct benefits to the countries. Another issue related to measuring food security is the lack of benchmarks for the various indicators, thereby making it difficult to assess what constitutes a food secure country, as well as the targets to aim for by countries.

The difficulty in assessing food security under such a wide range of issues lies in the fact that such an assessment needs to be inclusive of many variables, covering interlinked and sometimes interdependent issues, which in many cases do not necessarily follow similar trends or show progress in the same direction. This is particularly true given that there has not been an attempt to develop the FAO indicators into an overall food security index or even indices for each of the four dimensions (the state of food security in Arab countries, according to several FAO indicators, is provided in annex tables 1 to 4).

When compared with world averages, as an arbitrary benchmark, it can be seen that some indicators do not show a consistent pattern of food insecure countries. For example, while most Arab countries show a high insecurity level according to the indicators on cereal import dependency ratio and political stability, they score high on such indicators as access to water and sanitation. Nevertheless, on the basis of some indicators across the four dimensions, the least developed countries  $(LDCs)^{26}$  of the Arab region and the countries facing conflicts<sup>27</sup> are more food insecure than other countries of the region.

#### C. THE GLOBAL FOOD SECURITY INDEX

The Global Food Security Index was developed by the Economist Intelligence Unit (EIU). The process of developing the Index involved a panel of experts from the academic, non-profit and government sectors to identify and prioritize food security indicators. The panel of experts was tasked to review the framework, select and weigh the indicators, and to advise on the overall construction of the Index. The development of the Index is based on the 1996 World Food Summit definition of food security; however, it differs from the FAO indicator system in that it groups the indicators according to three dimensions of affordability, availability and quality. The Index is constructed from a total of 28 quantitative and qualitative indicators as shown in table 4. With a compiled index score for each country, the countries are ranked according to their stand on food security. The position of all Arab countries in the index list is shown in table 5. A unique feature of the Global Food Security Index is the inclusion of some qualitative indicators

<sup>&</sup>lt;sup>26</sup> LDCs in the Arab countries comprise Comoros, Djibouti, Mauritania, Somalia, Sudan and Yemen.

<sup>&</sup>lt;sup>27</sup> Within this context, Arab countries facing internal/external conflicts consist of Iraq and Palestine. Given that the data used reflect mostly the situation before 2011, the current events in other countries facing conflicts, including Libya and the Syrian Arab Republic, are not reflected in the obtained results. It is expected that availability, stability, utilization and access to food, in these latter two countries have deteriorated during the past few years.

that relate to government policies, thereby integrating aspects of food security that are not measured by other international organization. Even though the Index includes a large number of diverse indicators, the effort to synthesize these indicators into three indices, which form the basis for a single index on food security, adds value in that it helps countries to identify the path towards higher levels of food security. Again, it can be noticed that issues related to water availability and climate factors have not been considered in the selection of indicators and development of the Index.

Dimension	Indicators
Affordability:	Food consumption as a share of household expenditure
Measures the ability of consumers	Proportion of population under global poverty line
to purchase food, their	Gross domestic product per capita
vulnerability to price shocks and	A gricultural import tariffa
the presence of programmes and	Agricultural import tarifis
policies to support customers	
when shocks occur.	Presence of food safety net programmes
	Sufficiency of supply
	Sub-indicators include: food supply (kcal/capita/day); and levels of
	food aid
	Public expenditure on agricultural research and development
	Agricultural infrastructure
	Sub-indicators include: existence of adequate crop storage facilities;
Availability:	extent and quality of road infrastructure; and quality of ports'
Measures the sufficiency of the	infrastructure
national food supply, the risk of	Volatility of agricultural production
supply disruption, national	Political instability
capacity to disseminate food and	Corruption
research efforts to expand	Urban absorption capacity
agricultural output	Food loss
	Diet diversification
	Nutritional standards
	Sub-indicators include: existence of national dietary guidelines;
	existence of national nutrition plan or strategy; and existence of
	regular nutrition monitoring and surveillance.
	Micronutrient availability
	Sub-indicators include: dietary availability of vitamin A; dietary
	availability of animal iron; dietary availability of vegetal iron
Quality and safety:	Protein quality
Measures the variety and	Food safety
nutritional quality of average	Sub-indicators include: existence of agency to ensure health/safety of
diets, as well as the safety of food	food; access to potable water; presence of formal grocery sector

#### TABLE 4. INDICATORS OF THE GLOBAL FOOD SECURITY INDEX

Source: The Economist Intelligence Unit, Available at: http://foodsecurityindex.ieu.com.

On the basis of these indicators, the position of some Arab countries in the Index varies widely as can be seen from table 5. While the Index ranks countries according to their score, it does not provide a benchmark that distinguishes food secure countries from the rest.

	Affordability		Availability		Quality		Overall Index	
Country	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Kuwait	83.1	23	61.2	41	75.3	29	72.2	28
United Arab Emirates	87.2	15	55.2	51	73.2	32	70.9	30
Saudi Arabia	76.1	31	65.7	31	64.4	47	69.6	32
Tunisia	56.1	54	53.1	53	62	50	55.7	54
Jordan	53.8	59	52.8	55	51.3	67	53	59
Morocco	49.5	65	50.4	66	51.1	68	50.1	63
Egypt	35.7	81	59.6	42	55.1	62	49.3	66
Algeria	46.6	67	48.3	71	47.7	72	47.5	70
Syrian Arab Republic	39.6	75	39	94	45.5	79	40.3	79
Yemen	35.5	82	35.7	103	32.7	99	35.2	91
Sudan	27.1	94	34.6	105	41.5	85	32.7	97

 TABLE 5. POSITION OF SOME ARAB COUNTRIES IN THE GLOBAL FOOD SECURITY INDEX, 2014

 (Score and rank out of 109 countries)

Source: Compiled by ESCWA based on EIU. Available from <a href="http://foodsecurityindex.eiu.com/Country">http://foodsecurityindex.eiu.com/Country</a> (accessed 30 March 2015).

Within the index system, a number of common challenges were identified that apply to many Arab countries, namely, the low public expenditure on agricultural research and development, and the low gross domestic product per capita (PPP). Additionally, political instability risk and corruption were also identified as challenges for some countries.

Generally, it seems that the indicators and the resulting Index put higher weight on the economic capacity of a country to achieve higher levels of food security. This is evident from the fact that a country, such as Singapore, with limited agricultural production capacity is ranked at the top of the list (at number 5), while such countries as Argentina and the Russian Federation, with high agricultural production capacities, are ranked much lower (at numbers 37 and 40, respectively). From table 5 and on the basis of the overall structure of the Index, it can be concluded that Arab countries with economic capacity to import food, including those of the GCC subregion, are expected to rank in positions comparable to that of Kuwait, the United Arab Emirates and Saudi Arabia. Arab LDCs, on the other hand are expected to be ranked at the tail of the list, comparable to that of Yemen and Sudan. Moreover, while Lebanon is expected to rank in a comparable position to those of Tunisia and Jordan, other countries facing conflicts or unrest, including Iraq and Libya, are expected to score lower, comparable to that of the Syrian Arab Republic.

#### D. OTHER APPROACHES TO ASSESS FOOD SECURITY

#### 1. IFPRI's methodology

A study by the International Food Policy Research Institute (IFPRI) on assessing the state of food security at the national level in 175 countries resulted in a classification system that includes five food security groups, namely: lowest, low, middle, upper middle and high.<sup>28</sup> The methodology adopted to classify the countries into the five categories is based on analysing food availability in terms of both production and import, and utilization in terms of consumption. The rationale to limit the focus of food security on only these two elements stems from the convection of the instrumental role of agriculture to reduce poverty and malnutrition. In order for the agricultural sector to play the envisaged role of a contributor to food security through increased production and productivity, the study concludes that developing countries in particular need to develop a more conducive policy framework as well as increased investment in agriculture. The

<sup>&</sup>lt;sup>28</sup> B. Yu, L. You and S. Fan, "Toward a typology of food security in developing countries", IFPRI Discussion Paper 945 (Washington, D.C.: IFPRI, 2010).

study uses energy intake in terms of per-capita calorie, protein and fat supply as indicators for consumption; and domestic food production and food imports as indicators for production. Agricultural potential and distribution were also identified as elements that influence food production. The systematic examination of the four elements, namely food consumption, food production, import and distribution, and agricultural potential, lead to distinguish outcomes of food security (consumption), from determinants/inputs (production, import, and distribution), thereby allowing for the potential to identify targeted policies for each of the food security categories.

On the basis of the above rationale, the study adopted food consumption, production, import, distribution and agricultural potential as the five dimensions that encompass food security. The indicators used for each of the five dimensions are listed in table 6.

Dimension	Indicator			
	Daily calorie intake per capita			
	Daily protein intake per capita			
Food consumption	Daily fat intake per capita			
Food production	Annual food production per capita			
Food import	Ratio of total exports to food imports			
Food distribution Share of urban population				
	Soil without major constraints			
	Length of growing period			
Agricultural potential	Coefficient of variation of length of growing period			

TABLE 6. FIVE DIMENSIONS OF FOOD SECURIT	Ϋ́
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Source: B. Yu, L. You and S. Fan, "Toward a typology of food security in developing countries", IFPRI Discussion Paper 945 (Washington, D.C.: IFPRI, 2010).

Following a factor statistical analysis, and using the data for the indicators from various sources, including from FAO and the World Bank databases, the study grouped 175 countries into the five identified food security categories. In order to account for the production potential and trade security of the countries, a sequential method was used to generate a profile on food security for each country. Countries were first divided according to the level of their reliance on imports, with those whose food import account for less than 10 per cent of total export categorized as "trade secure", while those above 10 per cent identified as "trade insecure". The second screening step divided the countries according to their annual food production, per-capita level, with countries having higher levels than the mean value of the 175 sample countries classified as "high food production countries", while the remaining countries were classified as "low food producing countries". The third step arranged the countries within each import and production subgroup into two sets according to their agricultural potential factors, namely, soil fertility and climate (precipitation and temperature). The profile of Arab countries according to this methodology is show in table 7.

From table 7, the following four main observations can be drawn:

(a) Out of the 17 Arab countries included in the analysis, only Lebanon and the Syrian Arab Republic are classified as high food producing countries. Nevertheless, more recent data show that Tunisia is the only country that scores above the world average; and while Lebanon, Morocco and Egypt score below the world average, they still have higher scores relative to the other Arab countries;

(b) Out of the 17 Arab countries, only Kuwait, Libya, Tunisia and United Arab Emirates are classified as trade secure countries. By using the same criteria to identify trade secure countries, more updated data show that all the six GCC countries (of which Bahrain, Oman, Qatar were not included in the IFPRI analysis), Libya and Iraq qualify as trade secure. Moreover, Algeria and Tunisia stand at the

borderline, at 11 per cent for the ratio of food imports to the total exports. Saudi Arabia may have been misplaced as a trade insecure country, where FAO data show a lower that 10 per cent ratio since 1990;

(c) A total of 15 out of the 17 Arab countries, including Sudan, are classified as having low soil fertility. Only Comoros, Morocco and the Syrian Arab Republic are classified as having high soil fertility; and of these, only Comoros has favourable climate (rainfall and temperature);

(d) Out of the Arab LDCs, only Mauritania is classified within the upper middle food security category. Among the remaining four LDCs, Comoros and Yemen are classified within the lowest food security category, and Djibouti and Sudan within the low food security category.<sup>29</sup>

			Low soil fertility		High soil fertility		
			Unfavourable Favourable		Unfavourable Favourable		
			climate	climate	climate	climate	
	Trade	Low food					
Lowest	insecure	production	Yemen			Comoros	
food	Trade	Low food					
security	secure	production					
	Trade	Low food	Djibouti,				
Low	insecure	production	Palestine, Sudan				
food	Trade	Low food					
security	secure	production					
		High food					
		production					
	Trade	Low food					
	insecure	production	Jordan				
		High food					
Middle		production					
food	Trade	Low food					
security	secure	production		••			
		High food			Syrian Arab		
		production	Lebanon		Republic		
			Algeria, Egypt,				
	Trade	Low food	Mauritania,				
	insecure	production	Saudi Arabia		Morocco		
Upper-		High food					
middle		production		••			
food	Trade	Low food	Kuwait, Libya,				
security	secure	production	Tunisia				
		High food					
		production			••		
	Trade	Low food					
	insecure	production			••		
		High food					
High		production					
food	Trade	Low food	United Arab				
security	secure	production	Emirates				

# TABLE 7. CLASSIFICATION OF ARAB COUNTRIES ON FOOD SECURITY: METHODOLOGY DEVELOPED BY YU AND OTHERS

Source: B. Yu, L. You and S. Fan, "Toward a typology of food security in developing countries", IFPRI Discussion Paper 945 (Washington, D.C.: IFPRI, 2010).

<sup>&</sup>lt;sup>29</sup> Somalia is not included in the IFPRI analysis.

The main advantage of the methodology used in the IFPRI study is that it tries to combine the abovementioned two efforts to assess food security. By defining different categories and classifying countries accordingly, it adopts a ranking approach similar to that of the Global Food Security Index, but at the same time maps the countries according to their natural production inputs (soil and climate) and economic capacity (production value and food purchasing power). Although the FAO indicators include most of the indicators employed in the IFPRI methodology, they are compiled in a manner that presents food security in a qualitative manner that reflects a quantitative value.

IFPRI proposed another food security typology to assess the level of food security in each of the Middle East and North Africa (MENA) countries,<sup>30</sup> which considered four separate indicators, namely: the ratio of total exports to food imports; agricultural production per capita; the Global Hunger Index (GHI);<sup>31</sup> and the Gross National Income (GNI) per capita. According to that model, countries were classified as food secure if they exceeded the world average in all four indicators, or had a GNI per capita that exceeded that of the upper middle-income countries level, as set by the World Bank. To distinguish the countries according to their reliance on natural mineral resources, they were further classified into two categories: countries that were rich or poor in mineral resources. Table 8 shows the resulting classification of countries according to their level of food security.

# TABLE 8. CLASSIFICATION OF ARAB COUNTRIES ON FOOD SECURITY:METHODOLOGY DEVELOPED BY BREISINGER AND OTHERS

		Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United
Food secure	Mineral resource rich	Arab Emirates
countries	Mineral resource poor	
		Algeria, Iraq, Libya, Sudan, Syrian Arab Republic,
Food security	Mineral resource rich	Yemen
challenge		Djibouti, Egypt, Jordan, Lebanon, Morocco, Tunisia,
countries	Mineral resource poor	Palestine

*Source:* C. Breisinger and others, "Food security and economic development in the Middle East and North Africa: Current state and future perspectives", IFPRI Discussion Paper 985 (Washington D.C.: IFPRI, 2010).

Note: Comoros, Mauritania and Somalia were not included in the analysis.

The study showed that none of the countries met the criteria of exceeding the world average in all four indicators, and those that were classified as food secure (oil and gas rich countries) only met the alternate criteria of exceeding the GNI per capita. While only Djibouti, Sudan and Yemen failed to pass the GHI as an indicator for food security, all countries failed to pass the food production indicator, with the exception of Lebanon and the Syrian Arab Republic. The low GHI in most countries of the region suggests improved health conditions, which can be attributed to increased investment in the health sector. The low correlation between GHI and the other indicators may suggest it to be of lower relevancy to food security. Grouping the countries into only two categories can be misleading, suggesting, for example, that Tunisia and Lebanon are at comparable food security levels to Djibouti, Sudan and Yemen.

#### 2. Simplified assessment of food security

Building upon the methodology used by Breisinger and others (2010), another typology was proposed to classify countries of the Arab region using only two main indicators to measure food security, namely, the value of total exports to the total food imports ratio, and food production per capita.<sup>32</sup> Based on these two

<sup>&</sup>lt;sup>30</sup> Breisinger and others, "Food security" (see Introduction, footnote 3).

<sup>&</sup>lt;sup>31</sup> GHI is constructed from three indicators, namely, prevalence of undernourishment, prevalence of underweight in children aged under 5, and mortality rate of children ager under 5 years.

<sup>&</sup>lt;sup>32</sup> Ahmed and others, "Wheat value chains" (see Introduction, footnote 4).

indicators, countries were classified into three food insecurity categories: low, moderate and acute. While low food insecure countries are defined as having one or both indicators above global average, moderate food insecure countries are defined to have one or both indicators below global average, and the acute food insecure countries defined as having one or both indicators below 50 per cent of the global average. Additionally, the countries were further sub-classified according to mineral resource wealth (oil and gas) and labour abundance (see table 9).

Food security				
level Labour variability		Mineral resource rich	Mineral resource poor	
	Labour abundance			
		Bahrain, Kuwait, Oman, Qatar,		
Low food		Saudi Arabia, United Arab		
insecure	Labour importing	Emirates		
		Algeria, Sudan, Syrian Arab	Egypt, Jordan, Lebanon,	
Moderate food	Labour abundance	Republic	Morocco, Tunisia.	
insecure	Labour importing	Libya		
			Comoros, Djibouti,	
			Mauritania, Palestine,	
Acute food	Labour abundance	Yemen	Somalia.	
insecure	Labour importing			

# TABLE 9. CLASSIFICATION OF ARAB COUNTRIES ON FOOD SECURITY: METHODOLOGY DEVELOPED BY AHMED AND OTHERS

*Source:* G. Ahmed and others, "Wheat value chains and food security in the Middle East and North Africa region", Center on Globalization, Governance and Competitiveness (2013).

Note: Data were unavailable for Iraq.

The above analysis labelled all oil and gas exporting countries as mineral resources rich, where in fact large variations exist in the reserves and production capacities of these resources between the GCC countries, Libya, and Algeria on the one hand and those of Sudan, the Syrian Arab Republic and Yemen on the other.

#### E. A SUMMARY OF THE LEVEL OF FOOD SECURITY IN THE ARAB REGION

From the review of the above studies and methods to assess food security, it may be generally concluded that owing to the imbalance between the internal production capacity of the various countries and their economic purchasing capacity to acquire food, the entire Arab region can be considered as vulnerable to food insecurity. With that in mind, a broad summary of the outcome of the above assessment approaches leads to a general classification of Arab countries into three broad food insecurity categories, namely: low, moderate and high food insecure countries (table 10). In principle, the first category should include the large oil-exporting countries, namely, the six GCC countries. While Iraq and Libya are large oil-producing countries, conflicts and internal unrest justify placing Libya in the second category and Iraq in the third. Despite having high potential for food production, which would normally be classified among the second group, the ongoing conflict in the Syrian Arab Republic limits its production capacity, and it is therefore included in the third category. Besides Iraq and the Arab LDCs, Palestine is included in the third category. Data of the various indicators suggest including Mauritania in the second category despite being among the six Arab LDCs. The remaining eight Arab countries are included in the second category.

Food insecurity level	Countries			
Low	Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates			
Moderate	Algeria, Egypt, Jordan, Lebanon, Libya, Mauritania, Morocco, Tunisia,			
	Comoros, Djibouti, Iraq, Palestine, Somalia, Sudan, Syrian Arab Republic,			
High	Yemen,			

#### TABLE 10. SUMMARY OF FOOD SECURITY STANDING OF ARAB COUNTRIES

Source: Compiled by ESCWA based on the various indicators of the five methodologies reviewed in this chapter.

The methodologies reviewed in this chapter put much emphasis on the economic and financial capacity to obtain food and may have undermined some of the factors/indicators that relate to the potential for food production. Challenges to increase agricultural productivities (land, water and labour) in many countries, need to be seen as opportunities for higher levels of food security through exerted efforts for higher water and land use efficiencies, wherever these are economically and socially feasible. Moreover, food waste and storage capacities have not been addressed in a manner that recognizes them as contributing factors to higher levels of food security.

#### III. ESTIMATING WHEAT SECURITY IN THE ARAB REGION

As highlighted in chapter I, wheat in the Arab region constitutes a central element of food security. On average, wheat consumption in the region has been high for the past few decades (currently at around 130 kg per capita annually) and it contributes to more than one-third of the calorie and protein intake of the population. Low calorie, protein and fat is directly linked to undernourishment and has been reflected in some of the indicators used to assess food security, particularly those related to the access dimension of food security.<sup>33</sup> The contribution of wheat to the diet in the Arab region is summarized in table 11 (a more detailed analysis by country is presented in annex table 5).

		Total per-capita consumption/intake			Wheat contribution			
							Daily	
						Daily	protein	Daily
		Wheat	Calorie	Protein	Fat	calorie intake	intake	fat intake
Region		(kg/yr)	(Kcal/day)	(Gr./day)	(Gr./day)	(%)	(%)	(%)
World		65.4	2868	80.3	82.7	18%	20%	3%
	weighted average	128.4	2,993	84	74	34%	37%	7%
	Median	119	3136	81	78	37%	42%	6%
Arab	Range	22-205	1696-3557	50-104	46-116	10-49%	10-57%	2-13%
region <sup>a/</sup>	Range <sup>b/</sup>	90-205	1696-3557	50-104	46-116	24-49	23-57	3-13

TABLE 11. DIET COMPOSITION IN THE ARAB REGION, 2011

Source: Based on FAOSTAT.

*Notes*: <u>a</u>/ Owing to data unavailability, four Arab countries were excluded, namely, Bahrain, Comoros, Oman and Qatar. <u>b</u>/ Excluding Somalia and Sudan, which have a high reliance on other cereals, such as sorghum and maize.

While the per-capita total daily calorie and protein intake in the Arab region is slightly higher than the world average, fat intake is around 10 per cent lower. This could be explained by the heavy reliance of the region on wheat, which has a low fat content. The region deviates widely from the world trend in wheat consumption, where, on average, the per-capita consumption is almost double that of the world average. This higher wheat consumption translates into its elevated contribution to the calorie and protein intake of the population. Although the tendency is to think of the Arab region as homogenous in their diet habits and food preferences, a closer look at the data shows some discrepancies. For example, while generally there is high reliance on wheat across all countries, the GCC countries tend to have moderate contribution of rice to the calorie and protein intake with 18 per cent and 11 per cent, respectively, in Kuwait, 15 per cent and 9 per cent in the United Arab Emirates, and 13 per cent and 9 per cent in Saudi Arabia. The low wheat consuming countries in the region seem to complement their diet by elevated consumption of other cereals, such as sorghum, maize and rice. In Sudan, for example, the per-capita consumption of sorghum is double that of wheat, with a contribution to the calorie and protein intake reaching 26 per cent and 23 per cent, respectively. Similarly, the low consumption of wheat in Somalia is supplemented by consuming rice, maize and sorghum, where their collective contribution to the calorie and protein intake is 28 per cent and 23 per cent, respectively. At the global level and with the exception of for rice, which has a comparable nutritional contribution level to that of wheat, the contribution of other cereals is almost negligible.

#### A. WHEAT SECURITY

While there are many factors that contribute to the high reliance of the Arab population on wheat, ranging from habituation and preference to affordability, the obvious conclusion is that wheat has become a central component to the diet of the region. Consequently, its availability constitutes an important element

<sup>&</sup>lt;sup>33</sup> See table 2.1 in chapter II for the list of food security indicators.

of food security in all countries of the region. It is therefore important to try and assess the extent of wheat security at the level of individual countries as well as of the region more broadly. In other words, to assess how far the countries of the region are secure or safe in terms of wheat availability. Within the context of this study, wheat security is defined as being available at all times and in adequate quantities that satisfy demand. From this working definition, two main components of wheat security emerge, namely, availability and affordability, which can be assessed at the various levels, including per-capita, household, national or regional. Given the scope of this study, the focus will be limited to the national level.

Securing wheat availability is envisaged to be achieved through internal agricultural production and or import, both of which are influenced by a number of factors, including, for example, availability of natural resources, and technical and economic capacities. It also needs to be clarified that while the analysis in this study relates indirectly to some elements in other dimensions of food security, such as access, stability and utilization, they are not separately included in the analysis of the study. Some of the major elements that have determinant impacts on wheat security are outlined in figure 10.





Source: ESCWA.

*Note:* \* While wheat storage capacity is identified as an element of wheat security, it is not included in the assessment owing to data limitations.

Agriculture in the Arab region has a gender dimension that results from the direct involvement of women in farming and food production. In 2011, women comprised an average of 45 per cent of the total agricultural labour force in the Middle East and North Africa, which had increased from 34 per cent in the mid-1990s.<sup>34</sup> This increasing trend can be attributed to many factors, including male migration out of rural areas to non-agricultural sectors. The fact that women hold a sizeable share of the agriculture labour force necessitates a careful and deep analytical understanding of the gender issues that impact agricultural productivity, with special focus on the distribution of resources, availability of financial services and access to land. Production gains can be achieved through a better understanding of women's vulnerability in the agricultural sector in general and in crop production in particular, which is affected by the lack of safety nets, as well as by prevailing work segregation stemming from social norms.

<sup>&</sup>lt;sup>34</sup> M. Abdelali-Martini, "Empowering women in rural labour force with a focus on agricultural employment in the Middle East and North Africa (MENA)" (UN-Women, 2011), available from <u>http://www.un.org/womenwatch/daw/csw/csw56/egm/Martini-EP-9-EGM-RW-Sep-2011.pdf</u> (accessed 30 March 2015).

According to OECD, women's access to land, property other than land, and bank loans are among the factors contributing to inequality between men and women.<sup>35</sup> FAO confirms this gender gap in land holdings, where women represent less than 5 per cent of agricultural landholders in North Africa and Western Asia.<sup>36</sup> A similar gender gap is evident in women's access to financial services, such as credit, savings and insurance, which are crucial to improving financial outputs and agricultural production. Cultural stereotypes and legal barriers often hinder women's ability from opening and maintaining bank accounts that facilitate their work in the agriculture sector.

The existing gender inequality affects women's access to productive resources, markets and services in general. The fact that women are essential contributors to the agriculture sector in the region, yet have unequal access to land, bank loans, productive assets, resources and markets, have direct implications on the overall agriculture productivity in the region. Studies comparing the productivity of men and women farmers show that male farmers scored higher yields. Reasons behind the lower productivity of female counterparts were mainly attributed to discrepancy in input levels and unequal access to productive resources and services.

#### 1. Water and land in the Arab region

The Arab region is generally characterized as water scarce and an oil and gas rich region. Despite this typology, the region is actually diverse climatically and economically. Water availability in terms of per-capita annual share of renewable water varies greatly from a low 6 m<sup>3</sup> in Kuwait to more than 2,900 m<sup>3</sup> in Mauritania (see annex table 6). At 780 m<sup>3</sup>, the weighted average for the entire Arab region falls nevertheless below the globally recognized water poverty line of 1,000 m<sup>3</sup>. Water availability is a determinant factor in setting national agricultural policies, with extreme water scarce countries of the region, including Kuwait, Qatar and the United Arab Emirates, relying heavily on imports to satisfy the growing food (and wheat) demand. The GCC countries have also adopted a policy direction oriented around the use of desalination to meet the growing water demands in the domestic and industrial sectors. The costly water supply alternative and the reliance on food imports in the GCC have been possible, to a large extent, because of their high oil and gas revenues. On the other hand, the Arab region comprises also six LDCs, with very low per-capita GNI of less than \$1,500, compared to the regional average of nearly \$7,200, and a world average of around \$10,200. Nevertheless, four out of the six Arab LDCs, namely, Comoros, Mauritania, Somalia and Sudan, are among the five highest countries in the region on water availability.

The other major factor that determines the extent of agricultural activities is land availability and use. In terms of arable land, the regional per-capita average (at 0.16 ha) is lower than the world average (at 0.20 ha), with only five out of the 22 Arab countries (Syrian Arab Republic, Morocco, Tunisia, Libya and Sudan) exceeding the world average. Many Arab countries are generally characterized by land fragmentation whereby in most cases, land redistribution following agrarian reform programmes has not helped to control fragmentation of agricultural land. Even where holdings were assigned as one plot, inheritance has eventually divided them into smaller land units. Many analysts accuse the Islamic inheritance law. However, the Islamic inheritance system does not inherently differ significantly from most other inheritance laws. Excessive fragmentation usually prevents economies of scale and may lead to inverse impacts on crop production and productivity. Despite efforts at community and national levels to establish procedures and rules for land consolidation, land fragmentation remains an unresolved issue in many countries.<sup>37</sup>

<sup>&</sup>lt;sup>35</sup> OECD, "Gender equality: Factors reducing women's quality of life" (OECD iLibrary, 2012), available from <u>http://www.oecd-ilibrary.org/development/gender-equality\_20743866-table6</u> (accessed 30 March 2015).

<sup>&</sup>lt;sup>36</sup> FAO, "FAO gender and land rights database" (2010), available from <u>http://www.fao.org/gender/landrights</u>.

<sup>&</sup>lt;sup>37</sup> N. Forni, "Land tenure policies in the Near East" (FAO, 2003), available from <u>http://www.fao.org/docrep/005/y8999t/</u> <u>y8999t0f.htm#TopOfPage</u> (accessed 30 March 2015).

Given the high environmental and economic disparity among Arab countries to achieve higher levels of food security in general and wheat security in particular, it is clear that a single strategy direction towards securing wheat would not be feasible for all countries. Economists tend to put greater emphasis on maximizing or optimizing the returns from the use of natural resources, especially if these resources are scarce, such as water in the Arab region, thereby generally favouring the cultivation of high-value crops (cash crops, including fruit and vegetables) over cereals. The rationale is to use part of the returns from cash crops to import lower-value crops like wheat. It is clear that the cost to cultivate cereals with scarce water resources is higher than in other parts of the world that benefit from more favourable climate conditions. However, if the economic principle of putting resources to the highest return uses is strictly followed, then even in the low cultivation cost areas, land and water will need to be put into higher return activities within agriculture or be transformed to be used in other sectors. On the other hand, some of the social benefits from the use of limited land and water for cereal cultivation translate into rural stability and the provision of food, including wheat, for the poor segment of society. Nevertheless, sustainability of these natural resources needs to be carefully considered within the overall discussions that lead to identifying strategies on securing food. In trying to identify avenues for securing wheat, countries of the region will be faced with a dilemma. On the one hand, they are advised not to waste the limited water on such low-value crops as wheat; and on the other, the rapidly increasing demand for wheat constitutes an import challenge economically, especially in the presence of inefficient subsidy systems in many countries of the region. The call to shift into a more economically viable agriculture by maximizing the returns of the use of water and land and thus shifting into cash crops for export is a valid aim. However, in practice, this will face many barriers with regard to, among others, scale, capacities, investments, and the institutional, legal and political settings. As such, enhancing the productivity of existing agriculture, including wheat, should be seen as a step in the direction towards more economically efficient agriculture.

The alternative policy selection between securing wheat through production or import is not valid for all countries. Some GCC countries do not have a strong basis for agricultural production. With very limited water resources, these countries will need to use non-conventional water resources (desalinated sea water and treated wastewater) to achieve any level of sustainable agricultural production. It is economically difficult to justify the use of desalinated water for agriculture, owing mainly to the high additional investment and operational costs involved. While the use of treated wastewater for wheat cultivation has a limited impact on satisfying the national demand for wheat due to its limited quantities, the use of treated wastewater, however, seems to be an attractive option for the following three main reasons:

(a) Rapidly increasing quantities of treated wastewater results from increased investment in wastewater infrastructure to cope with the environmental impacts of the growing investment and expansion in domestic water supply systems;<sup>38</sup>

(b) All the GCC countries have opted for at least secondary level wastewater treatment, with some countries investing in tertiary and advanced treatment, which in many cases is suitable for cereal/ wheat cultivation;

(c) Although some treated wastewater is reused in agriculture, an increasing trend is reuse for landscape irrigation, which has more strict treatment requirements than cereal/wheat cultivation.

With the limited agricultural production potential from the use of treated wastewater, the GCC countries are not in a position to adopt self-sufficiency policies through sustainable internal agricultural production,<sup>39</sup> and therefore have been able to secure food, including wheat, mostly through imports. On the

<sup>&</sup>lt;sup>38</sup> According to UNdata, during the period 2005-2010, all GCC countries had elevated annual population growth rates compared to the world average of 1.2 per cent, with Bahrain at 7.1 per cent, Kuwait at 5.3 per cent, Oman at 2.1 per cent, Qatar at 15.1 per cent, Saudi Arabia at 2.0 per cent, and United Arab Emirates at 14.2 per cent. Demand for water supply is high owing to both the high population growth and the elevated per-capita water consumption in these countries.

<sup>&</sup>lt;sup>39</sup> Some GCC countries have taken initiatives to the purchase or lease lands in foreign countries to be used for agricultural cultivation, including wheat.

other hand, few countries have opted to achieve self-sufficiency of wheat. Saudi Arabia maintained high wheat production during the 1990s and 2000s, reaching production levels that allowed even for exports. On the basis of economic and environmental grounds this policy was reconsidered and has been redirected towards phasing out wheat production and higher investment for increased "offshore" wheat production as well as an increased reliance on imports. The Syrian Arab Republic is the other country that has adopted a policy aimed at self-sufficiency in wheat. Water availability has played a critical role in allowing the country to maintain high production levels of wheat during the past few decades. Looking at the two approaches followed by some GCC countries, such as Kuwait and Qatar, and by Syrian Arab Republic, and while recognizing that both approaches satisfy the national wheat demand, it is important to assess whether the economic capacity to import is comparable to self-sufficiency in terms of wheat security. In other words, while Qatar and Syrian Arab Republic are in principle wheat secure in terms of the ability to satisfy demand, what advantages, if any, favour one route over the other? While the GCC countries and the Syrian Arab Republic stand at the opposite ends of the policy spectrum on wheat security, the remaining Arab countries have, intentionally or inadvertently, followed an approach that depends on both production and imports. While cost-benefit analysis is an important tool to assist countries in selecting strategies to secure wheat, the analysis will have to be comprehensive, taking into consideration social, economic and environmental costs, which may result in different outcomes for different countries.

It is clear that there is a level of uncertainty in both approaches used to achieve wheat security. Many risk factors affect production, of which some are naturally induced, such as drought and flooding, while others are human related, including legal, institutional, technical and financial capacities. These risk factors have direct impacts on the ability of the agricultural sector to achieve the desired level of wheat production. Some of these factors are considered as crosscutting and relate to such sectors as transportation, water management, disaster risk prevention and reduction, research and development and technology transfer, among others. In terms of the import approach, some of the more evident risk factors that increase price volatility include climate change, conflicts, export restrictions and political embargoes.

#### **B.** WHEAT SECURITY INDICATORS

As indicated in the introduction, the aim of this chapter is to assess the level of wheat security at the individual country level. As highlighted above, the assessment will be confined to the two main dimensions that directly impact wheat availability, namely, production and import.<sup>40</sup> A number of indicators are selected to reflect the impact of these two dimensions of wheat security. The position or status of each country on the selected indicators is presented in a manner that allows comparison with the other countries as well as with the regional and world averages, where the world averages are used in some of these indicators as reference benchmarks. On the basis of the position of the countries on the selected indicators of wheat security, a summary matrix is presented to show the overall position of the countries (see table 9). Given that this methodology is based on the selection of indicators, it is clear that selecting other indicators, neglecting some of the adopted ones or using different benchmarks can lead to different results. The selection of the indicators and benchmarks, however, has not been arbitrary. Rather it is based on some of the approaches followed to assess the broader issue of food security (see chapter II).

The indicators selected to be used in the analysis and assessment of wheat security are as follows:<sup>41</sup>

- (a) On wheat production  $^{42}$ :
  - (i) Water availability: freshwater withdrawal as a percentage of total actual renewable water resources;

<sup>&</sup>lt;sup>40</sup> While grain storage facilities can be effective in securing wheat during periods of price volatility, and thus can be used as an indicator of enhanced wheat security, availability of reliable data pose a constraint towards that end.

<sup>&</sup>lt;sup>41</sup> While some of the proposed indicators are used in the analysis, they have not been included in the assessment. These include land productivity, harvested wheat share of arable land and wheat import dependency ratio.

<sup>&</sup>lt;sup>42</sup> Owing to data limitations, it is difficult to add indicators on such crosscutting issues as gender and technology.

- (ii) Wheat production per capita;
- (iii) Land productivity;
- (iv) Land availability: arable land per capita; and harvested wheat share of arable land.

(b) On wheat import:

- (i) Wheat import dependency ratio;
- (ii) Wheat import to total merchandise export ratio;
- (iii) Gross National Income (GNI) per capita.

#### 1. Wheat production indicators

#### (a) *Water availability*

The Arab region is generally characterized as an arid and semi-arid region, with heavy reliance on water resources that are generated outside its borders. It is estimated that almost 75 per cent of the Arab population lives under the water poverty level (1,000 m<sup>3</sup> per capita annually) and nearly 35 per cent are under extreme water scarcity (500 m<sup>3</sup> per capita annually). Despite the high water scarcity, water demand has been growing rapidly, resulting mostly from elevated population growth. Records show that between 2005 and 2010, only Morocco and Tunisia had annual population growth rates below the world average of 1.2 per cent, while 12 countries had rates that exceeded 2 per cent.<sup>43</sup> Another factor that exacerbates the water challenge is high inefficiencies in water use in all sectors. In agriculture, the largest water using sector, farmers still rely on inefficient irrigation practices, where on average irrigation water losses are estimated at 60 per cent.<sup>44</sup> The impact of climate change on water availability is another challenge facing the region, with expected changing rainfall patterns, higher temperatures and increased frequency of extreme weather events, such as droughts and floods.

Within the proposed framework for assessing wheat security in the region, it is clear that water availability is one of the main determinant factors that define the options available for wheat security. The option to increase wheat production through higher yield and or horizontal expansion depends, to a large extent, on water availability.<sup>45</sup> Improving irrigation water use efficiency is an issue that can provide additional water to the agriculture sector, thereby providing opportunities for higher food production, including wheat.

Although water scarcity is a common feature of the entire region, water availability varies in individual countries, with some having the possibility to use additional water resources, thereby offering the opportunity for agricultural expansion. The indicator to assess water availability is the ratio of freshwater withdrawal to the overall renewable water resources. This indicator is the official indicator that has been used to assess sustainability of water resources within target 7-A of Goal 7 (to "ensure environmental sustainability" within MDGs). Table 12 summaries the latest available data on this indicator for Arab countries.

With the exception of Oman, table 12 shows that all the GCC countries are not in a position to adopt policies of high water demand activities, such as agriculture, regardless of their prevailing water use efficiency. On the other hand, there are some countries, including Algeria, Comoros, Djibouti, Iraq, Lebanon, Mauritania, Morocco, Palestine, Somalia, Sudan, Syrian Arab Republic and Tunisia, that still have water available to justify some agricultural expansion, especially with policies to adopt water efficient

<sup>&</sup>lt;sup>43</sup> UNdata, available from <u>http://data.un.org/Data.aspx?d=PopDiv&f=variableID per cent3A47</u> (accessed 30 March 2015).

<sup>&</sup>lt;sup>44</sup> League of Arab States (LAS), "Arab Water Security Strategy" (2011).

<sup>&</sup>lt;sup>45</sup> Horizontal expansion refers to an increase of land under wheat through expansion into new arable land.
irrigation techniques. A third category, which includes Egypt and Jordan, comprises countries that are at the borderline of their full utilization of renewable water resources, but can still adopt policies to expand agriculture through enhanced irrigation water use efficiency.

		Freshwater withdrawal of total actual
Country	Data year	renewable water resources (%)
Algeria	2001	49
Bahrain <sup>*</sup>	2003	206
Comoros	1999	0.8
Djibouti	2000	6.3
Egypt <sup>*</sup>	2000	98
Iraq	2000	73
Jordan <sup>*</sup>	2005	99
Kuwait*	2002	2075
Lebanon	2005	18.6
Libya <sup>*</sup>	2000	615
Mauritania	2005	11.8
Morocco	2000	43.5
Palestine	2005	50
Oman	2003	86.6
Qatar <sup>*</sup>	2005	374
Saudi Arabia <sup>*</sup>	2006	943
Somalia	2003	22.4
Sudan	2011	71.2
Syrian Arab Republic	2005	84.2
Tunisia	2001	61.1
United Arab Emirates <sup>*</sup>	2005	1867
Yemen*	2005	168.6

#### TABLE 12. WATER AVAILABILITY POTENTIAL IN THE ARAB REGION

Source: Data compiled from AQUASTAT database.

*Note:* \* Countries that are already overdrawing their renewable water resources through the use of non-conventional water (from desalination and wastewater treatment plans) or mining non-renewable groundwater resources.

#### (b) *Wheat production*

Given the prime role of wheat in the diet of their populations, Arab countries have, during the past few decades, exerted efforts to secure wheat availability through mixed measures, ranging between higher production and greater imports. In pursuing wheat self-sufficiency, Saudi Arabia, for example, invested heavily in the agriculture sector and became a wheat producer and exporter during the 1990s. Despite achieving wheat self-sufficiency, these policies were criticized given their high economic and financial costs, including large subsidies, low economic and financial returns on scarce water resources, and the depletion of groundwater resources used to irrigate wheat. Consequently, the Saudi authorities reconsidered its subsidy policy and eventually took corrective policy measures that led to a progressive reduction in the production of wheat, with an aim to terminate domestic production by 2016. However, during the global food price crisis of 2007-2008, some voices in Saudi Arabia questioned the corrective measures and called on the Government to reconsider its stance on wheat self-sufficiency and to make it an integral part of the national food security, especially given that groundwater mining has continued for fodder cultivation.

Like Saudi Arabia, many other Arab countries increased their wheat production during the past five decades. The trend in wheat production increased in the Syrian Arab Republic from approximately 1 million tons in the early 1960s to reach almost 5 million tons during the mid-2000s. Consequently, the Syrian Arab

Republic became self-sufficient in wheat and even exported part of its production from the mid-1990s to the mid-2000s. Unlike in Saudi Arabia, water availability from renewable surface water resources has made it possible for the Syrian Arab Republic to maintain an agricultural policy aimed at higher local production, despite concerns over the economic cost and return on the water used. During the past five decades and until 2010, wheat production in Egypt increased fivefold to reach more than 7.5 million tons; grew almost sevenfold in Morocco, reaching 4.9 million tons; increased by two to four times in Algeria and Iraq, reaching production levels above 2.5 million tons; and reached 1 million tons in Tunisia. Despite the notable regional increase in wheat production, and with the exception of Saudi Arabia and the Syrian Arab Republic, Arab countries did not manage to achieve wheat self-sufficiency, as evident from the growing wheat imports throughout the past five decades (see figure 11).

Despite the aspiration and call for partial self-sufficiency in wheat, food imports in general and wheat in particular have been on the rise for the past few decades. Records show that while the Arab population grew from 95 million to 350 million between 1960 and 2010, wheat imports to the Arab region have increased by more than thirteen fold, growing from 2.6 million tons per year to over 34 million tons, with a bill that has increased from \$180 million to around \$8.5 billion, respectively<sup>46</sup>.



Figure 11. Growth of population, wheat production and import in the Arab region

While, at present, the population of the region consumes on average 130 kg of wheat per capita annually, the individual countries vary widely in their production capacity. Table 13 shows that the collective regional wheat production (at 71 kg/capita) actually exceeds the world average consumption (at 65.5 kg/capita), which indicates that the region could achieve self-sufficiency if its consumption level was comparable to that of the world average. Nevertheless, the total production level in 2011 satisfied only around 55 per cent of the regional demand. A closer look at the production levels of table 13 reveals the following observations:

(a) With the exception of the Syrian Arab Republic, Arab countries failed to satisfy wheat demand through internal agricultural production;

(b) The largest four producing countries account for nearly 77 per cent of total production;

(c) It is only in the largest six producing countries that per-capita wheat production exceeds the world average per-capita consumption;

(d) High wheat consuming countries seem to have adopted and implemented policies to promote higher production. Despite low production levels, some countries, including Libya, Jordan, Bahrain, Lebanon, Kuwait, Mauritania, Palestine and Yemen have relatively high consumption of wheat;

Source: Based on FAOSTAT.

<sup>&</sup>lt;sup>46</sup> LAS, "Arab Water Security Strategy".

(e) Wheat production in Saudi Arabia dropped by more than two-thirds between 1990 and 2012. Systematic phasing out of subsidies and financial incentives for wheat production has been part of the national policy aimed at higher economic efficiencies and conservation of non-renewable groundwater resources.

	Per cap	oita			Production per capita	
	consumption	n (kg/yr)	Total wheat production (tons)		(kg	g/yr)
Country	1990	2011	1990	2012	1990	2012
Egypt	150.7	146.1	4 268 049	8 795 483	75.8	109.0
Morocco	179.7	177.3	3 613 890	3 878 000	146.5	119.2
Syrian Arab	1747	150.8	2 070 000	2 600 006	166.2	164.0
Republic	1/4./	130.8	2 070 000	3 009 090	100.2	104.9
Algeria	183.9	184.9	750 080	3 432 231	28.6	89.2
Iraq	184.9	139.6	1 195 800	2 400 000	68.3	73.2
Tunisia	206.2	204.6	1 122 000	1 523 300	137.9	140.1
Saudi Arabia	104.1	90.6	3 580 344	1 100 000	220.9	38.9
Sudan (former)	31.1	35.8	409 000	324 000	15.9	6.7
Yemen	101.8	114	154 937	250 264	13.1	10.5
Libya	220.4	161.2	128 760	200 000	30.2	32.5
Lebanon	127.6	121.9	52 000	150 000	19.2	32.3
Jordan	144.9	143	82 870	19 205	24.7	2.7
Palestine		116.9		18 000		4.3
Mauritania	75.5	98.6	560	3 500	0.3	0.9
Oman			1 190	2 000	0.7	0.6
Kuwait	73.1	98.4	50	1 650	0.0	0.5
Somalia	18.1	21.6	925	1 000	0.1	0.1
Qatar			637	48	1.3	0.0
United Arab	617	05.8	2 977	25	1.6	0.0
Emirates	04.7	95.0	2011	55	1.0	0.0
Bahrain						
Comoros						
Djibouti	52.6	116.1				
Arab region	138.9	128.4	17 433 969	25 707 812	77.1	70.8
World	67.9	65.5	592 311 011	671 496 872	111.3	94.8

TABLE 13. GROWTH OF WHEAT PRODUCTION IN ARAB COUNTRIES, 1990 AND 2012

Source: Compiled from FAOSTAT.

Note: Two dots (..) indicate that data are not available or are not separately reported.

#### (c) Land productivity of wheat

There are many factors that have direct and direct impacts on wheat yield, ranging from such climatic factors as rainfall patterns, drought and floods, to agronomic factors, including availability and price of fertilizers, fuel shortages, seed shortages, seed quality, labour shortages, pests and diseases and gender inequality. With the exception of a few countries, namely, Egypt, Lebanon, Saudi Arabia, Oman and United Arab Emirates, wheat yield is lower than the world average. While the world average yield increased by 20 per cent from 2,560 kg/ha to 3,090 kg/ha, during the period 1990-2012, the regional average rose by 28 per cent over the same period. The potential for the lower yield countries to benefit from regional cooperation is high, especially given that many of the low- and high-yield countries share similar climatic and agronomic conditions. As can be seen from table 14, if yield is increased in all countries to reach the world average level the theoretical potential increase in wheat production is substantial. Wheat production would increase by as much as 49 per cent if the low-yield countries take initiatives to increase their yields to comparable levels to that of the world average. While this potential increase in production would naturally

lower the need for hard currency to import wheat, it still needs to be calculated on the basis of an overall economic analysis that takes the cost of increasing yield into considerations. Efforts to increase wheat yield raise the need for higher regional technical cooperation as well as more coordinated and systematic targeted research and development efforts at the national level. Increased wheat productivity should not be viewed as a national objective only; rather it needs to be put within the overall regional wheat security perspective. While increasing productivity requires additional investments in the agriculture sector, indirect social and economic returns from such investments can contribute to food security and to the overall welfare of the mostly poor segments of the population. Nevertheless, this needs to be verified through socio-economic analysis to show the feasibility of adopting regional initiatives for reducing the yield gap in the region.

	Yield (kg/ha)		Potential increase in production by using the same	
	1000	2012	harvested area and increasing yield to	
Country	1990	2012	(2012) World average level $(3,090 \text{ kg/ha})^{a/2}$	
Algeria	631	1 764	75%	
Bahrain				
Comoros				
Egypt	5 197	6 582		
Djibouti				
Iraq	1 013	2 000	55%	
Jordan	1 446	1 239	149%	
Kuwait	3 125	2 200	40%	
Lebanon	1 970	3 947		
Libya	1 232	1 212	155%	
Mauritania	1 077	1 647	88%	
Morocco	1 329	1 234	150%	
Qatar	2 300	2 286	35%	
Saudi Arabia	4 646	5 200		
Somalia	370	400	673%	
Sudan <sup>b/</sup>	1 586	1 730	39% <sup>b/</sup>	
Syrian Arab Republic	1 544	2 252	37%	
Oman	2 380	3 077		
Tunisia	1 272	2 020	53%	
United Arab Emirates	2 216	7 000		
Yemen	1 583	1 809	71%	
Palestine		1 565	97%	
Arab region	1 845	2 374	49%	
World	2 560	3 090		

TABLE 14.	POTENTIAL INCREASE IN WHEAT YIELD IN THE ARAB REGI	ÍON
	(Based on 2012 production level)	

Source: Compiled by ESCWA.

*Notes:*  $\underline{a}$ / Countries with higher than the regional or world yield are excluded.

<u>b</u>/ Additional production is assumed to be divided equally between Sudan and South Sudan.

Two dots (..) indicate that data are not available or are not separately reported.

# (d) Land availability: arable land per capita

While the Arab region covers around 10 per cent of the world's land area, the share of agricultural land in the total is comparable for both, region and world, and stood at 38 per cent in 2012.<sup>47</sup> At 4 per cent of the total land area, arable land in the Arab region can be considered scarce and limited if compared with the

<sup>&</sup>lt;sup>47</sup> The World Bank, "World Development Indicators", available from <u>http://data.worldbank.org/indicator/AG.LND.AGRI.ZS</u> (accessed 30 March 2015).

share of arable land at the global scale, which stands at 11 per cent.<sup>48</sup> Within the region, countries vary in the availability of arable land in terms of per-capita share, with only five countries exceeding the world average of 0.2 ha (see figure 12). Moreover, figure 12 shows that while the area under wheat constitutes on average around 16 per cent of the total arable land at the world level, it increases to 18 per cent at the regional level and varies widely among countries. Specifically, Egypt, Morocco, Iraq, Syrian Arab Republic, Tunisia, Algeria, and Palestine have more than 25 per cent of the total arable land under wheat. As can be seen from figure 13, the average regional allocation of arable land for wheat cultivation has been fairly constant for the past two decades, at around 1-3 per cent higher than the world average. An increasing trend for allocating more arable land for wheat during the past decade is visible in some countries, including Egypt, Iraq and Morocco, while a decreasing trend is clear for Saudi Arabia and Jordan. The remaining countries seem to show either fluctuation around their 20-year averages or a slight increasing trend. There is large variability between countries in terms of land use, with Egypt allocating nearly half of its arable land to wheat; and countries characterized by high water and land availability, such as Mauritania Somalia and Sudan, allocating less than 1 per cent of their arable land for wheat cultivation. Despite the regional initiatives on food security at the political level since the 1960s and the increasingly heavy reliance on imported wheat, the data on production and productivity of wheat is evidence that those initiatives have not been effective in bringing the region any closer to achieving wheat security through increased domestic production.

From the standpoint of land availability, several countries of the region have the potential to contribute to increased production at the national and even at the regional level. With a view on land availability and the share of area under wheat in the overall arable land, Sudan, Libya, Comoros, Saudi Arabia, Somalia and Mauritania have visible potential for increased wheat production through horizontal expansion.



Figure 12 Share of arable land and in wheat harvested areas in the Arab region

Sources: Data compiled from FAOSTAT and World Bank WDI databases.

<sup>&</sup>lt;sup>48</sup> FAO defines agricultural area as "the sum of areas under 'Arable land', and 'Permanent crops', and 'Permanent pastures"; and arable land as "land under temporary agricultural crops (multiple cropped areas are counted only once), temporary meadows for mowing or pasture, land under market and kitchen gardens and land temporarily fallow (less than five years)". FAO, *FAO Statistical Yearbook 2013: World Food and Agriculture* (Rome: FAO, 2013).



Figure 13. Allocation of arable land for wheat cultivation in the Arab region, 1990-2012

When examining the impacts of increasing the area under wheat to reach a share in the total arable land similar to that of the world average (16 per cent), the results show high increase in the production of wheat as presented in table 15. The table also shows the compound impacts of the potential increase in wheat production, resulting from increased yield (discussed in the previous section) and increased area under wheat cultivation, while taking into account the critical factor of water availability.

	Area under wheat	Scenario A:	Scenario B:	Scenario C:
	as a percentage of	Increase in wheat	Increase in wheat	Increase in wheat
Country	arable land (%)	production (tons)	production (tons)	production (tons)
Algeria	25.79%	*	*	2 580 217
Egypt	47.72%	*	*	
Iraq	35.02%	*	*	1 308 000
Jordan	7.23%	**	**	28 687
Kuwait	7.50%	**	**	668
Lebanon	18.36%	*	*	
Libya	9.59%	**	**	309 850
Mauritania	0.43%	99 769	187 174	189 627
Morocco	39.05%	*	*	5 830 780
Qatar	0.16%	**	**	
Saudi Arabia	4.75%	**	**	
Somalia	0.23%	67 501	521 448	528 173
Sudan <sup>a/</sup>	0.89%	2 671 520	4 772 612	4 900 021
Syrian Arab				
Republic	34.36%	*	*	1 343 599
Oman	1.93%	14 143	14 203	14 203
Tunisia	26.56%	*	*	806 560
United Arab				
Emirates	0.01%	**	**	

TABLE 15.	POTENTIAL	INCREASE	IN WHEA'	Γ PRODUC	ΓΙΟΝ RESUI	LTING FROM
	HIGHER	YIELD AN	D HORIZO	NTAL EXPA	ANSION	

Source: Data used to construct the chart are compiled from FAOSTAT.

	Area under wheat	Scenario A:	Scenario B:	Scenario C:
	as a percentage of	Increase in wheat	Increase in wheat	Increase in wheat
Country	arable land (%)	production (tons)	production (tons)	production (tons)
Yemen	11.12%	**	**	177 108
Palestine	25.56%	*	*	17 535
Bahrain		**	**	
Comoros				
Djibouti				
Arab region	18.23%	2 852 933	5 495 437	18 035 028
World	15.57%			
Arab region: Potential increase in wheat				
as a percentage of the reported 2012		11%	22%	71%
production				

TABLE 15. (continued)

Source: Data used to calculate the potential increase in wheat production are compiled from the FAOSTAT database.

Notes: a/ Additional wheat production for Sudan is assumed to be equally divided between Sudan and South Sudan.

Scenario (a): Horizontal expansion in wheat cultivation to reach the world average of 16 per cent for ratio of wheat area to total arable land and using the prevailing national wheat yield. Applicable only for countries with arable land and water availability (Mauritania, Somalia, Sudan and Oman).

Scenario (b): Outcome of Scenario (a) + increasing yield to reach world average level. Applicable only for countries identified in scenario (a).

Scenario (c): Scenario (b) + increasing yield to reach world average level in all countries with lower than world average yield (see table 14 above).

An asterisk (\*) indicates that the scenario is not applicable given that wheat area to arable land ratio exceeds the world average.

A double asterisk (\*\*) indicates that the scenario is not applicable given that water withdrawal exceeds renewable water levels.

Two dots (..) indicate that data are not available or are not separately reported.

Despite the typology characterizing the Arab region as climatically not suited to achieve food security through internal agricultural production, and the subsequent conclusion that food security in the region is mostly trade-related, which is partly true, the region does have the potential to achieve more agricultural production with the available water and land resources. By using some world averages as benchmarks, table 15 shows that the region can achieve a considerable increase in the production of wheat reaching over 70 per cent of the 2012 production levels. Allocating more arable land to wheat and increasing yield are not easy issues to tackle, especially given the weak legal, institutional, technical and financial capacities of the agriculture sector, both at the national and regional levels. While these are certainly challenges, the future will be even more difficult if these issues are not tackled, especially with increasing global demand for food and bio-fuels coupled with the increasing prospects for internal and intraregional conflicts, all of which will decrease the economic capacity of Arab countries, especially the non-oil exporting countries, to import the needed increasing quantities of wheat and food.

#### 2. Wheat import indicators

#### (a) Wheat import dependency ratio

As illustrated in figure 11 above, the Arab region has grown to be increasingly dependent on imports to satisfy the high demand for wheat. Unless measures are taken to enhance wheat production within the region, reliance on imports will continue to grow in the foreseeable future, making the region vulnerable to global production and price volatility. Within the various approaches to measure food security, reliance on

imports is partly measured by the Cereal Import Dependency Ratio, which compares the total import of cereals to the total consumption.

Given the increasing reliance on trade to satisfy the growing wheat demand, a wheat import dependency ratio can be calculated using the same approach used for cereals. The formula used to calculate the dependency ratio assumes that long-term storage level is constant and as such consumption is determined by production, imports and exports only. Applying the formula to most countries of the region resulted in ratios that do not exceed 100 per cent. However, when it is applied to the United Arab Emirates in 2010, it resulted in a ratio of 230 per cent, which is an indication that large quantities of the imported wheat were re-exported. In order to eliminate this overlap, the net import (import minus export) is used to replace total imports, given that it measures consumption more accurately. Consequently, the formula used to measure wheat import dependency ratio is as follows:

#### *Wheat import dependency ratio = net wheat imports/(wheat production + net wheat imports).*

According to this formula, wheat import dependency ratio for 1990, 2000 and 2010 is calculated and shown in figure 14. This reveals that the regional average of the dependency ratio increased modestly from 60 per cent to 65 per cent between 1990 and 2010, and that countries can be grouped into the following three main categories: (a) those characterized as highly dependent (exceeding 80 per cent) on import, including five of the six GCC countries, namely, Bahrain, Kuwait, Oman, Qatar and United Arab Emirates, in addition to Djibouti, Jordan, Lebanon, Libya, Mauritania, Somalia, Sudan and Yemen; (b) those characterized as moderately dependent (50-70 per cent) on imports, including Egypt, Palestine and Tunisia; and (c) those countries that witnessed large fluctuations with a tendency towards higher production and lower imports, including Algeria, Iraq and Morocco. A shift in the agricultural policy in Saudi Arabia is reflected in increasing reliance on import of wheat, which will continue in the near future, thereby positioning Saudi Arabia into the first category in the coming few years. While the Syrian Arab Republic shows also some fluctuations, the country seems officially determined to continue its wheat self-sufficiency policy.



Figure 14. Wheat import dependency ratio in Arab countries, 1990, 2000 and 2010

Source: Data used to calculate the wheat import dependency ratio are compiled from FAOSTAT.

*Note:* Data for the following countries and years were not available: Palestine, 1990; Mauritania, 1990; Somalia, 2010; and Comoros, and Djibouti, 1990.

#### (b) Wheat import to total merchandise export ratio

One of the indicators that measure the economic or financial capacity of a country to withstand the burden of food imports is the ratio of the value of food import to the value of the total export of the country. The ratio is usually low in high-income countries and increases for low-income countries, which qualifies the Gross National Income (GNI) as a second "proxy" indicator. While the ratio is recognized as one of the standard FAO indicators for food security, it is not disaggregated by the different food stuff. Within the

scope of assessing wheat security, it is proposed to use a similar indicator for wheat. To calculate the wheat import to total export indicator, the following formula is used:

#### Wheat import to total export ratio = value of net wheat imports/value of total merchandise export

Although no large variations in the indicator are expected over the short term, such factors as wheat price hikes and conflicts can have a significant change in the ratio from one year to the next, particularly for the vulnerable low-income countries. Figure 15 shows that the world average has been stable around 0.25 per cent during the period 2000-2011. The average for the Arab region is around five times higher than the world average, at approximately 1.2 per cent.



Figure 15. Trend of the wheat import value to total export ratio in the Arab region, 2000-2011

Sources: Data used to calculate the ratio are obtained from the FAOSTAT and the World Bank WDI databases.

As can be seen from table 6, the regional average of the ratio is largely influenced by the GCC countries. In 2011, the average ratio increased from 1.1 per cent (3.5 times the world average) to 4.7 per cent (15.5 times the world average) when discounting the six GCC countries. While the GCC countries account for 80 per cent of total regional export value, it represents only 11 per cent of the import value of wheat. At the individual country level, all the GCC countries fall below the world average; while, at the other extreme, Djibouti, Yemen and Egypt (and possibly Comoros and Somalia) all have ratios that exceed 10 per cent (more than 33 times the world average) and thus face serious challenges to secure wheat. Given that the Arab region is more dependent on wheat than the world at large, which explains the large variation between the world and regional average of this ratio, in order to select a more realistic benchmark to assess wheat import security, the world average for the ratio on food can be discounted for the share of wheat in the calorie intake in the diet of the region. In 2011, the world average ratio of the total food import to the total export was 5 per cent. Discounting it to represent the contribution of wheat in the diet of the region (on average 34 per cent as reported in chapter II), then the proposed benchmark to classify the countries is (5\*34%) 1.7 per cent. Consequently, every country that has a wheat import to total export ratio less than 1.7 per cent is considered wheat import secure. By applying this to the countries of the region, it can be seen that, in addition to the GCC countries, Libya falls within the wheat import secure group, while the remaining countries are considered less wheat import secure.

Country	Total export	Import value of wheat $(4)$	Ratio of wheat import to total merchandise export
Country	(thousands of )	(thousands of )	(percentage)
Algeria	/3 436 310	2 848 496	3.9
Bahrain	22 561 920	3/543	0.2
Comoros			
Djibouti	363 710	101 666	28.0
Egypt	31 582 440	3 199 207	10.1
Iraq			
Jordan	7 963 490	150 026	1.9
Kuwait	87 457 020	136 306	0.2
Lebanon	4 266 860	143 872	3.4
Libya	36 440 410	420 708	1.2
Mauritania	2 458 000	98 557	4.0
Morocco	21 649 930	1 322 600	6.1
Oman	47 091 870	88 080	0.2
Palestine	518 360	21 680	4.2
Qatar	74 810 220	39 592	0.1
Saudi Arabia	364 697 700	659 339	0.2
Somalia			
Sudan			
Syrian Arab Republic	11 352 920	232 306	2.0
Tunisia	17 846 960	552 859	3.1
United Arab Emirates	252 556 000	324 260	0.1
Yemen	6 947 670	961 895	13.8
Regional average (all Arab countries)	1 064 001 790	11 338 992	1.1
Regional average (excluding GCC)	214 827 060	10 053 872	4.7
GCC countries' average	849 174 730	1 285 120	0.2
World	17 632 909 320	51 184 264	0.3
Share of the GCC countries	80%	11%	

#### TABLE 16. RATIO OF WHEAT IMPORT TO TOTAL EXPORT IN ARAB COUNTRIES, 2011

Source: Data used to calculate the ratio are compiled from the World Bank WDI database.

*Notes:* Data presented in the table are for 2011, with the following exceptions: Kuwait, 2008; Djibouti and Palestine, 2009; and Libya, Qatar and the Syrian Arab Republic, 2010.

Two dots (..) indicate that data are not available or are not separately reported.

To illustrate the combined position of the countries on the two indicators of wheat import dependency ratio and wheat import to total export ratio, figure 16 shows that for countries to achieve higher levels of wheat security, both physical and economic, they need to reduce the value of both indicators, represented as moving towards the bottom left of the chart.



Figure 16. Illustration of combined position of Arab countries on the two indicators, 2010-2011

Source: Data used to calculate the indicators are compiled from the FAOSTAT database.

# (c) Gross National Income (GNI) per capita

Another indicator of the economic and financial capacity to withstand wheat imports is the GNI of the countries. With an average GNI per capita of nearly \$7,200, Arab countries, as a region falls within the upper middle-income category according to the World Bank classification.<sup>49</sup> Within the region, countries vary widely, ranging from nearly \$80,000 per capita in Qatar to less than \$1,000 per capita in Comoros (see table 17). By using the World Bank classification of countries on the basis of income, countries of the region can be grouped into two groups of wheat import security, namely: (a) the "wheat import secure", representing countries that fall in the high-income category, including Bahrain, Kuwait, Oman, Libya, Qatar, Saudi Arabia and United Arab Emirates; and (b) the "less wheat import secure" that includes all the remaining Arab countries. This grouping coincides with that concluded using the wheat import to total export ratio.

Country	GNI per capita, Atlas (\$)	Country	GNI per capita, Atlas (\$)
Algeria	4 970	Mauritania	1 040
Bahrain	19 560	Oman	25 250
Comoros	840	Palestine	2 810
Djibouti	1 030	Qatar	78 060
Egypt	2 980	Saudi Arabia	24 660
Iraq	6 130	Somalia	
Jordan	4 660	Sudan	1 460
Kuwait	44 940	Syrian Arab Republic	1 850
Lebanon	9 520	Tunisia	4 240
Libya	12 930	United Arab Emirates	38 620
Morocco	2 910	Yemen	1 220
Arab region	7 179		
World (total)	10 235		
World Bank "High	-income economies"		Greater than 12 745

TABLE 17. GROSS NATIONAL INCOME (GNI) IN ARAB COUNTRIES, 2012

Source: Data compiled from the World Bank WDI database.

*Note:* Data presented in the table are for 2012, with the following exceptions: Djibouti, 2005; Kuwait, 2011; Libya, 2009; and Syrian Arab Republic, 2008.

#### C. CLASSIFICATION OF ARAB COUNTRIES ON WHEAT SECURITY

<sup>&</sup>lt;sup>49</sup> Ibid.

Having developed the assessment framework and identified the indicators that reflect the impact on wheat availability, it is useful to use the indicators in defining the level of wheat security in Arab countries. Benchmarks for the criteria that are used to position countries into the various security levels are listed in table 18.

Criteria	Benchmarks
High wheat production	Per-capita wheat production > world average of 94.8 kg
Low wheat production	Per-capita wheat production < world average of 94.8 kg
	GNI per capita > \$12,745 (World Bank lower limit for high-income economies), or a
High economic capacity	wheat import to total export ratio $< 1.7\%$
	GNI per capita < \$12,745 (World Bank minimum limit for high-income economies),
Low economic capacity	or a wheat import to total export ratio $> 1.7\%$
Land available <sup>a/</sup>	Per-capita arable land $=> 50\%$ of the world average of 0.2 ha.
Land unavailable	Per-capita arable land $< 50\%$ of the world average of 0.2 ha.
Water available	Freshwater withdrawal to total renewable water resources ratio < 100%.
Water unavailable	Freshwater withdrawal to total renewable water resources ratio > 100%

TABLE 18. BENCHMARKS FOR THE CRITERIA USED TO DEFINE WHEAT SECURITY IN ARAB COUNTRIES

Source: Compiled by ESCWA.

TABLE 10 CLASSIFICATION OF ADAD COUNTRIES

Note: a/ This benchmark is determined on the basis of achieving a per-capita production of 130 kg/yr and assuming a maximum allocation of 50 per cent of arable land to wheat under the prevailing average regional wheat yield.

In order to classify the countries according to the two main elements of wheat security (production and import), it is important to account not only for both production and import levels but also for the impacts of water and land availability as determinant factors for wheat availability. Accordingly, table 19 shows the position of countries with regard to their production and import capacities. To translate these positions into a security level, it is proposed that countries that combine both high economic capacity to import wheat with high wheat production can be identified as highly secure, while those that have either high production or high economic capacity can be identified as less secure, and those with low production and low economic capacity can be identified as insecure. For each of the three security levels, additional information of the potential for enhanced production in terms of water and land availability is clarified. Table 19 shows that no Arab country is highly secure, and while 10 countries are considered wheat insecure, 12 countries are categorized as less secure.

TABLE 19.	CLASSIFICATION OF ARAB	COUNTRIES ACCORDING TO	WHEAT SECURITY INDICATORS, 2012

		land unavailable		land available		
Whea	t security			Water		Wheat security
criter	ia	Water unavailable	Water available	unavailable	Water available	level
	High					
uc	Economic					
cti	Capacity	-	-	-	-	Highly secure
High Produ	Low Economic Capacity	Egypt		-	Algeria <sup>*</sup> , Morocco, Syrian Arab Republic, Tunisia	
ų	Economic	Oatar. United		Libva, Saudi		
w ictic	Capacity	Arab Emirates	Oman	Arabia	-	Less secure
Lo	Low		Djibouti,		Comoros, Iraq,	
Pro	Economic		Lebanon,		Mauritania,	
	Capacity	Jordan, Yemen	Palestine	-	Somalia, Sudan	Insecure

Source: Compiled by ESCWA.

Note: \* At 90 kg production per capita, Algeria is close to world average of 94.8 kg/cap.

# IV. WHEAT WITHIN REGIONAL INITIATIVES ON FOOD SECURITY

As the population in Arab countries grows the concern of not being able to accommodate for its dietary needs also grows. Arab governments of food insecure countries are in a dire need to find a solution to this challenge, particularly in the light of the recent (and in some cases ongoing) Arab uprisings that were demanding proper food among other services and reforms. It is argued, for instance, that the conflict in Syrian Arab Republic was triggered by many factors, including the long drought over the period 2006-2011 which limited the availability of water and productive land resources for adequate food production.<sup>50</sup> In Egypt, it was reported that during the protests of 2011, demonstrators were chanting for "bread, freedom, and social justice".<sup>51</sup> Some Arab countries are presently trying to tackle corruption, starting social and economic reforms and embarking on development projects as preventive measures against social unrest in their countries. Fighting hunger and closing the food gap as measures to achieve food security are usually among the priority socio-economic development goals of many Arab countries.

Many attempts at achieving food security in the Arab region have taken place over the past five decades through different means, including, among others, regional agreements, bilateral contracts and trade agreements, shared resources agreements and attempts at self-sufficiency. To date, none has accomplished its goal in a sustainable manner. The large disparity among Arab countries in terms of GDP has led to different measures taken to achieve food security, with high-income economies such as the GCC countries relying on their oil remittance to import food, while poor countries such as LDCs partially depending on foreign investments and food aid programmes.

This chapter aims to highlight a number of different initiatives that have taken place over the past five decades at both regional and national levels, and sheds light on the reasons that have kept these attempts from succeeding, with a specific focus on wheat, which is the main food commodity across the Arab region.

#### A. FOOD SECURITY INITIATIVES AT THE REGIONAL LEVEL

Ever since its creation in 1945, the League of Arab States (LAS) has served as a regional platform for intraregional cooperation in many fields. Realizing the importance of regional cooperation to improve the agricultural sector, and thus livelihood of the Arab population, LAS has taken many initiatives during the past five decades aimed at achieving that goal.

In an effort to accentuate the development of agriculture and to introduce professional technical expertise in food production across the region, LAS signed an agreement with FAO in 1960 to cooperate in all agricultural technical and policy-related issues.<sup>52</sup> In 1993, a cooperation agreement was signed between LAS and the International Fund for Agricultural Development (IFAD), with special emphasis on agricultural and rural development.<sup>53</sup> Another memorandum of understanding was signed between the GCC and IFAD in 2014 aimed at improving water and land use efficiencies, controlling environmental pollution and mitigating the impacts of climate change.<sup>54</sup>

<sup>&</sup>lt;sup>50</sup> J. Sowers, J. Waterbury and E. Woertz, "Did Drought Trigger the Crisis in Syria?", *Footnote* (12 September 2013), available from <u>http://footnote1.com/did-drought-trigger-the-crisis-in-syria/</u> (accessed 30 March 2015).

<sup>&</sup>lt;sup>51</sup> T. Perry and A. Youssef, "Special Report: Egypt's Brotherhood turns to flour power", *Reuters* (13 June 2013), available from <u>http://www.reuters.com/article/2013/06/13/us-egypt-brotherhood-bread-specialreport-idUSBRE95C07P20130613</u> (accessed 30 March 2015).

<sup>&</sup>lt;sup>52</sup> More information is available at the League of Arab States website, available from <u>http://www.lasportal.org</u>/ (accessed 30 March 2015).

<sup>53</sup> Ibid.

<sup>&</sup>lt;sup>54</sup> IFAD, "The Cooperation Council for the Arab States of the Gulf and IFAD join forces for poverty reduction" (2014), available from <u>http://www.ifad.org/media/press/2014/10.htm#sthash.4VLIImRL.dpuf</u> (accessed 30 March 2015).

In order to establish a regional platform where Arab countries can exchange experiences and propose policies on food and agricultural related issues, several regional institutions were established during the 1970s under the political umbrella of LAS. In 1970, the Arab Organization for Agricultural Development (AOAD) was created with the aim of coordinating between national agricultural policies, natural and human resources as well as economic development, towards achieving the ultimate goal of a fully integrated Arab economy.<sup>55</sup> After the repercussions of Arab-Israeli war of 1973 on food security in some Arab countries, intraregional food production became an important issue and drove LAS to further stress the importance of the agriculture sector by establishing the Arab Authority for Agricultural Investment and Development (AAAID) in 1976, with a mission to promote food security across the Arab region. A total of 12 countries (Algeria, Egypt, Iraq, Kuwait, Mauritania, Morocco, Qatar, Saudi Arabia, Somalia, Sudan, Syrian Arab Republic and United Arab Emirates) participated and became members of this initiative upon launching. Soon after, all remaining Arab countries joined AAAID with the exception of Libya, which supported its establishment but never became a member.<sup>56</sup>

In 2008 and in response to the global food price hikes, the General Assembly of AOAD (comprising Ministers of Agriculture of LAS member countries) adopted the "Riyadh Declaration to enhance Arab cooperation to face world food crises". The Declaration called for the development of the Emergency Arab Food Security Programme with the aim to "increase and stabilize food production in the Arab world, especially the production of cereals, oilseeds and sugar, and calling all concerned parties to cooperate and coordinate in preparing this programme at both national and Pan Arab levels".<sup>57</sup>

On the basis of the Riyadh Declaration and the associated resolutions of the General Assembly, the Emergency Arab Food Security Programme was prepared and launched at the first Economic and Social Arab Summit (Kuwait, 19-20 January 2009), resulting in a resolution mandating AOAD to monitor the implementation the Programme. In order to facilitate the monitoring process, AOAD was tasked by its Executive Council to prepare an action plan for the implementation of the Programme, which was subsequently drafted and approved by the Executive Council of AOAD. The second Economic and Social Arab Summit (Sharm El Sheikh, Egypt, 19 January 2011) reiterated its call for AOAD to continue monitoring the implementation of the Programme in accordance with the developed action plan.

The action plan proposed a modality of implementation that divides the Programme into three parallel phases: a short term (2011-2016), a medium term (to 2021) and a long term (to 2031). Furthermore, the Programme includes the following three main components: (a) improving current agricultural production levels; (b) increasing investment in additional land resources to benefit from water savings of increased irrigation efficiency projects and in the utilization of non-conventional water resources; and (c) integrating investment projects related to the Programme activities. The action plan defines the geographical scope of the Programme to include 12 countries (Algeria, Egypt, Iraq, Jordan, Mauretania, Morocco, Oman, Saudi Arabia, Sudan, Syrian Arab Republic, Tunisia and Yemen) for the first and second components; and while, in principle, it is possible for other Arab countries to join the first two components, all Arab countries are included in the third component.

On the implementation of capacity-building activities of the first phase, AOAD has conducted 157 training workshops in several countries with participation from almost all Arab countries, of which only five workshops were devoted to wheat with a total of around 50 participants from selected countries. As for the implementation of national and regional field activities within the framework of the Emergency

<sup>&</sup>lt;sup>55</sup> See the website of the Arab Organization for Agricultural Development (AOAD), available from <u>http://www.aoad.org/about.htm</u> (accessed 30 March 2015).

<sup>&</sup>lt;sup>56</sup> See the website of the Arab Authority for Agricultural Investment and Development (AAAID), available from <u>http://www.AAAID.org/</u> (accessed 30 March 2015).

<sup>&</sup>lt;sup>57</sup> AOAD, "Riyadh Declaration to Enhance Arab Cooperation to Face World Food Crises" (2008), available from <u>http://www.aoad.org/strategy/RiadhDeceng.pdf</u> (accessed 30 March 2015).

Programme, a single activity on wheat was implemented in Mauritania, where AOAD provided advisory services and technical support to supervise the cultivation of 3,000 ha of wheat.<sup>58</sup>

In 2012 and in response to the Arab Food Security Emergency Programme, 71 projects were executed in nine countries (Egypt, Iraq, Jordan, Oman, Mauritania, Morocco, Sudan, Tunisia and Yemen) targeting the improvement of productivity and yield of some crops, especially wheat, oil seeds and date palms. The outcome of the projects on wheat was reported as promising, especially in Iraq and Yemen.

The region has recognized the importance of food storage as an effective tool to overcome temporal spikes in food prices as well as the risks of food supply disruptions resulting from climate and weather conditions or from political issues (including, for example, trade sanctions, unexpected tariffs, conflicts and embargoes). While there is still a lack of unified vision on food storage regionally, the theme of the Arab Agriculture Day in 2014 (celebrated on 27 September) was "Arabic strategic stocks of food to cope with the global food crisis". Individual countries have been active building their storage capacity, especially for cereals, with various levels of projections (see table 20). In an effort to reduce the high crop losses in Egypt, estimated at 10-15 per cent and costing around \$280 million annually, the Government of Egypt is planning for a project that aims to build 25 new silos per year in an effort to increase substantially its strategic storage capacity.

	Present storage level, 2010-1011	Projected storage level, 2015 onwards
Country	(months)	(months)
Algeria	5	6.9
Bahrain	8	16.6
Egypt <sup>a/</sup>	2.5 million tons	3.9
Jordan <sup>b/</sup>	6	10 to 13 (2014)
Lebanon	2.6	
Morocco	3	6.1
Oman	3-5	17
Qatar	7	13
Saudi Arabia	10.6	12.9
Syrian Arab	11	12.8
Republic	11	13.8
Tunisia	4.3	6.4
Yemen	3.6	

TABLE 20.         PRESENT AND PROJECTED WHEAT STORAGE	IN SOME A	<b>A</b> RAB	COUNTRIES
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*Source*: The World Bank and FAO, "The Grain Chain: Food security and managing wheat imports in Arab countries" (2012). Available from <u>http://www.fao.org/fileadmin/templates/tci/pdf/MENA-WB-The\_Grain\_Chain\_ENG\_.pdf</u> (accessed 30 March 2015).

*Notes*: <u>a</u>/ For Egypt, see also *Al Masri Al-Yawm* (14 August 2014). Available from <u>http://www.almasryalyoum.com/</u> <u>news/details/501507</u>; (accessed 30 March 2015)

b/ For Jordan, see also Zawya (22 August 2014). Available from <u>https://www.zawya.com/ar/story/الأردن مخزون/ZAWYA20140822070302/</u> (accessed 30 March 2015).

Two dots (..) indicate that data are not available or are not separately reported.

<sup>&</sup>lt;sup>58</sup> LAS, "Report of the LAS Secretary General on follow up of the execution of the decisions of the Arab Economic and Social Development Summit" (2011), available from <u>http://www.lasportal.org/wps/wcm/connect/7a637b804e0bd2a3b11bff31fcbed8</u> <u>c8/4+las+sumit+report+res+18.pdf?MOD=AJPERES</u> (accessed 30 March 2015).

#### B. FOOD SECURITY INITIATIVES ON A NATIONAL LEVEL

Another important issue related to food security is wastage of food at both production and consumption. AOAD reports total post-harvest losses of 7 million tons of cereals, of which over 50 per cent is wheat, representing around 13 per cent of total wheat production. To mitigate these losses, AOAD identified several measures that need to be implemented, among which are the development of storage and transport infrastructure, such as refrigerated warehouses, silos and refrigerated transport means, and the improvement of marketing services and information systems.

At the national level, many Arab countries adopted several approaches to promote food waste reductions, whether through official policies, national programmes or other unofficial societal initiatives. An example of the last is the establishment of the "Egyptian Food Bank" in 2006 aimed at ending hunger by 2020 by limiting food waste and distributing saved food to the needy. The success achieved by this initiative led to the creation of the "Food Banking Regional Network" in 2013 and prompted its replication in Iraq, Jordan, Lebanon, Mauritania, Saudi Arabia, Sudan, Syrian Arab Republic and Tunisia, with prospects to spread into Bahrain, Djibouti, Kuwait, Libya, Morocco, Palestine and Yemen.<sup>59</sup>

In 2008, Qatar launched the "Qatar National Food Security Programme" which aims at higher efficiency production and better crop-selection, thereby locally producing substantially larger quantities of the nation's food requirements using the same agricultural land and even less water than is currently utilized.<sup>60</sup> Whereas Saudi Arabia aims to phase out wheat production by 2016 and become totally reliant on imports, the United Arab Emirates is planning to introduce domestic wheat cultivation in an effort to reduce the import-production gap.<sup>61</sup>

# 1. Integration through bilateral investments

Intraregional cooperation in agricultural production has always been a goal of the various LAS initiatives. It is logical and fruitful to think of the marriage between natural resources (land and water) that are available in some countries, such as Mauritania, Sudan and the Syrian Arab Republic, and the economic capacity of the GCC countries. The natural outcome of such cooperation is agricultural development in the countries that have high potential for expansion and higher productivity through investments by the higher income countries. The resulting benefits would cover both producing and investing countries, thereby contributing to higher food security of the region. Several examples of bilateral cooperation are discussed briefly below.

#### (a) Jordan and Sudan

The Government of Sudan signed an agricultural protocol with its counterpart in Jordan in 1998 entitling Jordan to 26,800 ha of land in the River Nile State (300 km north of Khartoum) and another 8,800 ha south of Khartoum. However, the project was never commissioned, which led the Government of Sudan to set 2009 as a deadline to start implementing the agreed investment plans or risk losing the rights to the designated land. Several references reported differently on this issue, but almost all agree that the delay was the result of a lack of interest from the private sector in Jordan. However, a closer look revealed that although two companies, namely, Barakat and Hijazi and the Ghoshe Group, were seriously interested in the project, financing was the main obstacle facing implementation. This project was estimated to cost the Government of Jordan approximately \$115 million, which included costs of the infrastructure to connect the

<sup>&</sup>lt;sup>59</sup> Food Banking Regional Network, available from <u>http://www.foodbankingregionalnetwork.com/language/en/</u> (accessed 30 March 2015).

<sup>&</sup>lt;sup>60</sup> Qatar National Food Security Programme, available from <u>http://portal.www.gov.qa/wps/portal/topics/Environment</u> <u>+and+Natural+Resources/National+Food+Security+Program</u> (accessed 30 March 2015).

<sup>&</sup>lt;sup>61</sup> Ibid.

designated land to the electricity grid and waterworks to draw irrigation water from the Nile. The proposed setup was a public-private partnership modality and despite the economic feasibility of the project, weak commitment by the Jordanian Government led to the withdrawal of the private sector from the project.<sup>62</sup> However, in August 2014, Jordan announced plans to invest in developing 16,800 ha of agricultural land allocated by the Sudanese Government for Jordan. Implementation of these plans is pending the approval of the Joint Jordanian-Sudanese Agricultural Committee.<sup>63</sup>

#### (b) Djibouti and Sudan

Djibouti has also shown an interest in investing in Sudan, where the Djibouti Society of Food Security (Société Djiboutienne de Sécurité Alimentaire) signed a contract with the Government of Sudan entitling it to 4,200 ha of arable land to grow wheat.<sup>64</sup> Although the cultivation of 4,200 ha represents a relatively small contribution to the total wheat supply in Djibouti, it marks a step towards greater regional cooperation, especially given that both Djibouti and Sudan are among LDCs of the Arab region.

### (c) The GCC countries and Sudan

The GCC countries, through a number of semi-public investment companies, have acquired arable land in a number of countries. In 2008, the Saudi agribusiness firm HADCO benefited from a Government-backed loan to invest in offshore agricultural production, developing 10,117 ha of Sudanese land north of Khartoum to produce food and fodder crops for export to Saudi Arabia.<sup>65</sup> In February 2009, HADCO announced that it was conducting tests on whether to plant wheat or corn in Sudan, and revealed plans to lease another 32,756 ha of farmland from Sudan within the next five years.<sup>66</sup> Additionally, Al Dahra Agricultural Company, an agricultural production and investment company in the United Arab Emirates, leased 34,802 ha of arable land in Sudan and is currently growing wheat, barley, maize, sunflower, cotton, sugarcane and hay.<sup>67</sup> In 2012, the Qatari investment company, Hassad Food, started implementing a three-year project with the Government of Sudan to develop 101,172 ha of land to produce wheat, corn and soya.<sup>68</sup> The existing inefficient legal and institutional frameworks and weak infrastructure have been cited in many cases as the main cause for delays and even the failure of some bilateral initiatives and investments in the agricultural sector.

# (d) United Arab Emirates and Egypt

A food company in Abu Dhabi in the United Arab Emirates, namely, Jenaan, has accumulated approximately 67,200 ha of arable land in Egypt since 2007 to grow fodder to feed livestock in the United Arab Emirates. The company eventually switched to growing wheat intended for consumption within Egypt, since an export tax of \$43 per ton was unexpectedly imposed, along with such logistical problems

<sup>67</sup> Ibid.

<sup>&</sup>lt;sup>62</sup> J.M. Hopma, "Planning in the wind: the failed Jordanian investments in Sudan", LDPI Working Paper 22 (The Land Deal Politics Initiative, 2013).

<sup>&</sup>lt;sup>63</sup> Farmlandgrab.org, "Jordan agriculture minister discusses investment in Sudan" (13 August 2013), available from <u>http://www.farmlandgrab.org/post/view/23825</u> (accessed 30 March 2015).

<sup>&</sup>lt;sup>64</sup> Land Matrix, available from <u>http://landmatrix.org/en</u>/ (accessed 30 March 2015).

<sup>&</sup>lt;sup>65</sup> C. Smaller and H. Mann, "A thirst for distant lands: Foreign investment in agricultural land and water" (Winnipeg: International Institute for Sustainable Development, 2009) available from <u>http://www.iisd.org/pdf/2009/</u> thirst for distant lands.pdf (accessed 30 March 2015).

<sup>&</sup>lt;sup>66</sup> S. Karam, "Interview – Saudi's Hadco eyes Sudan, Turkey in food security push", *Reuters* (16 February 2009), available from <u>http://www.reuters.com/article/2009/02/16/saudi-agriculture-idAFLG68511620090216</u> (accessed 30 March 2015).

<sup>&</sup>lt;sup>68</sup> Ibid. See also Hassad Food, "Hassad Food closes major Sudan deal", available from <u>http://www.hassad.com/</u> <u>inthenews1.html</u> (accessed 30 March 2015).

as shortages of diesel and labour strikes. This problem along with some other unsuccessful deals in the region shifted the attention of some GCC countries towards investing in more developed countries in the European Union and the United States, which presented a safer investment environment. In their quest for higher food security, some countries have also acquired some European agricultural companies in Sweden and other EU countries<sup>69</sup>.

# (e) Egypt and Sudan

In 2014, Egypt announced plans to lease 25,000 ha of agricultural land to Arab investors in a plan to develop sustainably the country's agriculture sector.<sup>70</sup> After the uprising of 2011, the Government of Egypt signed a tentative agreement with its counterpart in Sudan, allocating approximately 1 million acres of arable land in Sudan for Egypt to grow such primary crops as wheat in an attempt to close the food deficiency gap of both countries. Additionally, the Egyptian investment company, Citadel Capital, signed a contract with the Sudanese Government in 2007, leasing 106,680 ha of agricultural land to produce wheat.<sup>71</sup> However until 2011, only 4,382 ha had been cultivated as per the company's yearly report of 2012. In 2012, the company developed an additional 2,838 ha of farmland and cultivated around 2,023 ha of hybrid sorghum in 2012, raising the total use of its agricultural investment to 6,893 ha.<sup>72</sup>

This study does not aim to make an inventory of all bilateral agricultural projects in the region and the cases cited above are only examples to illustrate that large-scale projects usually need smaller preliminary projects to build trust, identify gaps in the existing legal and institutional systems and streamline the required rules and procedures for efficient and productive projects to both sides. Generally, the issue of "offshore" agricultural investment has been viewed by many negatively and is associated with "land grab", a term conceived to highlight the adverse impacts on the local population of host countries. It is not within the scope of this study to analyse offshore agriculture investments. However, there is a need to highlight that intraregional agricultural investment between Arab countries that have been part of a regional process aimed at integration since the 1940s and that claim high levels of solidarity do have special specificities when compared to other projects in other parts of the world. Intraregional cooperation in agricultural production has additional social and cultural dimensions generated from the sense of the common origin of the entire region, with national borders less than 100 years old. Specifically, investment by Saudi Arabia in Sudan's agriculture is not the same as Saudi investment in Vietnam, where the latter is only assessed purely on its economic merits. Despite this, for intraregional agricultural investment to succeed, the correct enabling environment needs to be created with proper safeguards for the local farmers and land owners, as well as the overall food security concerns of both investing and host countries.

Within the framework of the Arab Food Security Emergency Programme, Arab countries are expected to cooperate by promoting intraregional trade and lowering taxes and tariffs on food commodities. However, the report of the Secretary General of LAS on the implementation of the resolutions of the 2011 Arab Economic and Social Development Summit highlighted many complaints on the lack of commitment of countries, particularly on issues related to the enabling environment for investment in agriculture with stalled progress on agricultural credits, loans and support to local small farmers.<sup>73</sup>

<sup>&</sup>lt;sup>69</sup> M. El-Dahan, "Gulf States seek food security in Europe, US after African problems", *Reuters* (30 December 2013), available from <u>http://www.reuters.com/article/2013/12/30/gulf-food-investment-idUSL5N0JI0WV20131230</u> (accessed 30 March 2015).

<sup>&</sup>lt;sup>70</sup> L. Balbo, "Arab investors and land grabbers wanted by Egypt", *Green Prophet* (24 April 2014), available from <u>http://www.greenprophet.com/2014/04/arab-investors-and-land-grabbers-wanted-by-egypt/</u> (accessed 30 March 2015).

<sup>71</sup> Ibid.

<sup>&</sup>lt;sup>72</sup> Citadel Capital, "Leading change: 2012 annual report", available from <u>http://www.qalaaholdings.com/publications-files/Files/annual-report-2012.pdf</u> (accessed 30 March 2015).

<sup>&</sup>lt;sup>73</sup> AOAD, "Arab food security report 2012" (in Arabic), available from <u>http://www.aoad.org/Arab%20food%</u> 20security%20report%202012.pdf (accessed 30 March 2015).

### C. ENVIRONMENTAL CONSTRAINTS AND THE NEED FOR OPTIMIZED MANAGEMENT OF NATURAL RESOURCES

#### 1. Land and water factors

Given that the mandate of AAAID calls for achieving food security in the Arab region, part of its investment has concentrated on agricultural production. Based on the action plan of the Arab Food Security Emergency Programme, AAAID issued an investment plan in 2012 for major agricultural projects, which includes four scenarios to reduce the gap in food security.<sup>74</sup> Since wheat is central to food security in the region, the proposed plan includes possibilities to increase production through both horizontal expansion as well as increase in yield, similar to the approach proposed in chapter III of this study. While both approaches adopt land and water availability as the main criteria to select countries with expansion potential, AAAID proposes an increase in cultivated land by 4.2 million ha, of which 2.0 million ha and 1.25 million ha are proposed in Sudan and Egypt, respectively. As discussed in chapter III, Egypt already allocates around 50 per cent of its arable land for wheat, and with less than the world average per-capita share of arable land, and water withdrawal exceeding the sustainable renewable level, Egypt is considered both a land- and water-scarce country. Prospects for higher productivity are also not realistic given that Egypt falls within the high yield countries exceeding the world average by more than twofold.

The other two countries identified for potential expansion in wheat are Iraq and Morocco with 0.6 million ha and 0.35 million ha, respectively. Additionally, with high allocations of arable land to wheat in both Iraq (35 per cent) and Morocco (40 per cent), it is not practical to assume high increase in wheat production, particularly from horizontal expansion, although there is some potential from increasing the prevailing lower than world average yields. From both land and water availability, Sudan has the potential to increase wheat production through both enhanced yield as well as horizontal expansion. Other countries, such as Mauretania and Somalia, do not face similar limitations in land and water that would impede an increase in wheat production.

It may be argued that some of these countries do not have the labour force necessary for increased agricultural production, and Somalia may not be easily accessible owing to internal conflicts. Apart from internal political conflicts, which are important factors that usually repel foreign investments, unemployment in LDCs is high and the prospect to invest in the agricultural sector is always an effective strategy for employment generation. Investing in the relatively water- and land-rich LDCs of the region is aligned with the notion of global and regional social responsibility, while at the same time serving both to enhance regional food security and strengthen solidarity among countries of the region.

An important issue of concern is reliability of the data needed to develop sound policies and strategies. High discrepancies have been noted between national, regional and global data sources. While AOAD reports an increase of sixfold in wheat cultivated land and an increase of 24 per cent in productivity during the period 2011-2012 in Iraq, leading to an increase in production by 306,000 tons, FAO reports a decrease of around 16 per cent in wheat harvested land and nearly 15 per cent in overall production.<sup>75</sup> Both sources claim that the data originate from official sources. It is important therefore that countries and specialized regional agencies put efforts to standardize data processes so as to align with internationally accepted norms and standards.

Besides land, water is the other main determinant of agriculture in the Arab region. Water availability is usually measured as the level of renewable water resources per capita, which is the standard indicator used to express the level of water scarcity (see chapter III). Besides irrigated agriculture, the level of agricultural

<sup>&</sup>lt;sup>74</sup> AAAID, "Arab agricultural investment map to implement large agricultural projects" (2012).

 $<sup>^{75}</sup>$  Ibid. For contrasting figures, see FAOSTAT database, available from <u>http://faostat3.fao.org/home/E</u> (accessed 30 March 2015).

activity in a country depends also on water availability through direct precipitation. Rain-fed farming constitutes a significant part of cereal production globally and is therefore dependent on the level and reliability of precipitation. Studies predict changes in temperature and the level and pattern of precipitation in the Arab region resulting from the impact of climate change on weather patterns. The prospects of extensive growth in rain-fed wheat production are not realistic given the low levels and increasingly erratic precipitation patterns in the Arab region. Table 21 shows that annual average precipitation in eight countries fall below 100 mm; and, with the exception of Comoros and Lebanon, all other Arab countries fall below the 400 mm mark. While national precipitation averages do not reveal the potential for rain-fed agriculture at the sub-national level, where precipitation could be much higher, the national low levels coupled with the potential impacts of climate change are indicators that lower the prospects for significant expansion in rain-fed agricultural production. Nevertheless, adoption of good agricultural practices could enhance production in both rain-fed and irrigated agriculture.

Country	Precipitation	Country	Precipitation
Algeria	89	Morocco	346
Bahrain	83	Palestine	402
Comoros	900	Oman	125
Djibouti	220	Qatar	74
Egypt	51	Saudi Arabia	59
Iraq	216	Somalia	282
Jordan	111	Sudan	250
Kuwait	121	Syrian Arab Republic	252
Lebanon	661	Tunisia	207
Libya	56	United Arab Emirates	78
Mauritania	92	Yemen	167

 TABLE 21. LONG TERM AVERAGE PRECIPITATION IN ARAB COUNTRIES, 2014

 (Millimetres per annum)

Source: AQUASTAT database.

#### 2. Technological solutions and alternative crops for wheat

In their constant search for ways to achieve food security, some Arab countries are cooperating with regional research institutions aimed at enhancing food production through proper management of their natural resources. In this regard, the International Centre for Agricultural Research in the Dry Areas (ICARDA) is cooperating with several Arab countries on wheat-related research aimed at using technological advances to enhance land and water productivities.

An example of cooperation between ICARDA and the Arab region is a project on promoting integrated technology packages that includes five countries, namely, Egypt, Morocco, Sudan, Syrian Arab Republic and Tunisia. The project introduces improved wheat varieties and more efficient crop and resource management practices. Field trials are under way at eight sites representing the major ecologies in each of the participating countries. In El Sharkia governorate in Egypt, the project demonstrated savings of 20 per cent in irrigation water and an increase of 25 per cent in wheat yields. In Morocco, an increase of 60 per cent in the production of irrigated wheat was reported as a result of improved agricultural practices. In Tunisia, the project reported an improvement of 28 per cent of yield for irrigated wheat in the Chebika region and an increase of 17 per cent for rain-fed wheat in the Fernana region. According to ICARDA, there are real prospects that these technologies could close the wheat yield gap for the Arab region.<sup>76</sup>

<sup>&</sup>lt;sup>76</sup> ICARDA, "Food Security Project", available from <u>http://www.icarda.cgiar.org/food-security-project</u> (accessed 30 March 2015).

Furthermore, the LAS-affiliated Arab Centre for the Studies of Arid Zones and Dry Lands (ACSAD) has been working on developing high-quality wheat seeds. ACSAD has been promoting the use of these seeds across the region with an aim to increase both wheat water productivity and yield. ACSAD projects have targeted mainly some of the low wheat yield countries, including Algeria, Jordan, Iraq, Lebanon, Libya, Mauritania, Morocco, Sudan, Syrian Arab Republic, Tunisia and Yemen.<sup>77</sup>

A number of Arab countries, with the support of FAO, have been looking into alternative solutions to reduce their reliance on wheat for their dietary needs through the introduction of other crops, such as quinoa. FAO launched a regional project aimed at providing technical assistance for the introduction of quinoa in Algeria, Egypt, Iraq, Lebanon, Mauritania, Sudan and Yemen, as well as assisting in institutionalizing its production. According to a representative from FAO, as the world "faces the alarming challenge of enhancing the production of quality food to feed a growing population in a changing climate, quinoa could offer an alternative food source for countries suffering from nutrition and food insecurity".<sup>78</sup> Quinoa is characterized by its richness in essential nutrients and ability to adapt to different ecological environments and climates. It is claimed to be resistant to drought, as well as to poor and high salinity soils. Furthermore, two demonstration sites were selected in Lebanon to test production levels and its feasibility in the Lebanese market. The project includes training workshops and other capacity-building activities for farmers, practitioners and other staff of the agricultural sector.<sup>79</sup>

#### D. BOTTLENECKS GOVERNING WHEAT PRODUCTION AND IMPORT

Natural resources represent an important constraint when it comes to wheat production. Poorly managed natural resources are in fact a determining factor leading partially to food insecurity. However, they are not the only factors that determine food security in the Arab region. Besides land and water availability, factors that define the enabling environment for food security (and wheat availability) include, among others, geopolitics, conflicts, climate change, infrastructure adequacy and trade policies. These are described briefly below.

# 1. Conflicts and geopolitical considerations

The recent conflict in the Syrian Arab Republic, which has resulted in a large influx of refugees to neighbouring countries, notably Iraq, Jordan and Lebanon, has stretched the economies of these countries and placed a substantial burden on their food markets (production and import).<sup>80</sup> As of the end of 2011, wheat consumption rose to new records in both Jordan and Lebanon, reaching 865,000 and 600,000 tons, respectively. Triggered by the movement of displaced people from the Syrian Arab Republic, demand for wheat continued to grow and is currently at 950,000 tons in Jordan and 765,000 tons in Lebanon.<sup>81</sup> The continued conflict in the Syrian Arab Republic was a factor in the decision by the Government of Jordan to increase its strategic wheat reserve. Furthermore, and in response to the Syrian crisis and its repercussions on the rest of the region, FAO prepared a regional agricultural response plan in addition to a number of national agricultural response plans for Egypt, Iraq, Jordan, Lebanon and Turkey.

<sup>&</sup>lt;sup>77</sup> See the ACSAD website, available from http://acsad.info/index.php/en/ (accessed 30 March 2015).

<sup>&</sup>lt;sup>78</sup> "Quinoa to make a grand entry to Lebanon's agriculture calendar", *The Daily Star* (11 September 2014), available from <u>http://www.dailystar.com.lb/Life/Lubnan/2014/Sep-11/270258-quinoa-to-make-a-grand-entry-to-lebanons-agriculture-calendar.ashx</u> (accessed 30 March 2015).

<sup>79</sup> Ibid.

<sup>&</sup>lt;sup>80</sup> World Food Programme, "Syrian refugees and food insecurity in Iraq, Jordan and Turkey: Secondary literature and data desk review" (2013), available from <u>http://data.unhcr.org/syrianrefugees/download.php?id=2762</u> (accessed 30 March 2015).

<sup>&</sup>lt;sup>81</sup> Data are from the United States Department of Agriculture (<u>http://www.indexmundi.com/</u>, accessed 30 March 2015).

All the plans focus on improving smallholder food production in the border areas with the Syrian Arab Republic.<sup>82</sup>

Increasing reliance on food imports can place countries at higher risks of global price shocks, shortages or trade sanctions. Some Arab countries import substantial quantities of food from limited number of suppliers whereas others take a more conservative approach and diversify their suppliers. Saudi Arabia, for example, imported approximately 70 per cent of its rice from India and, as a result, faced shortages in 2007 when India temporarily banned exports because of production shortages.<sup>83</sup>

Impacts of geopolitical factors on food security are partially related to the physical access to the international food supply routes. Seven primary ports in the United Arab Emirates, two in Qatar, one in Bahrain, two in Kuwait and two in Saudi Arabia receive nearly 6 million tons of wheat and coarse grains (around 40 per cent of total imports to the GCC) and 2.5 million tons of rice (81 per cent of their total imports) through the Strait of Hormuz. Additionally, 5.8 million tons of wheat and coarse grains imports (39 per cent of total imports) to the GCC, enter into the region through Bab Al-Mandab. Although the two straits are international waterways, they are vulnerable to piracy and potential conflicts and events in the surrounding countries.<sup>84</sup>

#### 2. Extreme weather conditions and infrastructure

In 2013, Djibouti, Somalia and Sudan were hit by drought, which substantially reduced their overall food production, particularly wheat. Similarly, Algeria was affected by drought in 2014, which resulted in below-average cereal harvests (6 per cent below the level of 2013). Similarly, Morocco faced dry conditions during the autumn of 2013, which slowed down wheat planting and led to a reduction of 27 per cent in wheat harvest in 2014 when compared to 2013.<sup>85</sup> Extreme weather events affect not only food production; their impacts also extend to food imports given that marine trade routes may be temporarily disrupted by increased cyclone frequency and intensity in the Arabian Sea. This can also lead to substantial physical damages to the infrastructure of the ports across the region.<sup>86</sup>

The capacity of ports and the availability and condition of infrastructure represent another constraint that influences food and wheat prices. A study by the World Bank and FAO suggests that the average wheat-import supply chain transit time in the Arab region is 78 days, with a cost of nearly \$40 per ton. This transit time is long and reflects high inefficiencies, especially when compared with countries in other regions, such as the Netherlands and South Korea, where transit times are as low as 18 days and 47 days, representing costs of only \$11 and \$17 per ton, respectively. Some of the factors that have been reported to affect the waiting time of ships at ports include capacity of unloading equipment, port handling and storage capacities, number of docks that can handle grains and their depths, ships priority rules, and customs and inspections procedures. It was concluded that by reducing the ship waiting time by one day, a saving

<sup>&</sup>lt;sup>82</sup> FAO, "Agricultural livelihoods and food security impact assessment and response plan for the Syria crisis in the neighbouring countries of Egypt, Iraq, Jordan, Lebanon and Turkey, March 2013" (2013), available from <u>http://reliefweb.int/report</u>/jordan/agricultural-livelihoods-and-food-security-impact-assessment-and-response-plan-syria (accessed 30 March 2015).

<sup>&</sup>lt;sup>83</sup> Global Agricultural Information Network (GAIN), "Saudi Arabia: Grain and feed annual – 2014", GAIN Report No. SA1402 (USDA Foreign Agricultural Service, 2014), available from <a href="http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Grain%20and%20Feed%20Annual Riyadh Saudi%20Arabia 2-19-2014.pdf">http://gain.fas.usda.gov/Recent%20GAIN%20Publications</a> /Grain%20and%20Feed%20Annual Riyadh Saudi%20Arabia 2-19-2014.pdf (accessed 30 March 2015). See also A. Prakash, *Safeguarding Food Security in Volatile Global Markets* (Rome: FAO, 2011), available from <a href="http://www.fao.org/docrep/013/i2107e/i2107e09.pdf">http://www.fao.org/docrep/013/i2107e/i2107e09.pdf</a> (accessed 30 March 2015).

<sup>&</sup>lt;sup>84</sup> R. Bailey and R. Willoughby, "Edible oil: Food security in the Gulf" (London: Chatham House, 2013), available from <u>http://www.chathamhouse.org/sites/files/chathamhouse/public/Research/Energy,%20Environment%20and%20Development/bp1113</u> edibleoil.pdf (accessed 30 March 2015).

<sup>&</sup>lt;sup>85</sup> Ibid.

<sup>86</sup> Ibid.

of more than \$2.94 per ton could be achieved, thereby reducing the selling price of wheat and contributing to its affordability to the poor.<sup>87</sup>

Furthermore, transport infrastructure, efficient irrigation systems and crop harvesting equipment and machinery, in addition to adequate storage, processing and packaging, pest control, and human and institutional capacities, are key elements to reducing food losses, thereby increasing food availability and affordability. Considerable food losses in Algeria are partly associated with poor road infrastructure; while in Egypt, 10-15 per cent of cereals are lost as a result of poor harvesting, processing and handling, and inadequate storage. Among the 11 countries included in the Global Food Security Index, seven Arab countries (Algeria, Egypt, Jordan, Morocco, Sudan, Tunisia and United Arab Emirates) have higher than the world average food loss of 4.8 per cent, while the remaining four countries (Kuwait, Saudi Arabia, Syrian Arab Republic and Yemen) have lower values.<sup>88</sup>

<sup>&</sup>lt;sup>87</sup> Ibid.

<sup>&</sup>lt;sup>88</sup> According to the Global Food Security Index, food loss is measured as the ratio of post-harvest and pre-consumer food loss to the total domestic supply (production, net imports and stock changes) of crops, livestock and fish commodities. See the Global Food Security Index website, available from <a href="http://foodsecurityindex.eiu.com/">http://foodsecurityindex.eiu.com/</a> (accessed 30 March 2015).

# V. POLICY DIRECTIONS FOR ENHANCED WHEAT SECURITY IN THE ARAB REGION

As can be concluded from the results of the wheat security assessment (chapter III), none of the countries in the Arab region are characterized as highly wheat secure. For the individual countries or the region as a whole to be considered highly wheat secure, it would need to demonstrate both high production as well as high economic capacities. From the assessment, it seems that no single country in the region has achieved this combination and, as such, the countries that exhibit either high production capacity to secure wheat locally or high economic capacity to import wheat are categorized as less secure, while the remaining countries (low production and economic capacities) are considered to be insecure. With the combined natural and economic resources available to the region, it is believed that the region as a whole has the potential to become highly wheat secure, provided that coordinated regional policies are adopted and translated into higher levels of cooperation between countries of the region.

This chapter intends to reflect some of the issues that have been raised in the study into steps that the region can take towards securing wheat availability at the regional level. Despite the fact that some of the issues that are raised in this chapter have not been analysed in depth owing to the limited scope of the study, they are included as an integral part of the proposed set of policy directions given their direct link to wheat security.

Although some institutional measures have been taken to enhance the wider food security in the region, including the establishment of specialized organizations (AOAD, ACSAD and AAAID) and adoption of policy directions (strategy for sustainable Arab agricultural, Riyadh Declaration and the Emergency Programme for Arab Food Security), none of these initiatives include a stand-alone holistic vision on wheat. Before the region takes a collective step towards securing wheat availability, it would first need to declare wheat as a strategic food staple that requires special attention and thus in need for specific policies targeting the various aspects of wheat supply and consumption. In the following sections, some elements that are proposed to be included within a regional vision on wheat in the Arab region are briefly discussed. Some of these elements, which aim to boost intraregional cooperation on wheat include a regional wheat production framework, a unified wheat storage system, a regional policy on wheat import and trade, and a coordinated water and agricultural institutional structure.

#### A. REGIONAL WHEAT PRODUCTION FRAMEWORK

Before highlighting some of the elements that may structure a regional framework on wheat production, it adds value to summarize the drivers for such a framework as follows:

(a) *High demand on wheat:* In this respect the Arab region is unique from the rest of the world whereby the collective wheat production in Arab countries allows for achieving self-sufficiency if the per-capita wheat demand, in terms of consumption, is lowered to the world average level. Characterized by a low wheat yield that falls below the world average, the current production capacity of the region satisfies only less than half of the growing demand. Consequently, the region is becoming increasingly reliant on imports to cover the demand gap, increasing the region's vulnerability to both price volatility and geopolitical factors. In this regard, the Syrian Arab Republic serves as an example of the contribution of the agricultural production system to socio-economic resilience during times of conflicts. For the past few years, the Syrian crisis has had a devastating impact on the country as a whole. According to the World Food Programme, wheat planted area and wheat production declined in 2013 by 30 per cent and 50 per cent, respectively, from pre-conflict levels.<sup>89</sup> The reduction in production was partially attributed to the drought of 2013, resulting in additional pressures to satisfy the demand deficit through imports. Despite the heavy toll that the Syrian conflict has exerted on the local population, still it may be concluded that the established

<sup>&</sup>lt;sup>89</sup> World Food Programme, "Will drought worsen the impact of conflict on food insecurity?" (2014), available from <u>http://documents.wfp.org/stellent/groups/public/documents/ena/wfp263930.pdf</u> (accessed 30 March 2015).

agricultural production system has been able to partially support livelihoods and contribute to food supply at a time where a large segment of the population would not have been able to bear the cost of imported wheat owing to the declining purchasing power;

(b) Scarcity of natural resources: Some countries of the region are facing extreme water scarcity and very low availability of arable land, including those in the GCC subregion. These conditions are proving to be the major constraints for sustainable agricultural production in these countries, and have thus resulted in high reliance on imports to satisfy food demand, including for wheat. Water scarcity or low water availability in particular is viewed as an obstacle to sustained self-sufficiency in other countries of the region, such as Jordan, Libya and Yemen, among others. Nevertheless, some countries, including Mauritania, Somalia and Sudan, still have additional water resources that can be allocated for wheat production. Given the current low irrigation water use efficiency and inefficient agricultural practices across almost all the countries of the region, there is a potential for higher wheat production through horizontal expansion in some countries and increased yield in many others;

(c) *High loses:* Wheat post-harvest losses and consumption losses/wastage are triggered by inefficient agricultural practices and lack of investment to enhance harvest and storage processes and infrastructure. Losses in the consumption side are triggered by economic incentives, including subsidies that have led to wasteful consumption patterns to an extent of using subsidized bread as animal feed in some cases.

The above points, in addition to other drivers, result in an inefficient wheat production system that can benefit from cooperation among Arab countries. Such cooperation could seek to enhance water and land productivity and contribute towards reducing the wheat consumption-production gap. The following elements can be considered parts of a regional framework aimed at enhancing wheat production, thereby contributing towards higher wheat security in the Arab region.

# 1. Coordinated regional investment

With the richer countries of the region facing major obstacles to develop local sustainable agricultural production, joint investment projects in countries where agricultural production is economically, socially and environmentally feasible could result in higher food availability and at the same time facilitate to increase intraregional food trade. This approach is not new in the region, as evidenced by the establishment of AAAID in 1976. However, what is new is the call to target wheat production with elevated investment levels, where the social responsibility and economic feasibility of such projects could make them attractive for intraregional investments.

# 2. Coordinated research and development

Investment in wheat research needs to be boosted and coordinated among the various stakeholders, including official research centres attached to the agricultural sector at the national level as well as academic institutions and regional and international research centres. An example of the outcome of applied research on wheat carried out by ICARDA in collaboration with national research centres and funded by regional funding agencies shows an average increase of 8-68 per cent in wheat yield at the project field sites in seven countries.<sup>90</sup> The results of such collaborative initiatives are promising and could trigger more interest of government and non-government actors to adopt and upscale the research conditions into wider, more commercial wheat production. In this regard, the role of the private sector, whether as a partner in the research phase or as an investor in the translation of research results into tangible production opportunities, is key in the development of the agricultural sector at both national and regional levels. Technology transfer

<sup>&</sup>lt;sup>90</sup> ADEF (2014), "Food Security: Challenges and Prospects", available from <u>http://www.afedonline.org/en/inner.aspx?</u> <u>contentID=1076</u> (accessed 30 March 2015).

in the area of crop loss reduction, storage and modern irrigation systems will have an impact on enhancing the physical and economic productivity of wheat in the region.

## 3. Data management and capacity-building

While some wheat-related data is readily available on global data sources, large discrepancies and variations are found between national, regional and global sources. Informed decision-making needs to be based on reliable data that are collected and analysed in compatible methodologies across all countries of the region. In order to achieve this objective, an initiative to establish a regional institutional mechanism for wheat data is required to facilitate coordination with relevant institutions at the national level. Although statistics represent a core activity of AOAD, it does not target wheat in particular; rather, it covers and reports on general agricultural-related statistics for the entire region. A regional wheat data unit at AOAD could enhance data reliability and provide technical assistance to its member countries. Moreover, calculating the potential production gains by closing the gender gaps requires precise sex disaggregated data that are currently unavailable. Additionally, AOAD could initiate a special wheat capacity-building programme to showcase and disseminate the results of research activities, as well as facilitate exchange of experiences and lessons learned among the countries and provide the needed technical assistance to enhance wheat productivity at the national level.

#### 4. A regional guideline on wheat loss reduction

In 2013, almost 30 per cent of all cereal production in the region was lost during the production and consumption processes, and the post-harvest losses of wheat was estimated at around 15 per cent.<sup>91</sup> While the subject of wheat losses was not a visible issue in the study, the proposed regional framework to enhance wheat production will have to tackle inefficiencies wherever possible. As such, it needs to incorporate crop loss reduction approaches during the production processes, leading to enhanced land and water productivity of wheat cultivation. Moreover, loss or wastage reduction during consumption will also serve to contribute to higher availability/security of wheat. The regional guideline will have to identify various interventions (structural and non-structural, including economic measures) needed to achieve loss levels compatible to those of efficient and sustainable production and consumption practices.

#### 5. Diversification of diet and wheat demand management

In order to develop approaches for diet diversification, an important question that needs to be clarified is related to the reasons for the high consumption levels of wheat in the region. Reasons may vary according to the country, where financial incentives in the form of subsidies seem to play an important role in some countries, while customary and preference related reasons may be determinant in others. Understanding the driving force behind high wheat consumption coupled with the food security and poverty alleviation policies within the overall national social and economic development objectives would set the basis for developing national strategies, polices, programmes and measures for wheat demand management and diet diversification. Supportive directives and guidelines to be adopted at the regional level could facilitate to incorporate the regional context within national policies.

# B. A UNIFIED WHEAT STORAGE SYSTEM IN THE ARAB REGION

Two of the effective approaches expected to reduce the supply risks of imported cereals in general and wheat in particular are investing in the set-up of strategic storage facilities, and engaging actively in the global trade mechanism. While the first is straightforward and, in principle, aims to establish reserves that bridge times of high price volatility or conflicts that impedes the flow of wheat supply, the second is more

<sup>&</sup>lt;sup>91</sup> AOAD, "Arab food security conditions" (in Arabic, 2013), available from <u>http://www.aoad.org/Arab%20food%</u> 20security%20report%202013.pdf (accessed 30 March 2015).

complex owing to the semi monopolistic nature of global cereal trade, making it difficult for newcomers to enter this market.

In order to build strategic storage capacity for wheat, a country needs to define the level of storage capacity that it considers strategic, based on the local, regional and global conditions. Some factors that are taken into account when defining a strategic level, which is often measured in months of consumption, include the assessment of the risks associated with potential conflicts along the supply routes as well as the associated risks of changing climatic conditions at the producing regions. The uncertainty of climate predictions resulting from climate change and higher frequencies of extreme weather conditions, such as floods and extended droughts, adds to the complexity of the analysis. Another aspect that needs to be factored in the analysis is the cost to manage grain reserves in a manner that optimizes their use and minimizes losses.

While the high-income countries of the region have been active in escalating their strategic grain storage capacities by investing in the construction of silos, low-income countries are facing funding constraints to achieve comparable storage levels similar to those in the oil-rich countries. With limited official funding and weak technical capacity of the public sector, the private sector in some countries has become a crucial player in grain trade and storage. The private sector is however mostly governed by profit optimization aims, which in many cases deviate from the larger national food security objectives and goals.

While various geographical and political conditions may determine different strategic storage levels for the diverse countries, a regional unified outlook that considers the comparative advantages of coordinated or integrated storage sites may prove to be economically and financially more attractive than separate, uncoordinated storage systems. The selection of sites for regional intermediary grain redistribution centres could help to lower the geopolitical risks of supply routes closures. Within a regional storage system, which can be developed, set up and managed in partnership with the private sector, countries in the Arabian Peninsula, for example, could benefit from redistribution storage facilities at the Omani and Yemeni coastlines, which enjoy access to unrestricted supply routes through the Indian Ocean, thereby reducing the closure risks at the Red Sea and or the Arabian Gulf. In addition to the required political will needed to adopt a unified regional grain storage system, it also requires large investments for the storage facilities as well as the additional transport infrastructure needed to facilitate grain movement between the countries.

#### C. A REGIONAL POLICY ON WHEAT IMPORT AND TRADE

An effective strategy for food security in the countries that do not have suitable conditions for sustainable agricultural production is to rely on food imports. Unlike for low-income countries, price volatility may not pose a high risk to the high-income countries, owing to the high purchasing power of the population, or the widely adopted social protection programmes that subsidize food, thereby stabilizing the retail prices to consumers. Export restrictions in food-producing countries resulting from drought or internal and/or regional conflicts, for example, and the geopolitical conflicts along the food supply routes are considered more serious risks, especially for the high-income countries. One direction that is usually adopted to minimize such risks is investing in strategic storage as highlighted above. Another approach that contributes to higher food security levels is engaging in the global food trade. In this regard, Singapore represents an example of such a direction, where it has established itself as a hub and an important player in the Asian and global food trade. China, with its own growing food demand, is following a similar direction and has invested in food companies, such as Nobel.<sup>92</sup> It seems that the major requisite for adopting such a direction lies in the economic capacity of the country and the ability to overcome and correct any unfavourable and inefficient trade-related legal and institutional settings.

<sup>&</sup>lt;sup>92</sup> S. Murphy, D. Burch and J. Clapp, "Cereal secrets: The world's largest grain traders and global agriculture", Oxfam Research Reports (2012), available from <u>http://www.oxfam.org/sites/www.oxfam.org/files/rr-cereal-secrets-grain-traders-agriculture-30082012-en.pdf</u> (accessed 30 March 2015).

Economic disparity among Arab countries makes the adoption of securing food (and wheat) by investing in the global food trade a viable option for only few countries. While some GCC countries have initiated projects for offshore wheat production, some of these projects have been criticized as land-grapping deals that do not consider the social dimensions and food security needs of the host countries. Where these initiatives are initiated by multinational companies (food producers and traders) as external investment projects, they may be viewed differently, thereby reducing the perception of rich countries trying to exploit poorer countries.

With more than \$2,000 billion in Arab sovereign wealth funds, the region is in a position to become an important player in food production and trade. While countries of the region can pursue individual strategies to invest in the global food production and trade market, it may prove more effective to follow a unified approach that includes both the oil-rich countries and the other, more populous low-income countries of the region. This may be achieved by raising the capital and investment level of AAAID and expanding its scope to global coverage.<sup>93</sup> New joint specialized companies, including, for example, in wheat/cereal production and trade, can also be established with adequate capital that allows for an effective role to support the food security of the region.

### D. COORDINATED INSTITUTIONAL STRUCTURES BETWEEN WATER AND AGRICULTURE

Although the strategy for sustainable Arab agriculture, the Riyadh Declaration, the Emergency Arab Food Security Programme and its action plan all address water issues, they do so from an availability perspective that focuses on the implications of the growing water scarcity on agricultural production. While this might represent the mainstream thinking of the agricultural sector at both the national as well as the regional levels, management of water resources in an integrated manner and its role, as crosscutting, in sustainable socio-economic development will need to be incorporated and embedded to a greater extent in the mindset of the agricultural sector when developing strategies and action plans related to the use of the increasingly scarce water resources.

Unlike for agriculture, attention on water resources management both at the national and regional levels is a comparatively recent development, with the establishment only in the past 20 years of ministries of water in some Arab countries. Indeed, water resources management is still linked to irrigation in some countries, such as Egypt and Jordan. While it is important to institute separate regulatory functions of water resources management from the actual use of water resources, ensuring effective coordination mechanisms between water and agriculture at both the planning and operational levels is elemental for effective integrated water resources management.<sup>94</sup>

At the regional level, although LAS does not have a ministerial council for agriculture similar to that of water (established in 2008), the two LAS-affiliated organizations, ACSAD and AOAD, were established more than 40 years ago, both of which are governed by the ministers of agriculture of member countries. It is quite important that greater coordination between agriculture and water institutions takes place in order to develop more appropriate approaches for integrated policy development, especially given that water and food securities are being accepted as wide-spectrum issues that encompass, besides water management and agricultural production, other social, economic and environmental dimensions.

Despite the current linkages between water and agriculture institutions, these links have not led to effective coordination, let alone to integrated programme planning and policy development. It is therefore important to develop and adopt effective institutional arrangements in order to strengthen coordination

<sup>&</sup>lt;sup>93</sup> The current geographical scope of AAAID is limited to the Arab region. Details of the investment portfolio can be found from <u>http://www.aaaid.org/english/Agricultural\_investment.htm</u> (accessed 30 March 2015).

<sup>&</sup>lt;sup>94</sup> On average, agriculture is the largest water-using sector (using 85 per cent of all water resources), with low irrigation water-use efficiency (at an average of 40 per cent).

between water and agriculture at both national and regional levels. As is the case with all the proposed policy directions highlighted above, political will is key for pushing forward the water-agriculture nexus reform.

#### E. FURTHER RESEARCH

While this study provides some analysis on wheat availability, given the extensive and complex interactions of the subject matter with various disciplines, many questions can be raised and may constitute the scope for follow-up research. One of the important questions is related to the economic/financial feasibility of increasing wheat production in the region through horizontal expansion and or through increased yield. Another question is linked to the driving force behind the growing reliance on wheat, which could set the basis for any food diversification efforts. A third question is related to the impacts of the existing global trade protocols and agreements on regional cooperation on agricultural production and intraregional trade.

# Annex

	Access					
			Prevalence of	Gross domestic		
	Prevalence of	Depth of the	food	product per		
	undernourishment,	food deficit,	inadequacy,	capita, PPP	Food price	
	2012	2012	2012	(constant 2011	level index,	
Country	(%)	(kcal/cap/day)	(%)	international \$)	2009	
Libya	<5	10	<5	23 032		
Palestine	31	204	42.4	4 497		
Egypt	<5	9	<5	10 685	1.57	
Jordan	<5	24	7.6	11 340	1.31	
Mauritania	9.3	56	14.3	2 829	2.17	
Bahrain				40 658	1.15	
Morocco	5.5	34	9.7	6 778		
Saudi Arabia	<5	18	6.4	51 122	1.15	
Lebanon	<5	21	7	16 633		
Algeria	<5	22	7	12 779		
Djibouti	19.8	138	29.2	2 807		
Iraq			32.9	14 510	1.46	
Sudan	39	334	45.3	3 545		
(former)			- 7	10.551	1.65	
Tunisia	<5	6	<5	10 551	1.65	
Yemen	32.4	215	41.5	3 765	1.65	
Somalia			74.3			
Kuwait	<5	11	<5	84 188	0.85	
Qatar				127 819	0.82	
Oman				44 491	1.19	
Syrian Arab Republic	<5	19	5.8		1.47	
Comoros	70	714	77.8	1 493		
United Arab Emirates	<5	29	9.5	57 045		
World	12.5	94	19.1	13 664	1.39	

# ANNEX TABLE 1. ACCESS INDICATORS OF FOOD SECURITY (ACCORDING TO FAO INDICATORS)

# ANNEX TABLE 2. AVAILABILITY INDICATORS OF FOOD SECURITY (ACCORDING TO FAO INDICATORS)

	Availability					
	Average dietary energy	Average value of food				
	supply adequacy (three-	production (three-year	Average protein supply			
	year average), 2012	average), 2012	(three-year average), 2011			
Country	(%)	(International \$ per person)	(g/capita/day)			
Libya						
Palestine						
Egypt	152	261	102			
Jordan	138	187	82			
Mauritania	127	135	80			
Bahrain		25				
Morocco	141	264	94			
Saudi Arabia	133	127	84			
Lebanon	129	262	81			
Algeria	138	186	88			
Djibouti	106	83	63			
Iraq	116	81	61			
Sudan (former)	107*	202*	75			
Tunisia	142	330	97			
Yemen	102	76	58			
Somalia						
Kuwait	140	88	108			
Qatar		28				
Oman		126				
Syrian Arab						
Republic						
Comoros						
United Arab	122	60	100			
Emirates	122	00	100			
World	121	303	79			

	Stability					
		Cereal import				
	Arable land equipped for	dependency ratio	Value of food imports over total			
	irrigation (three-year	(three-year average),	merchandise exports (three-year			
	average), 2012	2011	average), 2011			
Country	(%)	(%)	(%)			
Libya	27	92	6			
Palestine	54	102	60			
Egypt	100	46	37			
Jordan	51	99	29			
Mauritania	11	74	17			
Bahrain	100		6			
Morocco	19	37	19			
Saudi Arabia	51	90	5			
Lebanon	70	92	42			
Algeria	8	68	11			
Djibouti	54	100	637			
Iraq	99	57	9			
Sudan	0	27	20			
(former)	9	21	20			
Tunisia	16	60	11			
Yemen	55	83	30			
Somalia	18	70	94			
Kuwait	100	104	3			
Qatar	98		2			
Oman	100		5			
Syrian Arab	20	15	26			
Republic	30	45	20			
Comoros	0	71	304			
United Arab Emirates	100	145	4			
World	23	16	5			

# ANNEX TABLE 3. STABILITY INDICATORS OF FOOD SECURITY (ACCORDING TO FAO INDICATORS)

	Utilization						
	Political stability and		Access to				
	absence of	Children under 5 years of	improved	Access to			
	violence/terrorism,	age who are underweight,	sanitation	improved water			
	2012	2005-2011	facilities, 2012	sources, 2012			
Country	(Index)	(%)	(%)	(%)			
Libya	-1.56	5.6	97				
Palestine	-1.94	2.2	94	82			
Egypt	-1.48	6.8	96	99			
Jordan	-0.52	1.9	98	96			
Mauritania	-1.13	15.9	27	50			
Bahrain	-1.13		99	100			
Morocco	-0.46		75	84			
Saudi	0.46	5.2	100	07			
Arabia	-0.40	5.5	100	91			
Lebanon	-1.65		98	100			
Algeria	-1.34	3.7	95	84			
Djibouti	0.17	29.6	61	92			
Iraq	-1.93	7.1	85	85			
Sudan	2 27	21.7	24	56			
(former)	-2.27	51.7	24	50			
Tunisia	-0.73	3.3	90	97			
Yemen	-2.43		53	55			
Somalia	-2.89	32.8	24	32			
Kuwait	0.18	1.7	100	99			
Qatar	1.21		100	100			
Oman	0.47	8.6	97	93			
Syrian Arab	2.60	10.1	06	90			
Republic	-2.09	10.1	90	90			
Comoros	-0.39		35	95			
United Arab	0.88		0.8	100			
Emirates	0.00		70	100			
World			64	89			

# ANNEX TABLE 4. UTILIZATION INDICATORS OF FOOD SECURITY (ACCORDING TO FAO INDICATORS)

		Total per-capita consumption		Wheat contribution				
						Daily	Daily	
	Demoletien	W/h = = 4	Calaria	Ductoin	<b>F</b> -4	calorie	protein	Daily
Country	(2011)	(kg/yr)	(Kcal/day)	(g/day)	Fat (g/day)	(%)	(%)	(%)
Algeria	37 763 000	184.9	3220	90.4	75.7	44%	47%	7%
Diibouti	847 000	116.1	2526	63.5	59.9	37%	43%	6%
Egypt	79 392 000	146.1	3557	102.5	64.1	33%	35%	10%
Iraq	31 837 000	139.6	2489	61.4	69	47%	57%	11%
Jordan	6 731 000	143	3149	83.8	101.1	38%	43%	7%
Kuwait	3 125 000	98.4	3471	104.4	115.8	24%	23%	4%
Lebanon	4 478 000	121.9	3181	80.3	106	31%	33%	3%
Libya	6 103 000	161.2	3211	81.2	95.3	38%	41%	5%
Mauritani a	3 703 000	98.6	2791	80	79.6	28%	30%	5%
Morocco	32 059 000	177.3	3334	95.6	65.2	41%	44%	8%
Palestine	4 114 000	116.9	2032	57.8	48.1	41%	43%	7%
Saudi Arabia	27 762 000	90.6	3122	87	96.2	24%	26%	4%
Somalia	9 908 000	21.6	1696	49.6	61.8	10%	10%	2%
Sudan (former)	43 552 000	35.8	2346	75	69.2	13%	12%	2%
Syrian Arab Republic	21 804 000	150.8	3106	78.3	107.4	38%	45%	7%
Tunisia	10 753 000	204.6	3362	98	87.1	49%	50%	7%
United Arab Emirates	8 925 000	95.8	3215	98.2	102.7	24%	23%	3%
Yemen	23 304 000	114	2185	57	45.5	42%	48%	13%
World	6 887 310 000	65.4	2868	80.3	82.7	18%	20%	3%
Arab region (weighted average)	356 160 000	128.4	2 993	84	74	34%	37%	7%
Median		119	3136	81	78	37%	42%	6%
Range		22-205	1696- 3557	50-104	46-116	10-49%	10-57%	2-13%

ANNEX TABLE 5. CONTRIBUTION OF WHEAT TO THE DIET IN ARAB COUNTRIES, 2011

Source: Data compiled from the FAOSTAT database.

			Gross National	
		Total renewable water	Income (GNI)	Arable land
		resources per capita	per capita, Atlas	per capita,
	Total population	(actual), 2014	method, 2012	2012
Country	(2013)	(m <sup>3</sup> )	(current \$)	(Ha)
Algeria	39 208 000	297.6	4 970	0.1961
Bahrain	1 332 000	87.09	19 560	0.0012
Comoros	735 000	1633	840	0.1226
Djibouti	873 000	343.6	1 030	0.0023
Egypt	82 056 000	710.5	2 980	0.0347
Iraq	33 765 000	2661	6 130	0.1046
Jordan	7 274 000	128.8	4 660	0.0306
Kuwait	3 369 000	5.936	44 940	0.0031
Lebanon	4 822 000	933.8	9 520	0.0445
Libya	6 202 000	112.9	12 930	0.2794
Mauritania	3 890 000	2931	1 040	0.1054
Morocco	33 008 000	878.6	2 910	0.2474
Palestine	4 326 000	193.5	2 810	0.0107
Oman	3 632 000	385.5	25 250	0.0102
Qatar	2 169 000	26.74	78 060	0.0063
Saudi Arabia	28 829 000	83.25	24 660	0.1117
Somalia	10 496 000	1401		0.1079
Sudan	37 964 000	995.7	1 460	0.5658
Syrian Arab Republic	21 898 000	767.2	1 850	0.2131
Tunisia	10 997 000	419.7	4 240	0.2611
United Arab Emirates	9 346 000	16.05	38 620	0.0051
Yemen	24 407 000	86.04	1 220	0.0522
Arab region	370 598 000	779	7 179	0.1614
World			10 235	

# ANNEX TABLE 6. PER-CAPITA SHARE IN RENEWABLE WATER RESOURCES, GROSS NATIONAL INCOME AND ARABLE LAND IN ARAB COUNTRIES

Source: Data compiled from FAO Aquastat, FAOSTAT and World Bank WDI databases.

*Note*: GNI values are for 2012, with the following exceptions: Djibouti, 2005; Kuwait, 2011; Libya, 2009; and the Syrian Arab Republic, 2007.

No other crop better embodies concerns over food security in the Arab region than wheat. Wheat consumption per capita in the region has been high for the past few decades and is currently double the world average. Wheat contributes to more than one third of the total calorie and protein intake of the population, reaching as much as 50 per cent in some countries. Given the prime role of wheat in the diet of their populations, Arab countries have exerted efforts during the past decades to secure wheat availability through a mixture of measures, ranging between higher production and greater imports. Given the contribution of wheat to improving food security in the Arab region, this study aims to assess wheat security by examining the prospects for higher wheat availability. This is achieved by developing a methodology that assesses the current production capacity with a view on land and water availability as limiting factors as well as by assessing the economic capacity to sustain wheat imports.

The study includes a review of the various regional initiatives that relate to wheat in order to reflect the results of the assessment of wheat availability into useful regional policy directions that can help the region to enhance wheat availability. The outcome of the review coupled with the results of the assessment can shed light on the pathways that Arab countries, collectively or individually, can follow to secure higher wheat availability levels and, as such, contribute to enhanced food security for their populations.