



# *Africa Arab Food Security Current Status and Future Prospects*



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# Part 1: Introduction and Research Methodology:

## 1.1 Introduction:

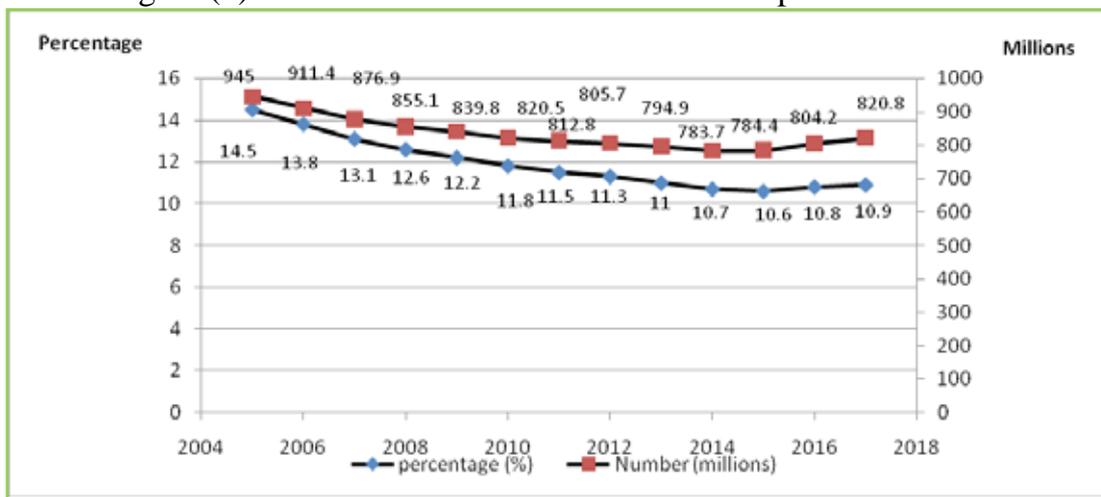
Ensuring food security is one of the main challenges facing the world community. The challenge is most critical in developing countries, where the number of hungry people is increasing. At the world level, in spite of the significant achievements that have been made on attaining many of the MDG targets, progress has been uneven across regions and countries, leaving significant gaps, (UN MDGs Report 2015). Consequently, the Heads of States and Governments, senior UN officials and representatives of civil society have adopted the Sustainable Development Goals (SDGs) 2030 in September in the 70th session of the UN General Assembly 2015.

It continued to afflict some 821 million people in 2018 compared to 804.2 in 2017, (FAO, 2018), Figure (1).

In Sub-Saharan Africa, food insecurity is on the rise. It increased by about 3% between 2014 and 2016. About 27.4% of the population in Africa was classified as severely food insecure in 2016, (FAO, 2017).

In the Arab region, there has been no improvement in food security and nutrition. The annual food gap remains between \$ 33 - 39 billion, while the value of the annual food imports ranges from \$ 90 - 95 billion. Moreover, the region imports more than 60% of its grain needs. However, there are large differences among Arab countries in the prevalence of severe food insecurity; large numbers of the population of the Arab world suffer from food insecurity and malnutrition in

Figure (1): The Number of Undernourished People in the World.



Source: Based on FAO, 2018, the State Food security and nutrition in the World.

Because the challenge of ending hunger has proven to be the most difficult target, ending hunger, achieve food security, and improved nutrition were set to constitute a clear priority of the SDGs and become the second goal of the SDG 2030 which strives for “Zero Hunger. Chronic hunger remains a large barrier of development in many regions, including Africa and Arab world.

areas experiencing instability and adverse natural conditions.

## 1.2 Scope and Methodology:

### 1.2.1 Scope and Timeframe of the Research:

This research assesses food security and nutrition developments in both Sub-Saharan Africa and Arab regions. Because of the relatively large numbers of countries and



population of the two regions and the nature of the aggregated secondary data used, the research focuses on food security situations at the regional levels rather than country or family levels.

The timeframe for the data collected from secondary data sources covers the period from the mid of the second millennium to 2017 /2018 depending on the various data sources. Time series data were used to enable the calculation of trends in food security variables in the Arab and African regions, in a context of a descriptive and quantitative analysis of the food security situation followed by this research.

### **1.2.2 Objectives:**

The prime objective of this research is to document the updated status of food security in Arab region and Sub-Saharan Africa, and to review factors causing food insecurity in the two regions, and to put forward the appropriate recommendations that can be adopted for enhancing food security and nutrition in the two regions.

### **1.2.3 Data Sources and Methods of**

#### **Analysis:**

The research was based on several data sources. They include secondary data sources, incorporated studies and reports related to the food and nutrition security in the two regions, as well as data collected from the databases of some of the international and regional organizations on food security indicators, food commodities production and consumption. Data was analyzed in a comparative manner to measure developments in food security and nutrition, as related to food availability, accessibility, utilization and stability in both regions. The analysis therefore included the measurement of the development of food security indicators related to the main food security pillars, trends of food security indicators, and

influencing factors. Besides, forecasts, simple and multiple regression models were employed to fill the data gap and to study the relationship between some Africa Arab food security indicators and related factors.

### **1.2.4 Organization of the Research**

#### **Document:**

This document includes six parts. Following this introduction, part two provides a review of the natural, human, and economic resources indicators in the Arab region and Sub-Saharan Africa. Part three analyzes food security situation in the two regions in terms of trends and developments of food security indicators, beside tracing and highlighting developments and salient features in food per capita, food sufficiency ratio and food gap in both regions. Part four analyzes the causes of food insecurity in the regions in terms of population growth, rural urban divide, low productivity, agricultural investment and climate change. Part five critically concludes the research results, and the last part discusses the way forward of enhancing food security and nutrition in the Arab region and Sub-Saharan Africa.

#### **1.2.5 Definition of Food Security:**

Food security is a multi-dimensional, multifaceted phenomenon. Its definition has changed significantly in recent decades (Francesco Burchi *et al.* 2018). During the 1970s and part of 1980s, food security was defined as a synonym for food availability. At the 1974 World Food Conference, food security was defined as the “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” (United Nations, 1975). In 1983, FAO expanded its concept to include securing access by vulnerable people to available supplies, implying that attention should be balanced between the demand and supply side of the food security.



In 1986, the highly influential World Bank report “Poverty and Hunger focused on the temporal dynamics of food insecurity. It introduced the widely accepted distinction between chronic food insecurity, associated with problems of continuing or structural poverty and low incomes, and transitory food insecurity, which involved periods of intensified pressure caused by natural disasters, economic collapse or conflict.

During the second half of the 1980s and 1990s, there was a radical shift in the perception of food security, as was reflected in the definition of the 1996 World Food Summit: “Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life”, (FAO, 1996). This definition is again refined in 2001: (The State of Food Security 2001). as “a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life”. Based on this definition, most studies break down the concept of “food security” into four components. According to FAO, 2008, these components are defined as follows:

**1. Food Availability:** Food availability addresses the “supply side” of food security and is determined by the level of food production, stock levels and net trade. It refers to the physical existence of food. At country level, food availability comprises a combination of domestic food production, commercial food imports and exports, food aid and domestic food stocks. On household level food could be from own production or bought from the local markets. The availability of a sufficient amount of food is a necessary condition, but not a sufficient condition, for household food security, ([wocatpedia.net/wiki](http://wocatpedia.net/wiki)).

**2. Access:** Access is ensured when all households have enough resources to obtain food in sufficient quantity, quality and diversity for a nutritious diet. However according to this definition access dimension is interpreted in terms of food access, access to other items that are relevant to food security is just as important as access to food (Burchi & De Muro, 2016). Access to other (non-food) food security-related items: access to drinkable water, adequate sanitation, health services and medicines is also fundamental to food security.

**3. Utilization:** Utilization is commonly understood as the way the body makes the most of various nutrients in the food (Menamo, 2014). Sufficient energy and nutrient intake by individuals are the result of good care and feeding practices, food preparation, and diversity of the diet and intra-household distribution of food. Combined with good biological utilization of food consumed, this determines the nutritional status of individuals. Another aspect is the biological utilization. This relates to the ability of the human body to take food and convert it.

**4. Stability:** It considers the other three dimensions over time. Food situation is considered to be insecure if inadequate access to food is on a periodic basis, even if food intake is adequate at appoint of time. It is related to sustained availability, accessibility and effective use of food.



## **Part 2: Natural, Human and Economic Resources**

### **Indicators:**

#### **2.1 Land Resources:**

The land area in the Arab countries is estimated at about 13.44 million km<sup>2</sup>, while the area in Sub-Saharan Africa is about 23.6 million km<sup>2</sup>. In general, the total area of arable land in the Sub-Saharan Africa is almost double that in the Arab countries.

Only 4% of arable land in Sub-Saharan Africa is under irrigation, and the rest depends on rain-fed agriculture, putting it at risk because of extreme climate changes. Due to the increasing population, the arable land per capita is decreasing in both regions. It decreased during the period (2000 – 2016) from 0.162 ha/person to about 0.146 ha/person in the Arab region, and from 0.25 ha/person to 0.21 ha/person in Sub-Saharan Africa. The area under cereal production in the Arab region is about one quarter of that in Sub-Saharan Africa. This area witnessed an annual decrease of about 0.2% annual in the Arab region during the period 2011 -2016, while it grew by 1.6% annually in Sub-Saharan Africa.

Forests cover a large area of African countries, reaching more than a quarter of the land area, although it has declined from 26.5% of the land area in 2011 to about 25.0% in 2016. Arab countries lack large areas of forests because most of their lands fall within the belt of arid and semi-arid regions. The area of forests in the Arab region represents a low percentage of the total land area, amounting to about 2.87% and 3.1% between 2011 and 2016 respectively. This percentage is relatively low compared to the international standards which set at (20%) of the total area of each country.

The rate of fertilizer consumption per hectare of arable land is higher in the Arab countries than in Sub-Saharan Africa. Its average for the period 2011 -2016 amounted to about 79.2 kg/ha in Arab countries, and 17.7 kg/ha in Sub-Saharan Africa.



**Table (1):** Resource base indicators in the Arab World and Sub-Saharan

Description	Arab Region						Sub Saharan Africa					
	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016
<b>Resources</b>												
<b>Land Resources</b>							<b>Land Resources</b>					
Land Area (Mill. km <sup>2</sup> )	13.6	13.44	13.44	13.44	13.44	13.44	23.4	23.6	23.6	23.6	23.6	23.6
Agr. Land Area (Mil km <sup>2</sup> )	6.57	6.96	6.97	7.06	7.3	7.2	10.6	10.7	10.6	9.5	9.6	9.6
Agr. Land Area (% total land area)	48	51	52	54.3	54.3	53.7	43.7	44.1	43.9	40.6	40.6	40.6
Arable Land (% of total land area)	4	4.4	-	-	10.7	10.8	8.7	9	8.8	9	9.1	9.1
Grown area (ha/person)	0.15	0.16	0.15	0.16	0.18	0.17	0.23	0.23	0.22	0.22	0.21	0.20
Area under cereal prod.	33.1	31.6	34.2	31.2	32.1	27.5	97.2	94.7	101.6	104.2	98.0	106.1
Area under permanent crops (% of total area)	0.6	0.61	0.61	0.68	0.71	0.72	1.18	1.19	1.18	1.19	1.18	1.17
Forest area (Mill. km <sup>2</sup> )	0.39	0.39	0.39	0.38	0.38	0.41	6.26	6.23	6.2	6.17	6.14	5.91
Forest area ((% of total land area)	2.87	2.9	2.9	2.83	2.83	3.1	26.19	26.07	25.95	25.83	25.71	25.11
Return from forest resources (% of GDP)	0.12	0.14	0.19	0.27	0.26	0.24	2.47	2.67	2.65	2.8	2.91	2.78
Fertilizer consumption (kg / ha of arable land)	74.5	80.5	78.2	80.3	80.6	81.2	14.6	16.3	18	19.3	18.7	19.2
<b>Human resources</b>							<b>Human resources</b>					

Population (million)	336.5	371.5	381.6	391	397.4	414.83	897.7	922.4	949.7	973.9	1006.8	1034.2
Annual urban Population growth (%)	1.48	1.41	1.36	1.35	1.36	1.41	1.98	1.97	1.95	1.93	1.9	2.1
Rural population (million)	156.6	158.8	161	163.1	165.3	1546.7	577.2	588.5	600	611.6	623.2	630.3
Rural population (% of total population)	43.4	43.1	42.7	42.5	42.2	37.8	64.3	63.8	63.3	62.8	62.3	60.9
Total Workforce (million workers)	120.2	123.4	126.5	124.34	126.73	127.29	351.1	361.4	372.1	383.3	394.9	397.4
Agricultural work force (million)	30.3	28.7	28.8	28.36	30.99	28.95	208.6	213.4	218.3	223.3	228.5	233.1
Agricultural workers of females (Million)	13	13.1	12.6	12.7	12.74	11.3	99.2	101.7	104.2	106.7	109.3	109.0
Agricultural work force (% of total workers)	25.2	23.3	22.8	22.3	21.8	20.3	59.4	59	58.7	58.3	57.9	58.4
Female agricultural (% of agri. Workers)	42.9	45.6	43.8	43.9	43.9	43.8	47.6	47.7	47.7	47.8	47.8	47.9
<b>Water resources</b>							<b>Water resources</b>					
% of rural population with access to Improved drinking water	73.6	76.6	80.7	80.9	88.2	-	51.8	53.2	54.1	55	55.9	-
Renewable internal freshwater per capita (m <sup>3</sup> )	708.5	693.2	674.9	658.7	648.1	620.8	320.7	307.9	303.1	295.6	285.9	278.4

#### Sources:

(1) <http://data.albankaldawli.org/topic/agriculture-and-rural-development>

(2) [http:// unctadstat.unctad.org](http://unctadstat.unctad.org)

(3) AOAD, Agric. statistical Yearbook, (various volumes).

### 2.2 Human Resources:

- The number of the population is steadily increasing in both regions. In Arab countries it reached about 414.8million in 2016, with an annual growth rate of 3.6%, while it reached about 1034.2 million in Sub-Saharan African countries with an annual growth rate of 2.8%.

- In Sub-Saharan Africa, the proportion of people living in rural areas is higher than that of Arab countries. This is due to the fact that the vast majority of the population is dependent on agriculture for its economic activities. However, this percentage is declining, reaching 64.3% in 2011 and 61.0% in 2016. This decline can be explained by the increase in rural-urban migration due to poor basic services in rural Sub-Saharan Africa and low agricultural

sector revenues compared to other economic sectors in the region.

- In general, there is an increase in the employment, both in the Arab countries and in Sub-Saharan Africa, with total employment reaching 120.2 million and 127.3 million in the Arab countries in 2011 and 2016, respectively. In Sub-Saharan Africa the number of total employments is estimated at 351.1 in 2015 and 397.4million in 2016.

- The number of agricultural workers in the Arab countries declined from about 30.3 million in 2011 to 28.95 million in 2016. This led to a decrease in the percentage of agricultural workers out of total employment from 25.2% in 2011 to 20.3% in 2016. Such decline may be attributed to the expansion of the use of

agricultural machinery and equipment, as well as the expansion of the industrial sector and other economic sectors, creating more employment opportunities in the non-agricultural sectors.

Although the number of agricultural workers in Sub-Saharan Africa was growing steadily, and increased from 208.6 million in 2011 to 233.1 million in 2016, the relative contribution of agricultural labor force to total labor force declined from 59.4% in 2011 to 58.4% in 2016. Such slight decline may be due either to the shift of agricultural labor to other local economic sectors or to external migration in pursuit of higher levels of wages to improve incomes.

- Female employment in agriculture represents a high percentage of the total Arab and African employment, but it is higher in Africa than in the Arab countries. The geometric mean for this percentage during the period 2011-2016 was 44.0%, 47.7% for Arab countries and African countries respectively.

### 2.3 Water Resources:

The quantities of available water and their distribution among the four Arab regions (Arab Maghreb, Arab Mashreq, Nile Basin

The per capita average of renewable water has decreased in the Arab region from about 765.4 cubic meters in 2011 to about 620.8 cubic meters in 2016, which is below the water poverty line of (1000) m<sup>3</sup> per capita per year.

Regarding sub-Sahara African countries, although the continent has abundant water resources, including large rivers and lakes, Africa is the second-driest continent in the world, after Australia, and suffers from acute water scarcity problems that involve water stress, water deficit/shortage and water crisis, (Pradeep K. N., 2016).

and Horn of Africa, and Gulf and Arabian Peninsula) are shown in Table (2). The total amount of water available in the Arab countries is estimated at 257.5 billion cubic meters, most of which is concentrated in the Nile Basin and the Horn of Africa, which holds about 49.7% of the water quantities in the Arab region. It is followed by Arab Mashreq region (26.1%), Arab Maghreb (18.2%) and Gulf and Arabian Peninsula (6.1%).

The surface water represents the largest share (81.2%) of the total available water in the Arab world, followed by ground water (14.1%) and the non-conventional water (4.6%).

- The Nile Basin and the Horn of Africa region enjoys the largest share of the various water sources available in the Arab world. It possesses about 43%, of the total surface water, 83% of the total groundwater, and 64.3% of the total non-conventional water available in the Arab world. - The amount of surface water in the Gulf and Arabian Peninsula region is low, whereas, the Arab Mashreq region enjoys few amounts of groundwater and non-conventional water.

**Table (2):** Quantity of Available Water in Arab Regions (million cubic meters)

Region	Surface Water		Groundwater		Non-conventional water		total available water	% of total available water
	Quantity	(%)	Quantity	(%)	Quantity	(%)		

Arab Maghreb	41845	20	4370	12	595	5	46810	18.2
Arab Mashreq	66951	32	109	0.3	48	0.4	67108	26.1
Nile Basin and Horn of Africa	89966	43	30224	83	7689	64.6		
							127879	49.7
Gulf and Arabian Peninsula	10461	5	1712	4.7	3571	30	15744	6.1
Total Arab Countries	209223	100	36415	100	11903	100	257541	100
% Of total available water		81.2		14.1		4.6		
								100

Source: AQUASTAT, & FAO, 2018, AOAD, Annual Arab Food Security report, various issues.

According to the African Development Bank (AfDB, 2012) report, Africa has about 14 waterdeficit countries, and the number will rise to 25 by 2025.

- The average annual renewable surface water in Africa is about 5629.2 billion m<sup>3</sup>, accounting for about 9% of the world, although Africa accounts for 14.8% of the world population (1.2 billion people, in 2016), and about 20.4% of the total world area (30.2 million km<sup>2</sup>). The annual per capita water supply in Africa is 3681 m<sup>3</sup>/year, representing almost half of the world's total per capita (6305 m<sup>3</sup>/year).

Per capita average of renewable water has decreased in Sub-Saharan Africa from about 6270.7

cubic meters in 2011 to about 5443.1 cubic meters in 2016, representing almost 86.3% of the world's total per capita (6305 m<sup>3</sup> / year).

- Central African region is the richest Sub-Saharan African region in terms of the availability of surface water, accounting for 51.7% of the total surface water estimated at 5629.2 billion m<sup>3</sup>, followed by West Africa region, representing 25.0%, Table (3).

- West Africa is the richest Sub-Saharan Africa with respect to groundwater availability, accounting for 50.8% of the total groundwater available in Sub-Saharan Africa, followed by Central Africa (38.2%), Eastern Africa (7.0%), Southern Africa (3.8%), and finally the Arab African Region (0.3%).

**Table (3):** Surface and Groundwater Quantities in Sub-Saharan Africa in (billion cubic meters (213 - 2017 Average)

Region	Renewable Surface Water resources	%	Renewable Ground water resources	%	Total Water resources
Arab African States ( <sup>1</sup> )	61.73	1.1	6.61	0.3	64.2

Eastern Africa <sup>(2)</sup>	662.96	12	152.06	7	674.48
Western Africa <sup>(3)</sup>	1387.38	25	1102.93	50.8	1434.38
Southern Africa	460.75	8.3	82.26	3.8	470.13
Central Africa	2867.5	51.7	829	38.2	2881.68
Northern Africa	104.28	1.9	-		91.77
Total	5544.6	100	2172.9	100	5616.6

1. Includes: Sudan, Somalia, Djibouti, Comoros, and Mauritania.

2. Includes: Indian Ocean island countries except the Comoros.

3. Includes: States of the Gulf of Guinea + States of Sudano Sahelian.

4. It is noted that the total renewable water resources are not equal to total surface resources + underground resources, because there is another type of water, which is the intertwined water between surface water and groundwater. Source: AQUASTAT, & FAO, 2018.

## **2.4 Macroeconomic and Agricultural Indicators:**

Table (4) presents the most important macroeconomic and agricultural indicators in Arab countries compared to those in Sub-Saharan Africa during the period ((2011-2017)).

### **2.4.1 Gross and Agricultural Domestic Product:**

The gross domestic product (GDP) in the Arab region is about (147.2%) of that of Sub-Saharan Africa, while per capita GDP in the Arab region is more than triple that of Sub-Saharan Africa. The gross domestic product (GDP) of the two regions witnessed modest growth rates during the period (2011-2017), resulting in a declined per capita GDP. It decreased between 2011 and 2017 by about 16.6% in the Arab region, and by 10.5% in Sub Sahara Africa.

The agricultural gross domestic product (AGDP) averaged to about \$ 141 billion in the Arab region during the period (2011-2017), and to about \$ 303 billion in Sub-Saharan Africa, which is more than double of that in the Arab region. Its annual growth rate during the period (2011-2017) accounted to 6.6% in Sub Sahara Africa, compared to 1.1% in the Arab region.

As a result of the modest growth in the value of the (AGDP) in the Arab region, the per capita (AGDP) declined at annual rate of 1.0% during the period 2011 -2015, from about \$ 372 to about \$ 339.3 in 2015. In Sub Sahara Africa, the per capita (AGDP) amounted to about \$ 290 as an average during the period 2011 -2015, and reached about \$ 341.3 in 2017, with an annual growth rate of 6.6%.

### **2.4.2. Value of Total and Agricultural Exports and Imports:**

The annual average of Arab total exports value for the period 2011-2015 was about twice and half as high as that of Sub-Saharan Africa. Due to recent global economic developments, total value of exports witnessed continuous decrease in both regions. Arab total exports value decreased in 2017 by about 40% compared to its average during the period 2011 -2015. It decreased from \$ 1227.2 billion to \$ 735.9 billion, with an annual decrease rate of 1.7%.

In Sub Sahara Africa, it decreased by 20.0% from \$ 479.4 billion to \$ 382.5 billion, with an annual decrease rate of 8.0%. Agricultural exports account to a significant share of total export value in Sub-Saharan Africa compared to the Arab region. The average of agricultural exports

value during the period 2011 -2015 amounted to about 8.1% of the total value of exports compared to 2.4% in the Arab region.

Agricultural inputs comprise a significant component of agricultural exports in the Arab region. Their average value accounted for about 43.5% of the value of agricultural exports during the period 2011 – 2015, compared to about 4.6% in Sub Saharan Africa.

The total value of imports witnessed the same decreasing trend as the case of the total value of exports during the period (2011-2017) in both regions. In the Arab region, the value of imports decreased by about 17% from \$ 835 billion to \$ 692.9 billion in 2017 at an annual decrease rate of 1.0%. In Sub Saharan Africa the value decreased by 17.4% from \$ 425.7 to 351.8%. The percentage of total agricultural imports value during the period (2011-2017) ranged between 9% and 9.6% in the Arab region, and between 9.6% and 21.3% in Sub Sahara Africa.

**Table (4):** Macroeconomic and Agricultural Indicators in the Arab region and Sub Sahara Africa 2011 - 2017

Region	Arab region			Sub Sahara Africa		
	(2011- 2015) Average	2016	2017	2011	2016	2017
GDP (current US\$ Billion)	2452.9	2379.5	2257.0	1649.6	1512.0	1645.0
GDP per capita (constant 2010 US\$)	6526.8	5736.2	5440.9	1737.2	1462.0	1554.0
Agricultural GDP (constant prices US \$ billion in 2010)	141.4	144.4	140.8	275.9	334.5	354.0
Agricultural GDP per capita (constant US \$ in 2010)	372.5	355.7	339.3	290.1	328.5	341.3
Food production index (2004-2006 = 100)	112.5	109.8	108.9	127.1	131.4	137.0
Imports of goods and services (% of GDP)	39.9	41.2	40.2	31.4	28.3	31.1
Total exports value (billion dollars)	1227.2	785.7	735.9	479.4	328.7	382.5
Value of agricultural and food exports (billion dollars)	29.0	36.9	35.6	38.6	37.9	37.7
Percentage of agricultural exports of total exports	2.4	4.7	4.8	8.1	11.5	9.9
Value of exports of agricultural production inputs (billion dollars)	12.6	12.2	11.8	1.8	1.6	1.7
Value of exports of agricultural production inputs (% of agricultural export)	43.5	33.1	33.1	4.6	4.2	4.5
Value of total imports (\$ billion)	835.0	790.2	692.9	425.7	323.2	351.8
Value of agricultural and food imports (billion dollars)	98.9	105.7	101.6	41.3	36.0	34.2
% of Agricultural imports of total imports	11.9	13.4	14.7	9.7	11.1	9.7
Value of imports of agricultural production inputs (% of agricultural imports value)	9.0	9.1	9.6	19.9	21.1	21.3
Agriculture, forestry, and fishing, value added (constant 2010 US\$)	132.0	139.3	143.5	253.7	281.2	294.1
Agriculture, forestry, and fishing value added (% of GDP)	5.4	5.9	6.4	15.4	18.6	17.9
Agriculture, forestry, and fishing, value added (annual % growth)	3.2	2.2	3.1		3.1	4.6

Agriculture, forestry, and fishing, value added per worker (constant 2010 US\$)	5080.4	5215.8	-	1273.5	1316.6	-
Unemployment, total (% of total labor force)	10.3	10.0	9.9	6.8	7.3	7.3
Inflation, consumer prices (annual %)	3.3	2.2	2.0	5.0	5.6	5.3

Sources:

(1) <http://data.albankaldawli.org/topic/agriculture-and-rural-development>

(2) [http:// unctadstat.unctad.org](http://unctadstat.unctad.org)

(3) AOAD, Agric. statistical Yearbook, (various volumes).

### **2.4.3 The Value Added of Agriculture, Forestry and Fishing:**

The Value added of agriculture, forestry, and fishing is of great importance in both regions, however it is more significant in Sub Saharan Africa., where it amounted to about 17.9% of the GDP compared to about 4.6% in the Arab region. Its annual growth rate in 2017 was about 4.6% and 3.1% in Sub Saharan Africa and the Arab region, respectively.

### **2.4.4 Unemployment:**

Unemployment is often associated with food insecurity. Increasing employment opportunities is one of the effective means of improving food security at households' level. According to the "World Employment and Social Outlook Trends 2018", the global unemployment rate has been stabilizing and expected to have reached 5.6% in 2017. Nevertheless, higher unemployment rates are still prevailing in both the Arab region Sub Sahara Africa.

### **2.4.5 Inflation:**

Soaring food prices can have devastating effects on household's food security by making it more difficult for consumers to afford food costs. According to (FAO, 2018), the annual food price inflation in the world has decreased from 6.3% in 2013 to 3.6% in 2017 with divergent trends at regional levels.

In Africa annual food inflation increased from 6% in 2013 to 14% in 2017, (Jean Marie, et al. 2018). The annual food price inflation in the Arab region amounted to about 2.0% which is below the world average of 3.6%, and Sub-Saharan Africa average of 5.3%.



## **3 Part 3: Food Security Situation in Arab Region and Sub Sahara Africa:**

This section provides a comparative analysis of Sub-Saharan Africa and Arab food security situation. The analysis focuses on the main food security pillars and related factors during the period 2000- 2017.

### **3.1. Trends in Food Production & Availability:**

#### **3.1.1 Production of Food Commodities:**

Agricultural production is the basis of food availability, and therefore food supply at affordable prices is a priority policy in the Arab and African regions. Despite the efforts of the two regions to increase food supplies, the availability of food per capita demonstrated either declining trends or remained stagnated. This is mainly due to modest improvement in the production of food commodities in the two regions. As presented in Table (5), the production of all food commodities of plant origin has declined between 2014 -2017.

The Arab region produced about 48 million tons of grains representing 33.3% of the Sub-Saharan African production, which totaled about 143 million tons as presented in Table (5).

As for the production of food commodities of animal origin, there has been a remarkable development in both regions between 2014 and 2017. The percentage of increase in the quantity of production ranged from about to 5.3% to 27.0%.

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It is to be noted that the production of meat and dairy products in both regions is not commensurate with the livestock herd size which is estimated at about 341 million head in the Arab region and about 647 million head in Sub-Saharan African countries.

As the slow increase in food production of the two regions is being offset by rapidly increasing population, there is a critical need for improving plant animal production in both regions through better management of and good investment in value chains.

The modest growth in agricultural output in the Arab region was reflected in the deterioration of food production as shown by Figure (2) which illustrates the food production index in Arab region and sub-Sahara Africa during the period (2011 -2017). The figure also shows that, unlike the case in the Arab region, improved agricultural production in SSA has been reflected in increased food supply.



**Table (5):** production of main plant and animal food commodities in Arab region Sub Sahara Africa\* (2014- 2017)

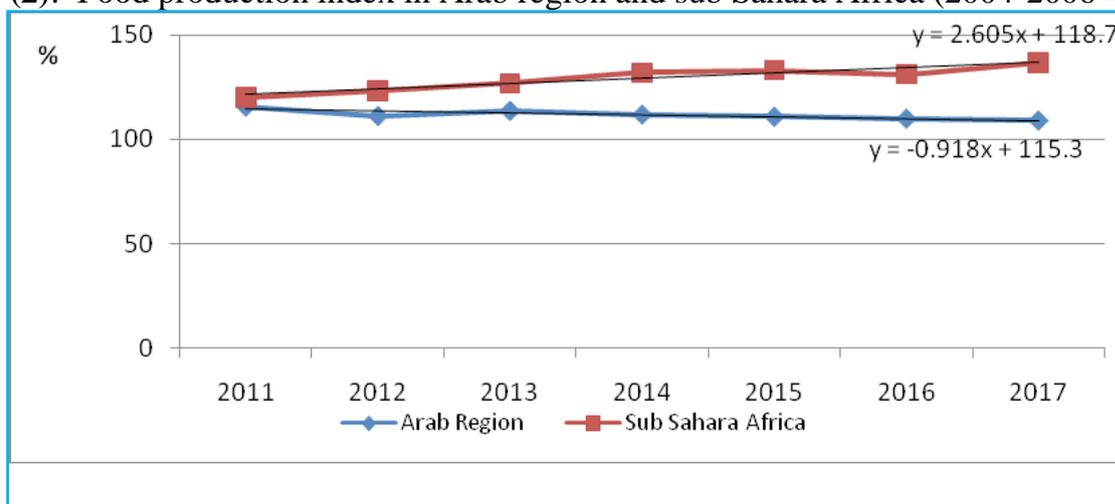
Commodity	Region	2014	2015	2016	2017	Change between 2014 & 2017 (%)
Cereals	Arab region	55.0	56.3	45.1	47.9	-13.0
	SSA	145.7	128.9	134.0	142.6	-2.1
Potatoes	Arab region	14.5	14.6	13.9	13.6	-6.2
	SSA	15.7	15.6	16.2	16.3	3.8
Legumes	Arab region	1.5	1.4	1.3	1.4	-8.0
	SSA	16.1	15.6	15.2	15.9	-1.2
Refined Sugar	Arab region	3.3	3.7	3.4	3.3	0
	SSA	6.49	6.86	7.4	8.45	7.1
Vegetable oils	Arab region	2.2	1.91	1.92	2.4	9.1

	SSA	5.57	5.73	5.82	5.81	4.3
Vegetable	Arab region	56.2	52.9	57.8	58.6	4.3
	SSA	33.56	35.81	34.21	34.31	2.2
Fruits	Arab region	34.3	41.5	35.0	37.1	8.2
	SSA	66.80	71.54	73.20	74.25	11.2
Read meat	Arab region	4.7	4.1	4.7	5.2	10.6
	SSA	9.7	10.1	10.3	10.7	10.3
Chicken meat	Arab region	3.7	4.3	4.3	4.7	27.0
	SSA	6.3	6.5	6.6	6.7	6.3
Fish	Arab region	4.60	4.66	4.96	5.23	13.7
	SSA	5.84	6.20792	6.502	6.712	14.9
Eggs	Arab region	1.80	1.79	1.68	1.89	5.0
	SSA	2.11	2.25137	2.28	2.32	
Milk	Arab region	26.4	27.1	27.7	28.0	6.1
	SSA	47.0	47.7	48.7	49.5	5.3

Sources: FAO Stat 2018, AOAD, 2018, OECD-FAO, Agricultural Outlook 2016 -2025.

\* SSA production figures are FAO and authors estimates for recent years.

**Figure (2):** Food production index in Arab region and sub Sahara Africa (2004-2006 = 100)



Source: based on FAO SATA data. 2018, <http://www.fao.org/faostat/en/#data>.

### 3.1.2 Average Dietary Energy Supply Adequacy:

This indicator expresses the Dietary Energy Supply (DES) as a percentage of the Average Dietary Energy Requirement (ADER). According to FAO food security indicators 2017, each country's or region's average supply of calories for food consumption is normalized by the average dietary energy requirement estimated for its population to provide an index (percentage) of adequacy of the food supply in terms of calories.

The average dietary energy supply adequacy in both regions is lower than the world average during the period 2011- 2017. Within the Arab region, the percentage of energy supply adequacy varies between the regions. The percentage is higher than the world average in both Arab Maghreb and Gulf and Arabian Peninsula regions, Table (6). It is comparatively low in both Arab Mashreq and the Nile Basin and Horn of Africa regions.

The overall energy supply adequacy average for SSA is about 100%, but it doesn't reflect food availability at household and individual levels. In eastern middle Africa regions, the energy supply adequacy average is relatively low compared either to world, Arab or SSA averages. The reason could be that most of the countries of the regions are of low GDP per capita value as well as of low food production capacities.

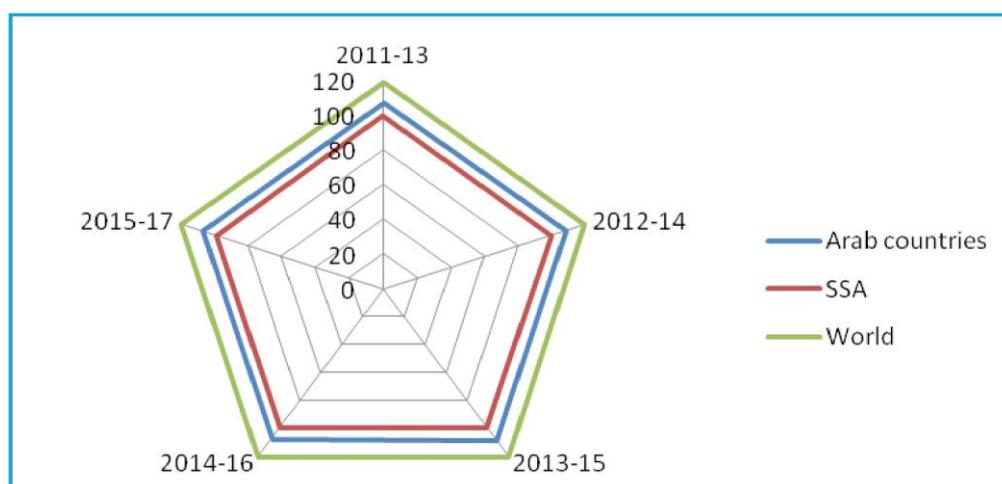
Figure (3) illustrates that average dietary energy supply adequacy during the period 2011- 2017 is higher in the Arab region than that of SSA, however it is lower than the world average in both regions.

**Table (6):** Average Dietary Energy Supply Adequacy (%)

	2011-13	2012-14	2013-15	2014-16	2015-17
Arab countries	107	108	108	107	107
Arab Maghreb	131.75	132.75	133.75	133.75	134
Nile Basin and Horn of Africa	99.33	100.67	100.67	100.67	100
Arab Mashreq	91.75	90.5	89.75	89.5	89.75
Gulf and Arabian Peninsula	130	131	131.25	131.5	131.75
SSA	100	100	99	99	99
Eastern Africa	93	93	94	93	93
Middle Africa	52	53	53	54	54
Southern Africa	122	122	121	120	120
Western Africa	123	123	122	121	120
World	119	119	120	120	120

Source: FAO, 2018, <http://www.fao.org/faostat/en/#data>.

**Figure (3):** Average Dietary Energy Supply Adequacy in Arab world, SSA and the World (2011 – 2017)



Source: Based on FAOSTAT data, 2018, FAO, 2018, <http://www.fao.org/faostat/en/#data>

### 3.1.3 Average Value of Food Production:

The indicator expresses the food net production value (in constant 2004-2006 international dollars), as estimated by FAO, in per capita terms. It provides a cross country comparable measure of the relative economic size of the food production sector in the country.

Compared to the world average, the per capita average value of food production is considered to be low in both Arab region and SSA. It accounts for about 44.2% and 51.6% of the world average for the period (2015 -2017) in Arab countries and SSA respectively, Table (7).

The Table also shows the variations in the value of food production across the Arab and SSA regions. The relative value of food production ranged between 21.2% and about 84% in Arab Maghreb region, whereas in SSA it ranged between 37% and 72%. The higher per caput average value of food production of SSA reflects the fact that SSA region is of high potential of food production as compared to the Arab region. As shown in the Table, the ratio varies between the different regions where it decreases in the regions of poor agricultural resources.

**Table (7):** Average value of food production (constant 2004-2006 I\$) Per capita

	2011-13	2012-14	2013-15	2014-16	2015-17	% of 2015-17 world average
<b>Arab Region</b>	146.9	144.2	143.3	140.7	141.8	44.2
Arab Maghreb	255.8	253.3	258.8	252.3	269.5	83.9
Nile Basin and Horn of Africa	138.3	136.5	134.0	132.3	136.6	42.5
Arab Mashreq	172.0	163.2	156.2	152.0	153.1	47.7
Gulf and Arabian Peninsula	81.2	80.0	80.4	79.8	68.1	21.2
<b>SSA</b>	162.0	164.0	163.0	161.0	165.7	51.6
Eastern Africa	136.0	137.0	137.0	133.0	138.6	43.2
Middle Africa	118.0	116.0	114.0	111.0	118.6	36.9
Southern Africa	225.0	228.0	226.0	219.0	232.3	72.3
Western Africa	197.0	203.0	203.0	204.0	204.0	63.5
<b>World</b>	306.0	309.0	312.0	313.0	321.1	

Source: collected & calculated from FAO 2018 <http://www.fao.org/faostat/en/#data>,



### 3.1.4 Share of Dietary Energy Supply Derived from Cereals, Roots and Tubers:

The indicator expresses the energy supply (in kcal/per capita/day) provided by cereals, roots and tubers as a percentage of the total Dietary Energy Supply (DES) (in kcal/caput/day) calculated from the corresponding countries in the FAOSTAT food balance sheets.

Food intake which is based on products of plant origin normally provides low levels of energy, as the diet is based on carbohydrates and less on protein.

More than fifty percent of the energy supply is derived from cereals, roots and tubers in SSA and the Arab region, compared to about 48.1% for the World. As shown in Table (8), there is a great disparity among regions.

**Table (8):** Share of dietary energy supply derived from cereals, roots and tubers (%)

Region	2011-13	2012-14	2013-15	2014-16	2015-17
Arab World	50.4	50.5	50.5	50.5	50.5
Arab Maghreb	55.3	55.3	55.0	54.7	54.3
Nile Basin and Horn of Africa	53.3	52.9	53.2	53.6	54.0
Arab Mashreq	46.4	46.5	46.5	46.5	46.5
Gulf and Arabian Peninsula	46.4	46.5	46.5	46.5	46.5
SSA	55.0	55.2	55.0	54.8	54.6
Eastern Africa	57.0	57.2	57.1	56.9	56.8
Middle Africa	-	-	-	-	-
Southern Africa	53.0	52.8	52.5	52.1	51.8
Western Africa	65.0	64.7	64.9	65.2	65.3
World	50.0	49.1	48.8	48.4	48.1

Source: collected & calculated from FAO 2018, <http://www.fao.org/faostat/en/#data>

### 3.1.5 Average Protein Supply:

This indicator provides information on the quality of the diet. According to WHO Technical Report on protein and amino acid requirements in human nutrition (2007), population average requirement is 105 mg nitrogen/kg body weight per day, or 0.66 g protein/kg body weight per day.

The figures in Table (9) indicate that, the average value of protein supply in Arab countries is similar to that of the world average. Protein intake falls short of the value of the world average in two regions of the Arab world, namely Nile Basin and Horn of Africa and Arab Mashreq. In Sub-Saharan Africa, except for Southern Africa region, protein intake is comparatively low and less than the World average in the other three regions of SSA.

It is to be noted that average protein supply is relatively high in high-income regions such as the Arabian Peninsula region in the Arab world, and Southern Africa region in Sub-Saharan Africa. In these regions, animal products and cereals are the two most important sources of protein, whereas the order is reversed in low-income states of the two regions. Thus, it could be observed that there is a positive relationship between the level of income and the consumption of animal protein. Table (10) shows the trends in per capita consumption of livestock products in Sub-Saharan Africa, Near East and North Africa as well as in other regions and country groups of the world. Although the levels in SSA and the Arab world are still well below the levels of consumption, whether compared to the world or developed countries, a remarkable increase in the consumption of animal products can be observed from the Table in East and south Asia and in Latin America and the Caribbean.

**Table (9):** Average protein supply gr/caput/day

Region	2011-13	2012-14	2013-15	2014-16	2015-17
Arab World	80.7	80.4	81.0	81.6	82.2
Arab Maghreb	77.7	75.2	76.3	77.3	78.3
Nile Basin and Horn of Africa	64.0	66.0	66.0	66.0	65.8
Arab Mashreq	<b>89.0</b>	<b>90.3</b>	<b>91.0</b>	<b>91.5</b>	<b>92.2</b>
Gulf and Arabian Peninsula	91.3	88.3	89.6	91.3	93.1
SSA	44.0	46.0	46.1	46.0	46.1
Eastern Africa	34.0	37.5	37.5	37.5	37.4
Middle Africa	26.0	26.6	26.7	26.7	26.8
Southern Africa	79.0	82.0	82.5	83.0	83.7
Western Africa	57.0	58.5	58.1	57.6	57.2
World	80.0	81.6	82.4	83.3	84.1

Source: collected & calculated from FAO 2018, <http://www.fao.org/faostat/en/#data>

Because animal-based proteins contain greater amounts of protein per portion, beside the essential amino acids, while not inhibiting the absorption of other essential nutrients, efforts of sub-Sahara Africa and Arab region to enhance food security should be directed to address this issue in order to increase average per capita animal protein, particularly among low-income groups and in rural areas.

**Table (10): Per Capita Consumption of Livestock Products**

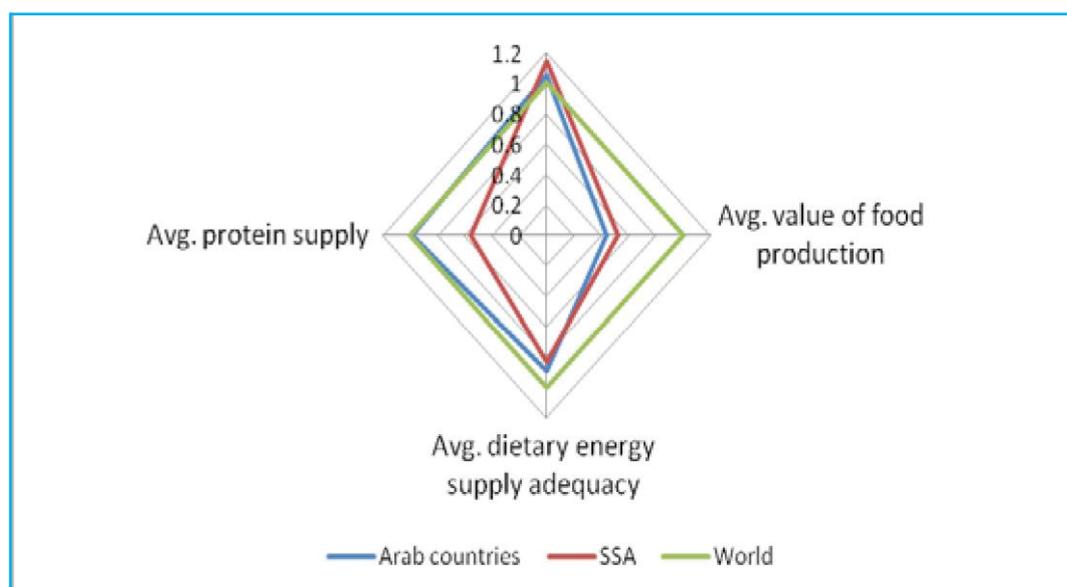
Region	Meat (kg per year)			Milk (kg per year)		
	1964 - 1966	1997 - 1999	2030	1964 - 1966	1997 - 1999	2030
World	24.2	36.4	45.3	73.9	78.1	89.5
Near East & North Africa	11.9	21.2	35.0	68.6	72.3	89.9
Sub-Saharan Africa	9.9	9.4	13.4	28.5	29.1	33.8
Developing countries	10.2	25.5	36.7	28.0	44.6	65.8
Latin America and the Caribbean	31.7	53.8	76.6	80.1	110.2	139.8
East Asia	8.7	37.7	58.5	3.6	10.0	17.8
South Asia	3.9	5.3	11.7	37.0	67.5	106.9
Industrialized countries	61.5	88.2	100.1	185.5	212.2	221.0
Transition countries	42.5	46.2	60.7	156.6	159.1	178.7

\* Excludes South Africa.

Source: WHO, Global and regional food consumption patterns and trends, www.who.int/ar

Figure (4) combines the above mentioned four sub indicators of food availability in Sub-Saharan Africa, Arab region and the World after being normalized in order to facilitate their comparison. The figure indicates the relatively higher share of dietary energy supply derived from cereals, roots and tubers and lower value of food production per caput in both Arab region and Sub Sahara Africa compared to the World average.

**Figure (4): Food availability indicators in the Arab region and Sub-Saharan Africa (2011- 2017 average)**



Source: Based on <http://www.fao.org/faostat/en/#data>.

### 3.1.6: Relationship between Income and Food Availability Indicators:

Relationship between income and food availability indicators in Arab and Sub Sahara Africa Regions is studied and quantified through regression analysis based on time series data on the development of GDP, average per caput protein supply, average value of food production, and prevalence of undernourishment.

A multiple regression model was employed to study the effects of GDP and average value of food production on protein supply in the Arab and Sub-Saharan Africa. Multiple regression estimates of the unknown regression coefficients were made according to the following equation:

$$Y_j = \beta_0 + \beta_1 X_{1j} + \beta_2 X_{2j} + \dots + \beta_p X_{pj} + \epsilon_j$$

where:

$Y_j$  = The dependent variable (average per caput protein supply gr/day).  $\beta_0$

=The intercept.

$X_i$ = The independent variables (GDP and average value of food production).

$\beta_i$ =The unknown regression coefficients

$\epsilon_j$  = The error (residual) of observation j.

The results of the multiple regression model are presented in Table (11) for both the SSA and the Arab region.

**Table (11):** Multiple Regression results on the Effects of GDP Value food production & on Protein Supply

Arab Region (R Square = 0.65)					Sub Saharan Africa (R Square = 0.91)				
	Coefficient	Standard Error	t Stat.	P-value		Coefficient	Standard Error	t Stat.	P-value
Intercept	61.79	14.24	4.344	0.14	Intercept	4.4	1.51	2.99	0.21
X Variable 1 (GDP/ caput)	0.000379	0.00017	2.23	0.026	X Variable 1 (GDP/ caput)	0.0042	0.00007	58.45	0.011
X Variable 2 (Food value/ caput)	0.042	0.0068	6.1	0.65	X Variable 2 (Food value/ caput)	0.183	0.0101	18.18	0.035

The regression results shown in Table (11) indicate the positive relationships between GDP per capita and the average per caput protein supply in both regions as indicated by the positive signs of the GDP coefficients. The values of the coefficient of determination (R squared) amounted to 0.65 and 0.91 for the Arab region and Sub-Saharan Africa, respectively which imply that the model explains most of the variability of the response data around its mean regression. Based on the p-values, and t-statistics, the results on the effects of the GDP on the supply of protein are statistically significant for both regions.

Regarding the effects of the value of food production on the average per caput protein supply, however the results indicated the positive relationships; the coefficient of the value of food production was not statistically significant for the Arab. As for Sub-Saharan Africa, the results showed the positive and statistically significant effects of value of food production on the supply of protein; this is in line with the importance of the agricultural sector in the region.

The relationship between the GDP and the prevalence of undernourishment in both regions is then studied employing a simple regression. The estimates of the unknown regression coefficients were made according to the following equation:  $Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_p X_{pi} + \varphi_i$ ,  $i = 1, \dots, n$  Where:

$Y_j$  = The dependent variable (Prevalence of undernourishment as % of of the population in both regions).

$\beta_0$  = The intercept, and

The  $\beta$  coefficients are unknown parameters, and the  $\varphi_i$  are random error terms.

The regression results are presented in Table (12). They indicate the negative relationships between the GDP per capita and the percentage of undernourished population in both regions. The values of the coefficient of determination ( $R^2$ ) amounted to 0.40 and 0.30 for the Arab region and Sub-Saharan Africa, respectively.

**Table (12):** Simple Regression results on the Effects of GDP prevalence of undernourishment in Arab Region &Sub Sahara Africa

Arab Region ( $R^2 = 0.402$ )					Sub Saharan Africa ( $R^2 = 0.30$ )				
	Coefficient	Standard Error	t Stat.	P-value		Coefficient	Standard Error	t Stat.	P-value
Intercept	19.54	2.954	6.64	0.0001	Intercept	23.62	3.93	6.0077	0.0003
X (undernourishment)	-0.04	0.01871	-2.32	0.049	X (undernourishment)	-0.0547	0.0249	-2.1971	0.047

### 3.2 Accessibility:

Among the factors affecting access to food are incomes, expenditure, markets and marketing systems, and food prices. Besides, the main accessibility indicators under FAO food security indicators are: gross domestic product per capita, prevalence of undernourishment, prevalence of severe food insecurity in the total population and rail lines density. In this section, according to data availability, accessibility to food in Arab and Sub-Saharan African countries is examined based on the first three indicators namely, gross domestic product per capita (incomes and poverty), prevalence of undernourishment, and prevalence of severe food insecurity in the total population.

#### 3.2.1 Incomes:

Food access is usually measured at the household or individual level. It is influenced by three main factors according to Food Security conceptual framework, (USAID, 1999). These include own food production, market purchases and food transfers. Market purchases are affected by the prices of food and the cash income available to households.

According Vogel (2002), the fact that many households continue to experience food insecurity in South Africa is an indication that the problem is not about food shortages but rather a problem of inadequate access to food by vulnerable groups in the country. Food accessibility is a major problem in South Africa which is an upper middle-income country in the Sub-Saharan region of Africa, and considered as a food secure country. This could be also the case in many Arab countries where high levels of poverty and low levels of incomes are among the most important factors limiting economic access to the food market.

The gross domestic product (GDP) index provides information on the possibility of economical access to markets. Data on GDP per capita in the Arab region and Sub-Saharan Africa is presented in Table (13). Compared to the World Average, the data indicates relatively low levels of incomes in both regions. The average per capita GDP in Sub-Saharan Africa was roughly about 33% of the World average. It ranged between \$ 2056 in East Africa, and \$ 12130- in Southern Africa, amounting to about 19% and 113% of the World average in Eastern Africa and Southern Africa, respectively. In the Arab region the average per capita GDP was about 51% of the World average. It ranged between 24% in both Arab Maghreb and the Nile Basin and Horn of Africa, and 227% in Gulf and Arabian Peninsula region.

**Table (13):** Gross domestic product per capita (Current US \$)

	2011	2012	2013	2014	2015	2016	2017	% of the world average 2017
Arab World	6639	6985	7037	7241	6279	5863	5441	51
Arab Maghreb	4249	4243	4245	3407	2993	2811	2618	24
Nile Basin & Horn of Africa	2117	2416	2202	3407	2993	2811	2618	24
Arab Mashreq	4202	4725	4909	4734	4299	4086	3921	37
Gulf and Arabian Peninsula	30749	31645	32152	35147	28073	26191	24285	227
SSA	3291	3340	3419	3495	3512	3466	3567	33
Eastern Africa	1713	1759	1830	1891	1948	1989	2056	19
Middle Africa	2668	2733	2778	2837	2832	2739	2836	26
Southern Africa	11735	11844	12013	12073	12041	11972	12130	113
Western Africa	3683	3766	3874	3999	4012	3921	4081	38
World	10452	10563	10730	10891	10182	10209	10722	100

Source: collected & calculated from FAO 2018, <http://www.fao.org/faostat/en/#data>, AOAD, Arab Statistical Year Book, vol. 34, -37. & the Worldbank.org/indicator/ny.gdp.pcap.cd, 2018.

### 3.2.2 Prevalence of undernourishment:

According to FAO food security suit indicators, this indicator expresses the probability that a randomly selected individual from the population consumes quantities of calories that is insufficient to cover energy requirement for an active and healthy life an adult consumer. Undernourishment found to be much higher in Sub-Saharan Africa. Compared to an average World level of 10.8%, the percentage of undernourishment in Sub-Saharan Africa amounted to 22.2% as an average for the period 2015 -2017. It ranged between 8.1% for Southern Africa and 31.2% for Eastern Africa. The average corresponding percentage in the Arab region is slightly higher than that of the World average. It amounted to about 12.5%, and ranged between 4.0% for Gulf and Arabian Peninsula and 16.6% for Nile Basin and Horn of Africa, Table (14).

### 3.2.3 Prevalence of severe food insecurity in the total population:

The prevalence of severe food insecurity is an estimate of the percentage of people in the population who live in households classified as severely food insecure. It is an indicator of lack of food access. The threshold used by FAO to classify “severe” food insecurity corresponds to

the severity associated with the item “having not eaten for an entire day” on the global Food Insecurity Experience Scale (FIES).

**Table (14):** Prevalence of undernourishment (%)

	2011-13	2012-14	2013-15	2014-16	2015-17
Arab World	11.5	11.7	12.0	12.3	12.5
Arab Maghreb	4.7	4.5	4.4	4.4	4.5
Nile Basin and Horn of Africa	16.7	16.3	16.2	16.4	16.6
Arab Mashreq	12.9	13.5	14.1	14.4	14.6
Gulf and Arabian Peninsula	4.0	3.9	3.9	4.0	4.0
SSA	21	20.8	20.8	21.4	22.2
Eastern Africa	31	30.5	30.4	30.8	31.2
Middle Africa	26	25	24.4	24.7	25.3
Southern Africa	7.0	7.1	7.5	7.8	8.1
Western Africa	10.4	10.5	10.9	11.7	13.1
World	11.3	11	10.8	10.7	10.8

Source: collected & calculated from FAO 2018, <http://www.fao.org/faostat/en/#data>

A household is classified as severely food insecure when at least one adult in the household has reported to have been exposed, at times during the year, to several of the most severe experiences described in the FIES questions, such as to have been forced to reduce the quantity of the food, to have skipped meals, having gone hungry, or having to go for a whole day without eating because of a lack of money or other resources.

The indicator of the prevalence of severe food insecurity in the total population witnessed an increasing trend during the period 2014 – 2017 either at the global level, Arab region level or Sub-Saharan Africa level, Table (15). The percentage of the prevalence of severe food insecurity was comparatively high in Sub-Saharan Africa, either compared to the Arab or global levels. Its average was about 29%, while its range reached alarming levels of 39.6 in Middle Africa and 52.4% in Malawi.

The above-mentioned accessibility indicators are normalized and combined in figure (5), from which it could be clear that the three food accessibility indicators are much higher in Sub-Saharan Africa than the World and Arab region levels. The poverty indicator is comparatively low in the Arab region compared to SSA and the World.

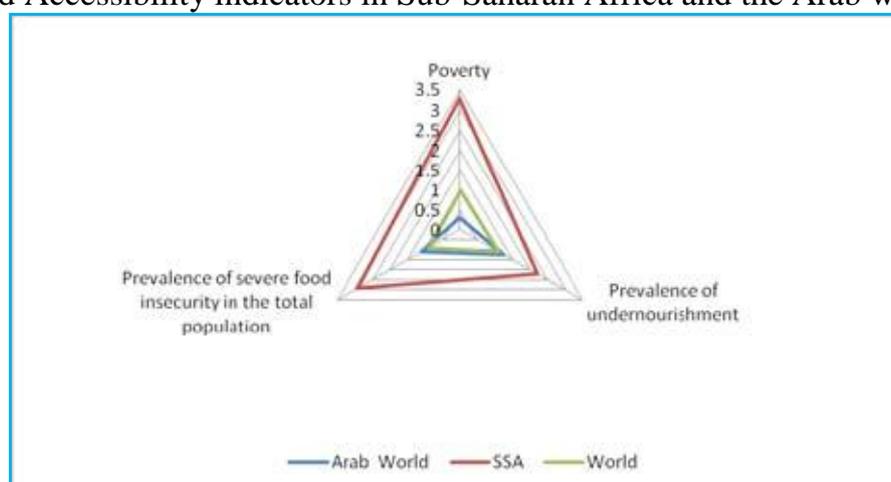
**Table (15):** Prevalence of severe food insecurity in the total population

Region	2014-16	2015-17
WORLD	8.7	9.2
	Prevalence of severe food insecurity (% of Population)	
Sub-Saharan Africa	26.3	29.3
Northern Africa	10.9	11.4
Middle Africa	34.6	39.6

Eastern Africa	27	29.2
Western Africa	22.2	25.1
Kenya	31.8	35.6
Malawi	53.9	52.4
Arab Region		
Egypt	9.4	10.1
Jordan	14.7	13.9
Palestine	9.7	9.2
Northern Africa	10.9	11.4

Source: collected & calculated from FAO 2018, <http://www.fao.org/faostat/en/#data>.

**Figure (5):** Food Accessibility indicators in Sub-Saharan Africa and the Arab world



Source: Based on FAO 2018, <http://www.fao.org>.

### 3.2.4 Factors Affecting Food Accessibility Indicators:

A multiple regression model was used to study the effects of the annual growth rates of the population, per capita gross domestic product, and value of per capita food production on the prevalence of severe food insecurity in the two regions. The annual growth rates of the population, per capita gross domestic product, and value of per capita food production were estimated as shown in Table (16). A multiple regression model was used to study their impacts on the prevalence of severe food insecurity in the different regions of Sub-Sahara Africa, the Arab region -represented by Northern Africa-, and the world. The average percentages of the prevalence of severe food insecurity during the period 2014 -2017 represent the independent variable (Y), and the annual growth rates shown in the Table (16) denote the independent variables ( $X_1$ ,  $X_2$ , and  $X_3$ ).

The regression results are presented in Table (17). They indicate a positive relationship between the prevalence of severe food insecurity and population growth, and a negative relationship between the prevalence of severe food insecurity and both the GDP per capita and per capita value of food production.

**Table (16):** Prevalence of severe food insecurity during the period 2014 -2017

Prevalence of severe food insecurity (percent of population)						Annual growth rates (%)		
Region	2014	2015	2016	2017	2014 -2017 average	GDP per capita	Population	value of food production
World	8.9	8.4	8.9	10.2	9.1	2	1.1	1.1
Africa	22.3	22.4	25.4	29.8	24.975	0.1	2.5	-0.1
Northern Africa	11.2	10	11.7	12.4	11.325	1.3	1.8	2
Sub-Saharan Africa	25	25.2	28.6	33.8	28.15	-0.1	2.6	-0.1
Central Africa	33.9	34.3	35.6	48.5	38.075	-1	3.1	-2
Eastern Africa	25.9	25.4	29.7	32.4	28.35	1.8	2.7	-1
Southern Africa	21.3	20.4	30.8	30.9	25.85	-0.01	1.3	-2
Western Africa	20.7	21.9	23.8	29.5	23.975	-1	2.6	2

Source: FAO, 2018, Regional overview of food security in sub Sahara Africa

The value of the coefficient of determination ( $R^2$ ) was about 0.79 indicating that that the model explains most of the variability of the response data around its mean regression. Based on the p-values, and t-statistics, the results of the effects of the independent variables on the prevalence of severe food insecurity are statistically significant.

**Table (17):** Multiple Regression Results on the Effects of GDP Per Capita, Population Growth and Value of Food Production on Prevalence of Severe Food Insecurity in SSA and the Arab Region

	Coefficients	Standard Error	t Stat	P-value
Intercept	10.056	2.211	4.547	0.01044
X Variable 1 GDP per capita	-2.174	0.562	-3.862	0.018113
X Variable 2 Population Growth	6.538	0.918	7.1213	0.002055
X Variable 3 Value of food production	-3.305	7 0.358	-9.232	0.000765

### 3.3 STABILITY:

Adverse weather conditions, political instability, and economic factors (unemployment, rising food prices) may have an impact on food security status.

Thus, the term stability describes the temporal dimension of food and nutrition security. Stability coincides when adequate food supply on household level is maintained and remains constant during the year and in the long-term.

Various factors may affect household's food supply and accessibility. These include adverse weather conditions, political instability, unemployment, rising food prices and external risks such as natural disaster and climate change, price volatility, conflicts and epidemics.

This section focuses on food stability in the two regions based on stability indicators for which recent data was available. Stability indicators analyzed in this section are cereal import dependency ratio, percent of arable land equipped for irrigation, value of food imports over total merchandise exports, and per capita food supply variability.

### 3.3.1 Cereal Import Dependency Ratio:

Cereals and coarse grains provide a main source of energy supply for the Arab and Sub-Saharan Africa consumers. Because domestic production of the two regions is not enough for meeting local demand, they depend on export to fill the gap of cereals and coarse grains domestic production. Arab cereal production meets on average about 45% of the demand, while SAA production meets more than eighty percent. Thus, the supply of grains is more critical in the Arab region than SSA due to its limited water resources and arid conditions. However, some of the Arab countries tended to reduce grain areas to preserve scarce water resources. For example, Saudi Arabia has suspended wheat cultivation since 2015, and Egypt has reduced rice areas, and imported rice for the first time in 2018 to meet the shortage of local rice production. At the global level, grain production is concentrated in few countries which subject other countries to problems of cereal supply and price volatility. Cereal import dependency ratio was very high in Arab region and increased from an average of 75.5% during the period 2011- 2013, to about 81% for the period 2015 -2017, Table (18). In Sub-Saharan Africa, the ratio was low and has stabilized over the past at five years about 18%.

### 3.3.2 Percent of Arable Land Equipped for Irrigation:

The production of food in the Arab region depends mainly on rain-fed farming systems that occupy more than 70% of the cultivated areas, and therefore food production is characterized by fluctuations and instability. The Area equipped for irrigation did not develop during the period 2001- 2017 in both two regions. It remained within the limits of 30% of the arable land in the Arab region. Thus, the development of rain-fed farming systems seems to be critical to maximize returns from the use of rain water in the production of food through water harvesting and supplementary irrigation.

**Table (18):** Food Security Stability Indicators in Arab World SSA and the World 2011 -2015

Indicator	Region	2011-13	2012-14	2013-15	2014-16	2015-17
Cereal import dependency Ratio (%)	Arab World	75.5	74.7	80.1	80.8	80.9
	SSA	17.1	18.0	17.8	17.7	17.8
	World	0.9	1.2	1.1	1.0	1.1
Percent of arable land equipped for irrigation	Arab World	31.5	31.3	31.6	30.2	31.7
	SSA	3.3	3.3	3.3	3.3	3.3
	World	23.3	23.3	23.3	24.0	24.2
	<b>Region</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
Per capita food production variability, (Constant 2004-2006 thousand international \$ per capita	Arab World (North Africa)	6.1	5.9	6.9	7.8	6.2

	SSA	3.6	3.3	3.3	3.3	2.2
	World	2.3	1.8	1.9	1.7	1.6
	<b>Region</b>	<b>2010-12</b>	<b>2011-13</b>	<b>2012-14</b>	<b>2013-15</b>	<b>2014-16</b>
Value of food imports over total merchandise exports (%)	Arab World	19	19	17	18	19
	SSA	9	9	8	9	9
	World	5	5	5	5	5

Source: collected & calculated from FAO 2018, <http://www.fao.org/faostat/en/#data>. In Sub-Saharan Africa, the percentage of land equipped with irrigation systems is low as the region relies mainly on precipitation for agricultural production, Table (18). This could reflect the poor technological development in this region, as one of the main factors behind poor and unstable food supply.

### 3.3.3 Per Capita Food Supply Variability:

Per capita food supply variability corresponds to the variability of “food supply in kcal/caput/day” as disseminated in FAOSTAT. It is part of the FAO Suite of Food Security Indicators (2017) in the dimension “Stability”. It compares the variations of food supply across countries and time, and corresponds to the variability of the net food production value in constant (2004-2006) prices divided by the population number. As presented in Table (18), the variability is high in Sub-Saharan Africa, and much higher in the Arab region as compared to the world. This could be related to a variety of factors important among them are the economic factors such as prices volatility, and environmental factors that cause higher fluctuations in food production.

### 3.3.4 Value of Food Imports over Total Merchandise Exports:

This indicator provides a measure of vulnerability and captures the adequacy of foreign exchange reserves to pay for food imports, which has implications for national food security depending on production and trade patterns. It is calculated in three-year averages, from 1990-92 to 2010-11, to reduce the impact of possible errors in estimated trade flows. Averages for the periods 2012-14, 2013-15, and 2014-16 were projected based on data available for the previous periods. The geometric means were then calculated to get the overall average of each region. As presented in Table (18), the geometric means of the value of food imports as a percent of the value total merchandise exports were higher than World average in both regions. Nevertheless, the variations were very high among the countries of the two regions, where the ratios ranged between 3% to more than 600% in the Arab region, and from 1% to more than 800% in Sub-Saharan Africa. This suggests that the stability of national food security is fragile and weak because in many countries there is insufficient foreign exchange reserves to meet the value of food imports, which negatively affects the stability of food security status in these countries.

### 3.4 Utilization:

Food utilization refers to the metabolism of food by individuals. The nutritional status of individuals is maintained through the biological utilization of food consumed, enough energy, and nutrient intake. While the biological utilization of food depends on the ability of the human body to take food and convert it into energy, sufficient energy and nutrient intakes is affected by most of the factors affecting food availability and accessibility, as well as by good care and feeding practices, food preparation, and diversity of the diet. Insufficient food increases the susceptibility of the body to malnutrition and other diseases that impede the ability of the human body to take food and make use of it.

Food utilization indicators adopted by FAO include: people using at least basic drinking water services, people using safely managed drinking water services, people using at least basic sanitation services, people using safely managed sanitation services, percentage of children under 5 years of age affected by wasting, percentage of children under 5 years of age who are stunted, percentage of children under 5 years of age who are overweight, prevalence of anemia among women of reproductive age (15- 49 years), prevalence of obesity in the adult population (18 years and older), and prevalence of exclusive breastfeeding among infants (0 – 5) months of age.

In this section, the indicators for which data were available for Arab and Sub-Saharan African countries are analyzed. These are the percentage of people using at least basic drinking water services, people using safely managed sanitation services, prevalence of anemia among women of reproductive age, and prevalence of obesity in the adult population. Moreover, the depth of the food deficit, food self- sufficiency ratios, and food gap in both regions are analyzed.

### 3.4.1 Percentage of People Using at Least Basic Drinking Water Services:

This indicator provides information useful to assess the utilization dimension of food security outcomes. It encompasses both people using basic water services, and those using safely managed water services. Basic drinking water service is defined as drinking water from an improved source, provided collection time is not more than 30 minutes for a round trip. Improved water sources include piped water, boreholes or tube wells, protected dug wells, protected springs, and packaged or delivered water.

As presented in Table (19), the percentage witnessed slight increase during the period 2011-2017 in both the two regions and the world levels. Compared to the global level, the ratio is relatively low in both the Arab and Sub-Sahara region, although the proportion in Sub-Saharan is much lower than that of the world average. The data reflect that the proportion of population without basic drinking water services about 12.6% in the Arab region and about 34.7% in SSA. At the regional level in Sub-Saharan Africa, the percentage of people using at least basic drinking water services was relatively high in Southern Africa (78%) and Central Africa (70%), but it was considered to be low in Eastern and Middle Africa regions averaging to about 60%, and 58%, respectively.

At the Arab world level, the percentage exceeds the World average in the Gulf and Arabian Peninsula region (96.4%), while it equates the world average in the Arab Mashreq region, (90%). The ratio was comparatively low in both the Nile Basin and Horn of Africa regions (82%) and the Arab Maghreb region (74%).

**Table (19):** Food Utilization Indicators 2011 -2017

Indicator	Region	2011	2012	2013	2014	2015	2016	2017
Percentage of people using at least basic drinking water services. (%)	Arab World	84.6	85.1	85.6	86.1	86.5	86.9	87.4
	SSA	62.1	62.8	63.4	64.0	64.7	64.7	65.3
	World	86.7	87.2	87.6	88.0	88.5	89.6	90.1
Percentage of people using at least basic sanitation services. (%)	Arab World	72.6	73.1	73.6	74.1	74.4	74.9	75.3
	SSA	26.6	27.2	27.7	28.1	28.6	29.4	29.9
	World	65.5	66.1	66.8	67.4	68.0	68.9	69.6

Prevalence of anemia among women of reproductive age. (%)	Arab World	32.02	32.2	32.4	32.7	33.3	34.03	32.1
	SSA	38.9	38.6	38.4	38.4	38.5	38.8	36.9
	World	30.0	30.3	30.7	31.3	32	32.8	31.0
Prevalence of obesity in the adult population. (%)	Arab World	18.9	19.5	19.9	20.6	21.5	22.2	22.1
	SSA	6.7	6.9	7.1	7.4	7.7	8.0	8.0
	World	11.4	11.7	12.1	12.4	12.8	13.2	13.3
Depth of the food deficit (Kilocalories/person/day. (*))	Arab World	71.5	55.2	53.2	52.2	51.7	51.0	-
	SSA	146.0	139.7	135.7	133.1	131.2	129.6	-
	World	102.0	97.6	94.4	92.3	90.3	88.4	-

Source: collected & calculated from FAO 2018, <http://www.fao.org/faostat/en/#data>, & (\*) World Bank data, 2018, <https://data.worldbank.org/indicator/SN.ITK.DFCT>.

### 3.4.2 Percentage of People Using Safely Managed Sanitation Services:

This indicator refers to the percentage of people using at least basic sanitation services, i.e. improved sanitation facilities that are not shared with other households. The indicator encompasses both people using basic sanitation services, and those using safely managed sanitation services. Improved sanitation facilities include flush/pour flush to piped sewer systems, septic tanks or pit latrines; ventilated improved pit latrines, composting toilets or pit latrines with slabs.

This indicator provides information useful to assess the utilization dimension of food security outcomes. It corresponds to the MDG 7 target 7.C: “halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation”.

Compared to a World average of 69.6% in 2017, the percentage of people using at least basic sanitation services was higher in the Arab region (75.3%) and much lower in Sub-Saharan Africa (29.9%). This implies that the proportion of those without sanitation services were about 25% in the Arab region, and about 70% in Sub Saharan African. In comparison with previous years’ data shown in Table (19), it is concluded that little progress was made towards achieving MDG 7 target 7.C.

### 3.4.3 Prevalence of Anemia Among Women of Reproductive Age (15-49 years):

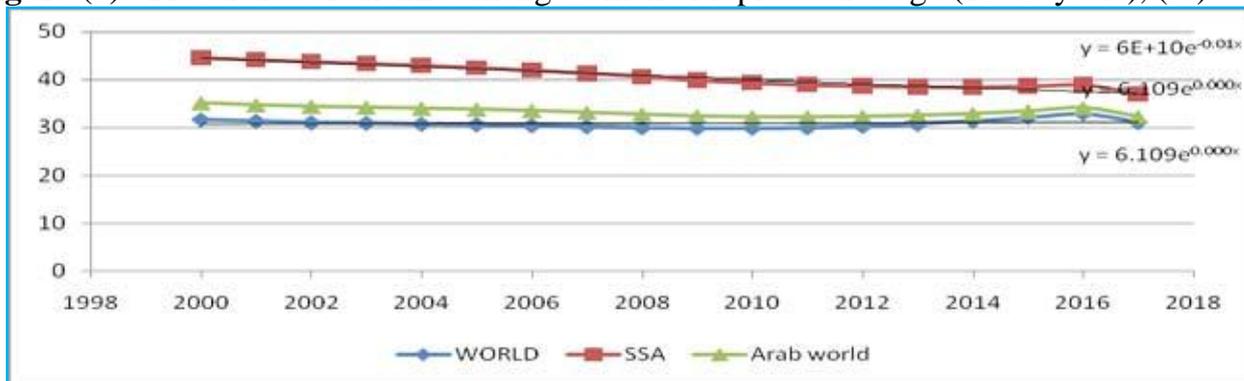
Anemia is a condition in which the number of red blood cells or their oxygen-carrying capacity is insufficient to meet physiologic needs, which vary by age, sex, altitude, smoking, and pregnancy status. According to (WHO), iron deficiency is thought to be the most common cause of anemia globally, although other conditions, such as foliate, vitamin B12 and vitamin A deficiencies, chronic inflammation, parasitic infections, and inherited disorders can all cause anemia.

In its severe form, it is associated with fatigue, weakness, dizziness and drowsiness. Pregnant women and children are particularly vulnerable.

A joint Study of the World Health Organization (WHO), United Nations Children’s Fund (UNICEF), and United Nations University (UNU) on “Iron Deficiency Anemia Assessment, Prevention, and Control, A guide for program managers, 1993”, pointed out that the cut-off values for public health significance is 40%. A prevalence of Anemia equal or higher than this level signals a severe public health problem.

However, the study indicated that in most industrialized countries, the prevalence of anemia among pregnant women is around 20%, the percentage of the prevalence of anemia among women of reproductive age during the period (2011–2017) averaged to about 32.7% in Arab region, 38.4% in Sub-Saharan Africa compared to a global level average of 31.2, Table (19) and Figure (6).

**Figure (6):** Prevalence of anemia among women of reproductive age (15-49 years), (%)



Source: Based on FAO 2018, <http://www.fao.org/faostat/en/#data>.

### 3.4.4 Prevalence of Obesity in the Adult Population (18 Years and Older):

Overweight and obesity are defined as abnormal or too much fat accumulation that may impair health. (WHO) 2018 indicated that obesity has nearly tripled worldwide since 1975, and more than 1.9 billion adults, was overweight in 2016. Of these over 650 million were obese, and an estimated 41 million children under the age of 5 years were overweight or obese in 2016. The primary cause of obesity and overweight is an energy imbalance between calories consumed and calories spent.

Globally, there has been an increased intake of energy-dense foods that are high in fat; and an increase in physical inactivity due to the increasingly sedentary nature of many forms of work, changing modes of transportation, and increasing urbanization, (WHO, 2018).

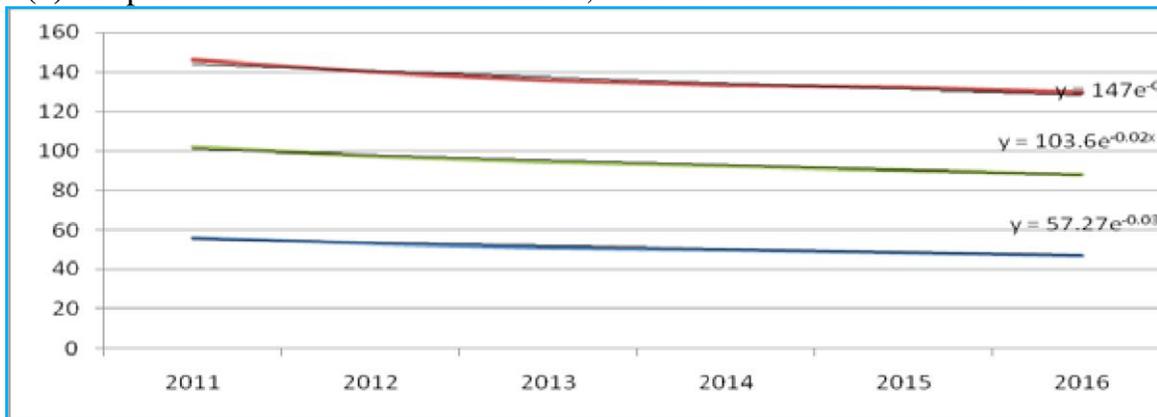
Overweight and obesity are linked to more deaths worldwide than underweight. Globally there are more people who are obese than underweight – this occurs in every region except parts of Sub-Saharan Africa and Asia, (WHO, 2018). The data in Table (19) confirm these facts as the proportion of overweight people in Sub-Saharan Africa declines compared to the world and the Arab region. The percentage of the prevalence of obesity in the adult population in the Arab region is more than double of the world average. This calls for actions to support healthy diets and regular physical activities to reduce overweight and obesity in the Arab region.

### 3.5 The Depth of the Food Deficit:

The depth of the food deficit indicates how many calories would be needed to lift the undernourished from their status, everything else being constant. The average intensity of food deprivation of the undernourished, estimated as the difference between the average dietary energy requirement and the average dietary energy consumption of the undernourished population (food-deprived), is multiplied by the number of undernourished to provide an estimate of the total food deficit in the country, which is then normalized by the total population.

The depth of the food deficit expressed in kilocalories per person per day in the Arab world, Sub-Saharan Africa, compared to the world average during the period (2011–2016) is presented in Figure (7). The average value of the depth of the food deficit during this period amounted to about 56 kcal/ person/day in the Arab region, 137 kcal/ person/day in SSA, compared to 94 kcal/ person/day as a world average. As shown in the figure, the value the depth of the food deficit declined by an annual rate of about 2 per cent for both Sub-Saharan Africa and the world, and three per cent for the Arab region.

**Figure (7):** Depth of the food Deficit in MENA, SSA and the World 2010 -2016



Source: Based on World Bank data, 2018, <https://data.worldbank.org/indicator/SN.ITK.DFCT>.

### 3.5.1 Per capita Food Consumption and Food self- Sufficiency Ratios:

Food consumption and consumers food intake are the ultimate outcome of efforts in the production, marketing and distribution of food and related policies and programs. The amounts consumed by individuals of various food commodities represent the per capita food consumption of these commodities. They differ among different regions according to food availability, consumer accessibility to food and nutritional habits. They are used in this section to give insights and allow comparison of the levels of per capita food commodities, and self-sufficiency ratios between the two regions, and between them and the global level.

#### 3.5.1.1 Per Capita Food Consumption:

Table (20) presents data on average per capita of main food commodities in the Arab region and Sub-Saharan Africa and the world in 2017. They help identifying the characteristics of food consumption patterns in the two regions, the most important of which is the low consumption levels of animal products compared to global levels, despite the large numbers of livestock in two regions. Per capita food consumption in Sub Sahara Africa is lower than those of the both Arab region and World average for all of plant food commodities, except for legumes, fruits. In the Arab region, per capita food consumption was higher than those of both sub Saharan Africa and the World average for all of plant food commodities, except for vegetables. Lower amounts of per capita food consumption could explain the poor food security indicators, especially prevalence of undernourishment, per caput protein supply, and dietary energy supply in subSahara Africa.

**Table (20):** Average per capita of main food commodities in the Arab Region, Sub-Saharan Africa, the world 2017 (kg/person/year)

Food commodity	Arab region <sup>1</sup>	SAA <sup>2</sup>	World <sup>3</sup>
Cereals	310.6	137.9	148.7
potatoes	32.8	15.8	32.0
Sugar	30.8	12.6	25.3
Legumes	8.2	15.4	-
Vegetable oils	16.5	5.62	22.8
Vegetables	170.3	33.6	136.0
Fruits	85.3	71.8	74.0
Meat	30.1	16.81	42.7
Milk	83.7	47.8	111.4
Fish	11.6	11.8	20.4

Sources:

1. AOAD, 2018, Arab Food Security Annual Report..
2. FAO, Food outlook, November, 2018.

### 3.5.1.2 Food Self- Sufficiency Ratios:

Food self-sufficiency ratios of various food commodities in the Arab region and Sub Sahara Africa are given in Table (21). The analysis of self-sufficiency ratios helps to identify the conditions of production of various food commodities, as it reflects the ability of local production to meet the consumer requirements. The degree of dependence of the Arab region and Sub Sahara Africa on foreign markets to meet consumption requirements varies according to different food commodities. The Arab region depends heavily on foreign markets to meet the consumption requirement of the food items of low self-sufficiency ratios, namely cereals, sugar, vegetable oils and legumes. As shown by the Table, the self-sufficiency ratios of these items range between 35.0% for vegetable oils and 42.8% for sugar.

In Sub-Saharan Africa, self-sufficiency ratios seem to be high for most food items, ranging between 91.3% for milk and 115.5% for potatoes. There are however few commodities of relatively high or moderate self-sufficiency ratios namely, cereals (85.3%) and poultry meat 72.4%, legumes (65.2%), and fish (64.4%).

It should be noted that despite the high self-sufficiency ratios of most food commodities in Sub-Saharan Africa, which exceed those in the Arab region, the prevalence of malnutrition, and low energy and protein supply are common in Sub-Saharan Africa. This could indicate a lack of, or limited access to food at the household and state levels.

**Table (21):** Self-sufficiency ratios of food commodities in the Arab region & SSA 2017 (%)

Food commodity	Arab region1	SSA2
Cereals	37.1	85.3
Potatoes	100.0	115.5
Sugar	42.8	106.8
Legumes	40.6	65.2
Vegetable oils	35.0	103.3
Vegetables	101.0	109.6
Fruits	104.9	115.4

Red Meat	86.3	102.7
Poultry Meat	71.1	72.4
Table egg	97.1	105.4
Milk	80.7	91.3
Fish	108.5	64.4

Sources:

1. AOAD, 2018, Arab Food Security Annual Report.
2. FAO, <http://www.fao.org/faostat/en/#data>.

### 3.5.2 Food Gap:

#### 3.5.2.1 The value of Food Gap:

The value food gap of major food commodities in the Arab region amounted to 33.6 billion dollars in 2017, (AOAD) 2018. It was estimated based on the difference between production and consumption available, i.e. net imports of food commodities.

For Sub-Saharan Africa, it was not possible to estimate the value of food gap in 2017 due to lack of accurate data on the values and quantities of trade in food commodities, especially intraSub-Saharan Africa trade in food commodities. Based on its value in 2014 which estimated at \$ 19.1 billion, compared a food gap value of \$ 34.2 billion for the Arab region in that year (AOAD) 2016, the value of food gap in Sub-Saharan Africa will be about \$18.76 billion in 2017, assuming that the percentage of the value of the food gap in Sub-Saharan Africa to the value of the food gap in the Arab region assumed is constant as it was in 2014.

The food gap value represents the value of net imports of food commodities. Thus, it shouldn't be considered as an appropriate measure of the food security situation in the Arab region or Sub-Saharan Africa, as it reflects only the value of net imports of food commodities which is in turn affected by the capability of countries to import the needed amounts of food items. Limited access capacities of countries or individual consumers impede the choices of countries to import more food to meet the demand, and limit the consumers' choices of the food baskets components, as well as the amounts of food intakes. This is true in many African and Arab countries where the food gap is low, and the proportion of undernourished people is high. This could explain the phenomenon of the increased numbers of undernourishment in some of low-income countries that enjoy relatively high self-sufficiency ratios and low food gap value.

The results on the analysis of the supply and demand for calories, protein and fats revealed that local food production in both regions does not meet the entire energy, requirements of these nutritional components. In 2017 local food production provided about 84% of calories requirements in Sub-Saharan Africa, and only about 64% of these requirements in the Arab region.

#### 3.5.2.2 Supply and Demand for Calories, Protein and Fats:

The estimation of the consumption requirements of energy, protein and fat components compared to the quantities available from the local production of different food commodities, provides an idea of the possibility of meeting these components from local production, and explains the need to deliver additional quantities of food either through imports or through increasing domestic production.

The estimation of the requirements of the energy, protein, and fat components was based on the global averages of the daily requirements of these items multiplied by the total population in each region, multiplied by the number of days of the year. The results are presented in Table (22).

The results revealed that food production in both regions does not meet the entire energy, protein and fat requirements. In 2017 it provided about 84% of calories requirements in Sub-Saharan Africa, and only about 62.4% of these requirements in the Arab region. Self-sufficiency ratio in calories decreased between 2015 -2017 from 70.3% to 62.4% in the Arab, whereas it increased from 76.4% to 84% in Sub-Saharan Africa. The results are consistent with the limited increase of food production items in the Arab region, and the considerable increase in cereal production witnessed in Sub-Saharan Africa during the previous few years.

Protein supply from domestic production measured as percentage of total consumption needs decreased in both regions during the period (2015- 2017). In the Arab region it decreased from about 84.3% to about 73.3%, whereas it decreased in Sub-Saharan Africa from 77.7% to about 68.9%. Regarding fats supply from domestic production, it represents low percentage of total consumption needs in both reigns, as it amounted to 43.1% for the Arab region in 2017%. In Sub-Saharan Africa it amounted to about 44.4% in 2015 and decreased to about 36.9% in 2017.

Table (22): Consumption requirements of Calories, Protein and Fats in the Arab Region<sup>1</sup> and Sub - Saharan Africa<sup>2</sup> in 2015 <sup>3</sup> and 2017

**Table (22):** Consumption requirements of Calories, Protein and Fats in the Arab Region<sup>1</sup> and Sub - Saharan Africa<sup>2</sup> in 2015 <sup>3</sup> and 2017

	Calories (billion kcal)				Protein (Million tons)				Fats (Million tons)			
	Arab region		SSA		Arab region		SSA		Arab region		SSA	
	2015	2017	2015	2017	2015	2017	2015	2017	2015	2017	2015	2017
Consumption needs	410.6	428.6	751.1	1083.37	11.5	12.0	21.1	30.4	11.8	12.3	21.6	31.2
Available for consumption	288.7	267.4	573.9	910.13	9.7	8.8	16.4	20.96	4.3	5.3	9.6	11.5
Balance	-121.9	-161.2	-177.2	-173.24	-1.8	-3.2	-4.7	-9.44	-7.5	-7	-12	-19.7
Self- sufficiency ratio (%)	70.3	62.4	76.4	84.0	84.3	73.3	77.7	68.9	36.4	43.1	44.4	36.9

Sources:

1.AOAD, 2018, Arab Food Security Annual Report.

2.Based on <http://www.fao.org/faostat/en/#data>.

3.AOAD, 2016, Development of Arab-Africa Agricultural Trade & Investment.

Insufficient calories, protein and fats obtained from domestic food production usually leads to increased import of food commodities, or further deterioration of food security and nutritional conditions. This is evident from the high value of food imports in the Arab

region, which ranged between \$ 90.3 billion as an average for the period 2009 -2015, and \$ 91.3 billion in 2017. In Sub-Saharan Africa, this is evident in the prevalence of undernourishment, which mentioned previously and is illustrated by Table (23) data which show the relatively low levels of supply of dietary energy, protein and fats in Sub - Saharan Africa.

Based on these results, it worth mentioning that the relatively high self sufficiency ratios that Sub-Saharan African countries enjoy in most of the main food commodities don't reflect an improved food security conditions, rather than limited capabilities of accessing food either at states levels, or household levels. Such limited capabilities apply also for many of Arab countries where malnutrition or food security is high, while at the same time contributing little to the value of the Arab food gap. Therefore, efforts to strengthen food security should target the increase of local production of various food commodities; and the enhancement of consumer accessibility to food items.

It should be noted, despite the importance of reviewing statistical data on food trade and trends of food gap values and self-sufficiency ratios, it is of great importance to assess the developments of Arab and African food security through monitoring and analyzing the developments in food security main indicators, especially those related and connected to food accessibility, utilization and satiability, at both national and household levels. This will help providing obvious insights on the conditions of malnutrition, food insecurity, causes and means of addressing such phenomena.

**Table (23):** Per capita Consumption of Calories, Protein and Fats in the Arab Region and SSA During the Period 2011 - 2017

		2011-13	2013-15	2014-16	2015 -17
Dietary Energy Supply (kcal/caput/day)	Arab Region	2905	2910	2908	2908
	SSA	2429	2434	2425	2422
	World	2863	2875	2889	2904
Average protein supply (gr/caput/day)	Arab Region	81	80	81	82
	SSA	44	46	46	46
	World	80	82	82	84
Average fat supply (gr/caput/day)	Arab Region	84	85	86	87
	SSA	55	56	57	58
	World	79	79	80	81

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

## **4 Part 4: Regional Strategies and Initiatives on Agricultural Development and Food Security:**

Due to the growing concerns and willingness of Africa-Arab leaders to promote Africa-Arab food security and Agricultural development, The Arab and African regions witnessed the launching of several strategies and initiatives aimed at promoting agricultural development and enhancing food security paths in the two regions. Despite these initiatives, food security situation in the two regions, which has been reviewed in the previous sections remains below expectations and aspirations. Some of these initiatives and strategies are reviewed below.

### **4.1 The Comprehensive Africa Agriculture Development Program (CAADP):**

In the African continent, the political leadership has put in place a mechanism to address the recurrent twin problem of food insecurity and poverty. In 2003, the African Heads of State and Governments endorsed the Comprehensive Africa Agriculture Development Program (CAADP). Its aim is to raise agricultural productivity by at least 6% per year and increase public investment in agriculture to 10% of national annual budgets.

CAADP represents the agricultural program of the New Partnership for Africa's Development (NEPAD), established by the AU assembly in 2003. CAADP's goal is to eliminate hunger and reduce poverty through agriculture. To do this, African governments have agreed to increase public investment in agriculture by a minimum of 10 percent of their national budgets. CAADP identifies four key pillars for food security improvement and agricultural investment:

1. Sustainable Land and Water Management;
2. Market Access;
3. Food Supply and Hunger;
4. Agricultural Research.

The CAADP is centered around the definition of national and regional plans ('Compacts'), an agreement between all stakeholders (public, private as well as donors) serving as a framework for partnerships, alliances, and dialogue to design and implement the required policy interventions and investment programs. The formulation of national and regional investment plans is one of the most important activities to implement CAADP after the definition and signature of the Compact (up to June 2018, 47 country in Africa have signed the CAADP Compacts, many of them have reviewed Investment Plans and have convened Business Meetings). Thus, there has been a lot of progress in terms of the alignment of Member states to the CAADP core values and principles. The aligned countries have gone ahead to sign the National Compacts following in-depth analytical work as well as the subsequent development of the National Agricultural and Food Security Investment Plans that are based on the National Compacts.



CAADP therefore is a common framework for stimulating and guiding national, regional and continental initiatives on enhanced agriculture productivity and food security which each region and country can develop and implement as preferred.

#### **4.2 The Arab Strategy for Sustainable Agricultural Development (ASSAD):**

The ASSAD represents the activation and development of concrete Arab action to address the challenges of the Arab agricultural sector through the provision of safe food and economic prosperity for the Arab world. Optimism in achieving such goals is inspired by the positive political developments as embodied in the continuing interest in Arab agricultural issues at the successive Arab Summits in Tunis and Algiers. Against this background, the Arab leaders issued the Tunis Declaration of 2004 on Sustainable Agricultural Development and Food Security in the Arab Region. The Declaration calls for coordinating country-specific agricultural policies within a pan-Arab agricultural development strategy that supports the processes of Arab agricultural and economic integration and achieve the goals of Arab economic merging.

The strategy was adopted at Riyadh Summit in 2007 and was considered part of the joint strategy for Arab economic and social action.

The strategy included seven main programs: it is proposed to be implemented in cooperation with implementing partners: (The Arab and international development bodies and institutions and Arab member states). It has components of a national, joint and country specific nature proposed implemented by the Arab countries

#### **4.3 Emergency Program for Arab Food Security (EPAFS):**

To address the food security situation in the Arab region and the global food crisis, the emergency program for Arab food security was prepared and adopted by the Arab Economic and Social Development Summit in Kuwait in January 2009.

The program has three main components:

1. Component of improving productivity in the existing farming systems.
2. Component of investing more land resources by benefiting from water saved through rational use of irrigation water.
3. Component of integrated investment projects related to the program activities.

The Executive Framework for the second phase of the program (2017-2021) (2011-2016) was adopted by the 28th Ordinary Session of the Arab Summit, in Amman , Jordan 23-29 March 2017.

#### **4.4 Africa–Arab Joint Action Plan on Agricultural Development and Food Security (JAP):**

In a separate but related development, under the auspices of the Africa-Arab collaboration, the African and Arab Ministers of Agriculture meeting in Sharm El Sheikh, Egypt on the 16th of February 2010 undertook an in-depth review of the



state of affairs regarding agricultural development and food security in the African and Arab countries recommended by the Experts of Member Countries. The objective of the meeting was to endorse a concrete Plan of Action to promote cooperation in Agricultural Development and Food Security between the two regions.

The Plan of Action emanates from the strategies developed and adopted by the two regions respectively. The Sustainable Agricultural Development strategies adopted by both the African Union (AU) and the League of Arab States (LAS) call for the attainment of significant increase in agricultural productivity capable of alleviating poverty, hunger and malnutrition.

JAP was adopted by the Second Africa Arab Summit held in Sirte, Libya on 10/10/2010.

The core JAP areas of cooperation include:

- Agricultural Intensification (The Food Supply shifters) initiative,
- The food reserves initiative,
- Infrastructure and trade initiative, and JAP's Cross-Cutting Issues:
- Trans-boundary and environmental challenges.
- Capacity Development.

#### **4.5 The Implementation of the Regional Strategies and Initiatives on Agricultural Development and Food Security:**

Since the launching of the Africa-Arab strategies and programs, the countries of the two regions have developed plans and programs to implement their components, with varying degrees of success in achieving their objectives. This is due to many reasons that vary from region to region and from country to country within regions.

On the African side, countries have prepared and started implementation regional CAADP compacts programs beside preparation of Regional Agricultural Investment Plan. Considerable progress has also been made on the national level, (Jeske van Seters et. al., 2012.) Most of the member countries have signed national Compacts and validated National Agricultural Investment Plans (NAIPs). Many have defined project information documents and started to mobilize resources to implement NAIP-related programs and activities.

On the Arab side, most countries have prepared and started implementation of national strategies and programs within (ASSAD) and (EPAFS), including preparation of food and agricultural investment projects.

As for the joint Action Plan (JAP) which has been launched in 2010, its components have not yet been put into practice. This is due to many of the determinants that prevented the establishment of a facilitation unit, which was proposed and approved by the Arab Joint Summit in 2010 to facilitate the implementation of the JAP's components.



Some efforts have been made under this plan. These were mainly the implementation of some training courses for technical cadres from African countries, financed by the Arab Bank for Economic Development in Africa, implemented by the Arab Organization for Agricultural Development.

Despite all these efforts and the political will directed to strengthen food security, the countries of the two regions are still confronted with shortages in food commodities, particularly; grains, vegetable oils and sugar in the Arab region. In the same vein, natural resources of the two regions continue to be exposed to exploitation which is un-economical.

Many reasons were discussed above as being responsible for the fragile and deteriorating food security; however, there are some shortcomings on the implementation of the above-mentioned initiatives either at the sub regional levels, at each of SSA and the Arab region or at the pan Africa- Arab level.

#### **4.6 Constraints on the Implementation of Programs and Strategies:**

The problems and determinants of implementing these programs and strategies are somewhat similar in the Arab and African regions. These include financial, institutional and policy constraints.

##### **4.6.1 Financial Constraints:**

Most of African and Arab countries have prepared investment projects, either in the context of the Regional Investment Plan (RIP), or the Emergency Program for Arab Food Security (EPAFS). However, some of these projects have been funded through local resources in the countries concerned, but many of them await funding from regional or international institutions concerned. In this respect AOAD study on "Arab Mechanism for Financing Agricultural Development and Arab Food Security, 2013", indicated that the national agricultural lending and financing institutions in the main agricultural countries are not able to meet the financial requirements for accelerating agricultural development to achieve national and Arab food security. Also, it pointed out that despite the adequacy and efficiency of existing Arab financing institutions and funds, the share of the agricultural sector provided by these institutions has not been commensurate with actual needs in the past and is insufficient for future requirements.

##### **4.6.2 Poor Integration Commitments:**

Most of the efforts exerted in the implementation of food security and agricultural development plans in countries of the two regions seemed to be primarily from national perspectives. This deprives the opportunities of utilizing the potential benefit that could accrue from regional economies of scale and limit the potential of achieving the objectives of agricultural integration within the Arab or African region. This was evident in the drafting process of national agricultural development plans of some African countries, where some national actors have focused mainly on developing their country's agricultural sectors. In



this respect Jeske van Seters, *et. al.* 2012 argued that the national and regional components still lack some degree of coherence between initiatives at the national and regional level could be further exploited in the context of CAADP regional plans. Moreover, they noted that the national compacts are often inward-looking and do not take into consideration the inter-linkages which exist between sectors and among member states, particularly issues related to cross-border trade, natural resource management and disaster risk management (drought, climate change effects, etc).

This applies to the implementation of ASSAD and EPAFS Programs, where the focus was on food security issues at the country levels.

In regard to Africa Arab integration in the fields of agricultural development and food security, the implementation of the JAP with its main pillars provides the basis for such interregional integration; however, as noted earlier, many of the constraints faced the implementation of this plan.

#### **4.6.3 Policy Interventions to Promote Food Security through enhancing access to food:**

However, most of Africa and Arab agricultural development Strategies and programs consider the issue of food security, they lack joint regional programs to address the issue of food access which was highlighted previously in this research as one of the most important factors responsible for widespread of food insecurity and malnutrition in many countries of the two regions. Even at national levels, food access issues have not been given enough attention because in most of the countries where food access is a problem for consumers, there is scarcity of resources, and budget limitations.

Because income and poverty differences affect food security outcomes, food security policies should be directed to address poor consumers' access to food.

Access to food could be considered at both national and household levels.

At the national levels access to enough food for the country as a whole is determined by the availability food from local production, and availability of foreign exchange to pay for the necessary food imports to complement supplies from domestic production. Balance of payments deficits and the increased indebtedness could be a common reason that inhibits the import capacities of many of the countries in the two regions where access to food is a persistent problem.

At the household level access to food depends on the available means to get food, and thus food insecurity occurs when the means are insufficient. Measures to enhance the capacity of gaining access to the food at household levels include price-based input subsidies, consumer price support, direct income transfers and other social protection policies.

These interventions vary according to countries and consumers and are primarily influenced by the financial resources available to the countries themselves. This

can lead to a conclusion that countries with limited resources suffer from the problem of providing enough food at the national level, and consumers suffer from the inability to access available food.



## **Part 5 : Main Causes of Food Insecurity in the Arab Region and SSA:**

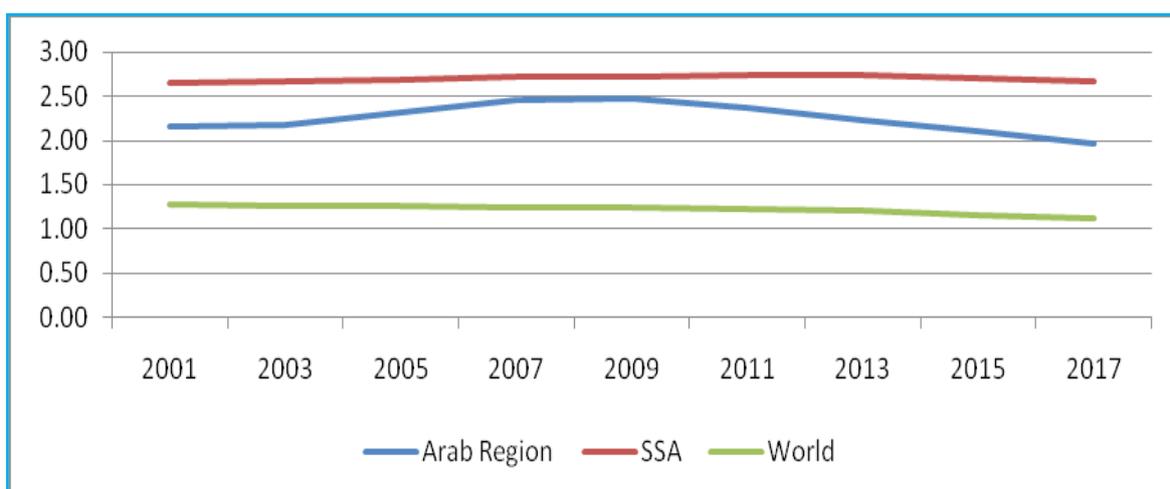
Food and nutrition security in the Arab and African regions are affected by a combination of economic, social and natural factors. Among these are: population growth, poverty and inequity, crop yields, food waste and losses, and climate changes. The effects of these factors are analyzed in this section.

### **5.1 Population Growth:**

The Arab and Sub-Saharan African countries account for over 18.8% percent of total population of the World in 2017. The continuous population growth places great pressure on arable land, water, energy, and biological resources to provide an adequate supply of food while maintaining the sustainability of these resources. As most of the food supply comes from the land, the continued production of an adequate food supply is directly dependent on ample fertile land, fresh water, and energy. The requirements for these resources increase as population growth increases.

Population growth rates in Sub-Saharan Africa and the Arab region are among the highest in the world. As shown in Figure (8), population growth rate in 2017 amounted to about 2.0% in the Arab region, 2.7% in SSA, and 1.1% for the World. The steady decline in per capita availability of arable lands is a direct result of fast population growth.

**Figure (8):** Population Annual Growth in the Arab region, SSA and the World Rates 2001 - 2017

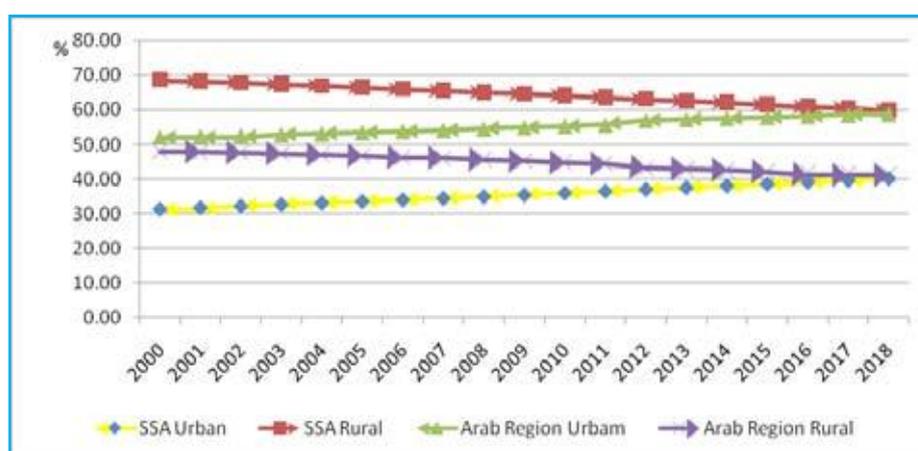


Source: Based on UNACTADSTAT, 2018.

Other population-related phenomena with a negative impact on food security in both regions include rural-to-urban migration. This phenomenon is linked to low incomes and social services in rural areas, as well as declining per capita agricultural land. The percentage of rural to urban population in the Arab region decreased from about 48% at the beginning of the last century to about 41% in 20108, Figure (9).

In Sub-Saharan Africa it decreased from about 68.6% to 60% in 2018. Such fact seems to be a potential threat to food security in the two regions, because most of the rural and urban households will shift from food producers to net buyers of food.

**Figure (9):** Percentage of Rural Population of Total Population in the Arab region & SSA 2000 -2018



Source: Based on UNACTADSTAT, 2018.

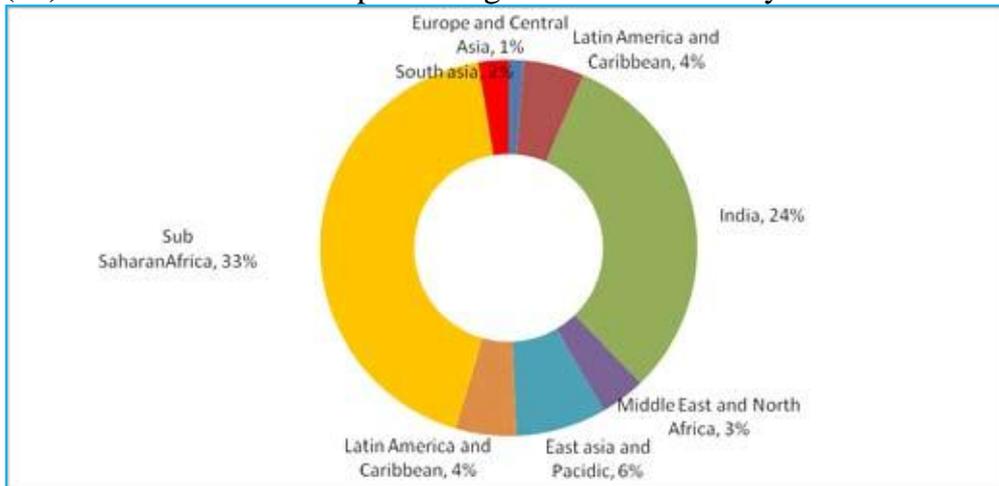
## 5.2 Poverty and Inequality:

### 5. 2.1 Poverty:

Food insecurity is entirely linked to poverty, which is a direct cause of the nutritional vulnerability of millions of people. In addition, food insecurity is a cause of poverty, depriving the poor of the most important resource they possess - power and skill in work and production. Lack of food reduces labor productivity, negatively affects mental development during childhood and thus disrupts the ability to learn and work.

According to the World Bank’s report on “Poverty and Shared Prosperity 2018”, more than 1.9 billion people, or 26% of the world’s population live on less than \$ 3.20 per person per day in 2015, and about 46% of the world’s population live on less than \$ 5.50 per person per day. The World Bank data of 2015 showed that poverty in Sub-Saharan Africa is increasing, Figure (10). Forecasts also indicated that by 2030, nearly 9 in 10 extremely poor people will live in Sub-Saharan Africa.

**Figure (10):** The Number of People Living in Extreme Poverty



Source: Based on World Bank PovcalNet and Poverty & Equity Data portal, 2018.

The categories of the poor are the most affected by the factors that affect the achievement of food security in its comprehensive sense. Low food supply due to lower domestic production or shrinking imports leads to higher prices, which directly affect the poor and low-income people who direct high percentage of their incomes for food. Food security will help the poorest to pull them out of poverty and grow the food they need.

Globally, some 735.9 million people live on less than \$1.9 a day in 2015 accounting for about 10% of the total population, Table (24). In SSA the percentage of poor is comparatively high. The percentage of those who live on less than \$1.9 a day amounted to about 50.7% in 2005 and decreased to about 41.1% in 2015. The percentage of those who live on less than \$3.20/day ranged between 47.8% in 2005 to about 66.3% in 2015. The percentage of those who live on less than \$5.50/day was also very high in SSA. It ranged between 90% in 2005 to about 84.5% in 2015.

In MENA region the proportions of the poor are much lower than those in Sub-Saharan Africa. The proportion of people who live on less than \$ 1.9% amounted to about 5% in 2015. In spite, there are some Arab countries where the proportion of poor people is relatively high, (UNDP and Oxford University), 2018. As shown in Table (25). There are high percentages of population living below the national and international poverty lines. For those living below national poverty line, the percentages ranged between 8.9% as in Morocco and 48.6% as in Yemen. **Table (24):Poverty Headcount Ratio as (%) of Population in MENA, SSA and the World 2005-2015**

Region	MENA			SSA			WORLD		
Indicator	Poverty rate/\$day (2011 PPP)			Poverty rate/\$day (2011 PPP)			Poverty rate/\$day (2011 PPP)		
	1.90	3.20	5.50	1.90	3.20	5.50	1.90	3.20	5.50
2005	3.0	18.8	49.5	50.7	74.8	89.9	20.7	42.2	60.4
2008	2.7	16.7	46.6	47.8	72.2	88.1	18.1	38.2	56.5
2010	2.3	14.8	43.6	46.6	71.2	87.6	15.7	35.2	53.9
2011	2.7	14.9	43	45.1	70.1	86.9	13.7	32.8	52.2
2012	2.7	14.6	42.9	43.8	68.9	86.1	12.8	31.3	50.8
2013	2.6	14.4	42.3	42.5	67.8	85.4	11.2	28.8	48.7
2015	5.0	16.3	42.5	41.1	66.3	84.5	10	26.3	46

Source: based on World Bank PovcalNet & Poverty & Equity Data portal, 2018.

### 5.2.2 Inequality:

Economic growth is the most powerful instrument for reducing poverty and improving the quality of life in developing countries. The extent to which growth reduces poverty depends on the degree to which the poor participate in the growth process and share in its proceeds, (DFID), 2008. Thus, when inequality is high, high economic growth delivers less poverty reduction. This is because the absolute increases in income resulting from economic growth are smaller for the bottom quintiles (ECA), 2017.



**Table (25):** Population Living below Income Poverty Line in Some Arab countries

Country	Population living below income poverty line (%)	
	National Poverty line	PPP \$1.90/ day
	2006 - 2017	2006 - 2016
Morocco	8.9	3.1
Jordan	14.4	0.1
Djibouti	23	22.5
Comoros	24.1	18.1
Palestine	25.8	0.2
Egypt	27.8	1.3
Mauritania	31	6
Syria	35.2	-
Sudan	46.5	14.9
Yemen	48.6	18.8

Source: UNDP and Oxford University 2018, The 2018 Global Multidimensional Poverty Index (MPI).

The World Bank’s inequality trends data of 2018 revealed that high percentages of population live in countries with very high to high levels of inequality in Sub-Saharan Africa and some Arab countries. As shown by table (26), Gini Index is ranging between 29.1 and 63. The data of the Table reveals that South Africa, Botswana, Namibia, Zambia, Central Africa and Mozambique are the most unequal countries in the two regions with GINI Index ranging between 60 and 54. Moreover, about 60% of the African population lives in countries with very high to high levels of inequality (ECA), 2017.

In the Arab region Comoros and Djibouti are the most unequal countries with GINI Index amounting to 45.3 and 44.1 for the two countries, respectively.

**Table (26):** Gini Index in Some Arab and SSA Countries

Arab countries	SSA countries
----------------	---------------

Country	Gini Index	Country	Gini Index
Comoros	45.3	South Africa	63.0
Djibouti	44.1	Botswana	60.5
Morocco	39.5	Namibia	59.1
Syria	36.8	Zambia	57.7
Yemen	36.7	Central Africa	56.2
Tunisia	35.8	Mozambique	54.0
Sudan	35.4	Benin	47.8
Jordan	33.7	South Sudan	46.3
Mauritania	32.6	Nigeria	43.0
Egypt	31.8	Angola	42.7
Iraq	29.5	Kenya	40.3
Algeria	27.6	Ethiopia	39.1

Source: Based on World Bank PovcalNet & Poverty & Equity Data portal, 2018.

### 5.3 Crop Yield and Factor Productivity:

Low productivities in agriculture is an important factor responsible for reduced food production, and hence the persistent food insecurity in SSA and the Arab region. Compared to many of the developed countries, as well as to world averages, the productivity of cereals and oil seeds are observed to be significantly lower in both regions, Table (27). The yield gaps vary from 15.2% to 65% in SSA, and from 5% to 58% in the Arab region. As shown in the table, there are many crops in the Arab region, the productivity of which exceeds the global average. These crops are mainly grown under the irrigated farming system, indicating that productivity in both regions is low in rain-fed farming systems. The productivity of most of the food commodities in the Arab region is less than those at the world level, although they exceed those in Sub-Saharan African countries.

**Table (27): Arab Region & SAA Main Food Crops Productivity & Productivity Gaps**  
(Productivity in ton/hectare, average of (2009 -2015), (productivity gaps from the world average)

Commodity	Arab Region		Sub-Saharan African		World productivity Average (ton/ha)
	Productivity (ton/ha)	Productivity gap (%)	Productivity (ton/ha)	Productivity gap (%)	
Grains Group	1.7	-52	1.47	-58.7	3.56
Wheat	2.6	-13	2.2	-26.7	3.0
Maize	5.4	4	1.8	-65.4	5.2

Sorghum	0.5	-64	1.1	-21.4	1.4
Barley	1	-62	1.8	-30.8	2.6
Rice	8.5	93	2	-54.5	4.4
Sugarcane	98.7	39	56.6	-20.1	70.8
Sugar Beet	52.4	7	14.3	-70.7	48.8
Peanut	0.7	-58	0.9	-45.5	1.65
Sesame	0.3	-39	0.6	22.4	0.49
Sunflower	1.4	8	1.1	-15.4	1.3
Soybean	2.9	15	1.2	-52.4	2.52
Legumes	0.95	-5	0.45	- 55.0	1.0

Source: Data obtained from FAO data website-FAOSTATS. <http://faostat3.fao.org/home/E> FAO data, & Arab Agricultural statistical Year Book, various Volumes.

The agricultural technology gap is one of the main causes of low productivity in Africa and the Arab region where traditional agricultural systems predominate in crop and livestock production. In this respect, Tsedeke Abate, *et al.*, 2012, reported the lack of incentive for private investment in seed production, decline in investment in agricultural research and development among the major constraints to the development of major SSA grain legumes.

This is evidence from (IFPRI) data on agricultural research spending 2014, which indicated that however low-income countries are far more dependent on agriculture than are middle- or high-income countries; their research intensity ratio is comparatively low. Average agricultural research spending relative to agricultural gross domestic product for 39 of SSA countries amounted to 0.84%, with maximums of 5.9% in Mauritius, and a minimum of 0.02% in Guinea-Bissau. (UAID), 2015 specified that the West African economy is heavily based on smallholder agriculture, where the Smallholder farming is characterized by rain-fed production, low fertilizer use, poor quality seeds, inadequate water management, low soil fertility, and insecure property rights for women producers. As a result, per-hectare yields in the region are some of the lowest in the world.

In the Arab region the percentage was about 1.16% as an average for 10 countries, with a maximum of 5.61% in Sultanate Oman, and a minimum of 0.14% in Sudan.

The ratio is low in both regions compared to more than 3% in high income countries. This emphasizes the critical needs for agricultural growth given the prevailing low productivity levels, and the greater significance of agriculture to the national economy and food security in SAA and the Arab region.

#### **5.4 Food Losses and Wastes:**

Agricultural and fish production is exposed to significant losses through the various stages of the value chain, including the stages of production, harvesting, transport, manufacturing, post-harvest, warehousing and marketing. Food waste also takes place at the end of the value chain; at the consumer level, which is more for wealthy community segments compared to poorer segments. The global food losses and wastes is estimated at about 1.3 billion tons annually amounting to about \$1 trillion, whereas food waste by consumers in wealthy countries is estimated at about 222 million tons per annum.



The total amounts of Arab food losses and wastes reached about 77.21 million tons in 2017 representing 34.75% of the total food production. It included about 14.4 million tons of grains losses equivalent to about 30% of the total Arab cereal production in 2017, (AOAD) 2018. This amount includes more 45% of Arab vegetables and fruits production, and more than 18% of Arab oils seeds and milk production in 2017.

The amount and percentage of losses in grains and other crops vary between countries. In SSA, the estimate is roughly 37% or 120–170 kg/year per capita, (FAO) News Article 2018. In Africa, most of the food loss happens between harvest and the point of sale - very little is wasted by consumers after purchase. FAO estimates indicate that post-harvest losses can reach up to 20% for cereals, 30% for dairy and fish, and 40% for fruits and vegetables.

Much of this loss happens because of a lack of technology, limited knowledge in supply chains, and limited access to markets, poor infrastructure and inadequate financing.

These estimates are mainly based on the FAO's loss and waste fixed ratios assumed for each commodity. However, the magnitude of losses differs between geographical regions, and over time. Consequently, there is a critical need to measure the amounts of losses and wastes along the value chain of various food commodities in each region, as well as at the country levels of the two regions. This will facilitate developing appropriate measuring methods, determining the exact magnitude of losses and wastes, and identifying the causes of losses, and helps developing appropriate policies and designing strategic solutions to address food losses and wastes with impact at all levels. This may include capacity building, research and pilot projects at the value chain level with farmers, producers and retailers.

### **5.5 Climate Change:**

Climate change increases the risks of hunger and under nutrition through climate-related disasters such as droughts, floods and storms and changes in the temperature of the universe. An increased frequency of extreme events, especially floods and droughts, also harms crops and reduces yields.

Climate change affects all dimensions of food security and nutrition, (WFP), 2014. Changing temperatures will have impacts on yields while changes in rainfall could affect both crop quality and quantity. Lower agricultural output resulting from climate changes means lower incomes, and hence limited access of the poorest people to meet their nutritional requirements. Climate changes impact food utilization by creating a vicious cycle of disease and hunger, or by affecting nutrition through related adverse impacts on dietary diversity, and care practices. Moreover, climatic variability can disturb food stability through creation of fluctuations in food availability, access and utilization.

Most of the Arab countries, and many of the African are known for being of the hottest places on earth, and highly vulnerable to climate change impacts. In an IPCC special report on regional climate change, models projected that average temperatures in the Arab region will increase by 1 to 2°C by 2030-2050.

Selected potential impacts of climate change in Sub-Saharan Africa and the Arab region were outlined by FAO report on “Climate Change and Agriculture and Food Security, 2016. The report pointed out that rising temperatures threaten wheat production in North Africa, and maize yields region wide. Besides, they are expected to result in a general decline in water availability, but a slight increase in Sudan and southern Egypt. Usable water resources in many

Mediterranean and Near East basins are expected to decline. Catch potential is expected to fall by about 50% in some parts of the Mediterranean and Red Seas.

Regarding Sub-Saharan Africa, the report indicated that the overall impacts on yields of cereals, especially maize, are negative across the region, beside the increase of the frequency of extremely dry and wet years and the degradation of rangelands in the Sahel. In many countries, particularly in Eastern and Southern Africa, adverse climatic conditions due to El Niño resulted in a decline in agricultural production and soaring staple food prices.

Given the fragile food security situation in both regions, the projected increase in population, and the expected negative impacts of climate change pose a major challenge for the Arab and African countries. Thus, dealing with climate change can become a major challenge in both regions, which calls for increased attention to support small producers and herders in adapting to climate change. This, in turn, calls for the concerted efforts of the public and private sectors, civil society organizations, research and academia to support small producers and herders to mitigate climate change.



## ***Part 6: Summary, Conclusion and Recommendations:***

### ***6.1 Summary:***

The challenge of ensuring food security is most critical in both Sub-Saharan Africa and the Arab region. The number of hungry people is increasing in Sub-Saharan Africa. In the Arab region there has been no great improvement in food security and nutrition, as the annual food gap remains between \$ 33

and 39 billion, and a large number of Arab populations suffer from food insecurity and malnutrition in areas experiencing instability and adverse natural conditions.

The main objective of the research is to assess the status food security, and to analysis factors causing food insecurity in the two regions, besides suggesting possible paths to enhance Africa Arab food security. The research was based mainly on secondary data sources. Data analysis included the measurement of the development of food security indicators related to food



availability, accessibility, utilization and stability. It also included measurements of trends in food security indicators, and influencing factors, and incorporated forecasts, simple and multiple regression models for causal analysis.

The research is organized into six parts. Part one covers the introduction and research methodology. Part two provides a review of the natural, human, and economic resources indicators in the Arab region and Sub-Saharan Africa. Part three analyzes food security situation of the two regions in terms of trends and developments of food security indicators, beside tracing and highlighting developments and salient features in food per capita, food sufficiency ratios and food gap in both regions. Part four analyzes the causes of food insecurity in the two regions in terms of population growth, rural urban divide, low productivity, agricultural investment and climate change. Part five critically assesses the research results, and the last part discusses the way forward.

The review of the natural, human, and economic resources indicated that only about four percent of arable land in Sub-Saharan Africa is under irrigation, and the rest depends on rain-fed agriculture, putting it at risk due to extreme climate changes. In the Arab region land for agriculture relative to the population is comparatively very low, and decreasing because the region is experiencing large population growth. Due to the increasing population, the arable land per capita is decreasing in both regions. Despite the importance of building up land soil fertility for ensuring sustainable food production, the rate of fertilizer consumption per hectare of arable land is relatively low in both regions.

The renewable water resources in both regions represent the determining factor for

food production, especially in the Arab region where the average per capita renewable water is below the water poverty line. More than 300 million people in Sub-Saharan Africa live in a water-scarce environment.

The numbers of the population are steadily increasing in both regions at relatively higher growth rates. However, the proportion of population living in rural areas is declining. This decline can be explained by the increase in rural-urban migration due to poor basic services and low agricultural revenues in rural areas of both regions compared to other economic sectors.

The most important macroeconomic and agricultural indicators in Arab countries are also reviewed and compared with those in Sub-Saharan Africa during the period (2011-2017). They included gross and agricultural domestic product, value of total and agricultural exports and imports, the value added of agriculture, unemployment, and inflation.

The gross domestic product (GDP) in the Arab region is about one and a half of that of Sub-Saharan Africa, while per capita GDP in the Arab region is more than triple that of Sub-Saharan Africa. The gross domestic product (GDP) of the two regions witnessed modest growth rates during the period (2011-2017), and thus resulted in a decline in per capita GDP growth rates that estimated at about (0.6%) in the Arab region and (- 2.0%) in Sub-Saharan Africa.

The agricultural gross domestic product (AGDP) averaged to about \$141 billion in the Arab region during the period (2011-2017), and to about \$ 303 billion in Sub-Saharan Africa, which is more than double of that in the Arab region. Its annual growth was relatively high 6.6% in Sub-Saharan Africa, compared to 1.1% in the Arab region.



The modest growth in the value of the (AGDP) in the Arab region resulted in the decline of the per capita (AGDP) by about 9% during the period (2011-2017).

Total value of exports witnessed continuous decrease in both regions due to recent global economic developments.

Agricultural exports account for a significant share of total export value in Sub-Sahara Africa compared to the Arab region.

Agricultural inputs are important items of agricultural exports in the Arab region. They comprised about 43.5% of the value of agricultural exports during the period 2011-2015, compared to about 4.6% in sub Sahara Africa.

The total value of imports witnessed the same decreasing trend of the total value of exports during the period (2011-2017), as it decreased by about 17% in both regions.

The ratio of imports value of production inputs to the total value of agricultural imports was higher in Sub-Saharan Africa than in the Arab region.

The Value added of agriculture and forestry seemed to be much higher in Sub Saharan Africa compared to the Arab region. It amounted to about 17.9% of the GDP compared to about 4.6% in the Arab region.

Despite the stabilized global unemployment rate, higher unemployment rates are still prevailing in both the Arab region Sub Saharan Africa. It reached about 10% and 7.3% of the total labor force in the Arab region and Sub-Saharan Africa, respectively.

The annual food price inflation in the World decreased from 6.3% in 2013 to 3.6% in 2017. In spite, annual food inflation in Africa increased from 6% in 2013 to 14% in 2017. Annual food price inflation in the Arab region amounted to about 2.0% which is below the

World average of 3.6%, compared about 5.3% in Sub Sahara Africa.

Food security situation in the Arab region and Sub-Saharan Africa was assessed in the context of the main food security pillars and their associated factors on the basis of time series data for the period (2000- 2017).

In regard to food availability, the analysis included trends of the production of main food commodities, average dietary energy supply adequacy, average value of food production, share of dietary energy supply derived from cereals, roots and tuber, average protein supply, and the relationship between income and food availability indicators.

The results revealed that despite the efforts exerted in the two regions to increase food supplies, the availability of food per capita either declined or remained stagnated. This was mainly due to sluggish increase or to decrease of the production food commodities in the two regions, as almost all the all plant food commodities production has declined between 2014 and 2017.

Although the production of animal commodities witnessed remarkable increases in both regions between 2014 and 2017 the volume of various animal products is not matching the huge herd size of both regions. The results stressed the critical need for improving food production because the slow increase in food production of the two regions is being offset by rapidly increasing population.

The Average value of food production per capita is low in both Arab region and SSA. It accounts for about 44.2% and 51.6% of the World average for the period (2015 -2017) in Arab countries and SSA respectively. The relatively higher per capita average value of food production of SSA reflects the fact that



SSA region is of high potential of food production as compared to the Arab region.

Though intake which is based on products of plant origin normally provides low levels of energy, more than 50% of the energy supply is derived from cereals, roots and tubers in SSA and the Arab region, compared to about 48.1% for the World.

Regarding protein daily intake, the results revealed that it is comparatively low and less than the World average in all Sub-Saharan Africa regions except for Southern Africa region. In the Arab region the average value of protein supply is equal to the World average, but it falls short of the value of the World average in the Nile Basin and Horn of Africa and Arab Mashreq regions.

Accessibility to food in Arab and Sub-Saharan African countries was examined based on the gross domestic product per capita (incomes and poverty), prevalence of undernourishment, and prevalence of severe food insecurity in the total population.

Food access which is usually measured at the household or individual level, is influenced by three main factors, namely: Own food production, market purchases and food transfers. Market purchases are affected by the prices of food and the cash income available to households.

The effects of income and food availability on protein supply were examined using a multiple regression model. The results indicated positive and statistically significant effects of GDP per capita on protein supply in both regions.

Although the value of food production proved to exert positive effects on the protein supply in both regions, but these results were statistically significant only for Sub-Saharan Africa, which is in line with the importance of its agricultural sector.

The association between the GDP and the prevalence of undernourishment in both regions was then assessed using a simple regression model; the results indicated negative relationships between the GDP per capita and the percentage of undernourished population in both regions. The percentage of undernourishment found to be much higher in Sub-Saharan Africa. Compared to an average World of 10.8%, it amounted to 22.2% in Sub-Saharan Africa as average for the period (2015-2017). It ranged between 8.1% for Southern Africa and 31.2% for Eastern Africa. The average corresponding percentage in the Arab world was slightly higher than that of the World average, but it was lower than that of SSA. It amounted to about 12.5% and ranged between 4.0% for Gulf and Arabian Peninsula and 16.6% for Nile Basin and Horn of Africa.

Access to food seemed to be a major problem in many countries of the two regions, including those countries which are generally considered to be food secure. It seemed that the problem was not related to food shortages but rather the problem of insufficient access to food by vulnerable and low-income groups in these countries.

Data on GDP per capita in Arab region and Sub-Saharan Africa indicated relatively low levels of incomes in both regions, as compared to the World average.

The average per capita GDP in Sub-Saharan Africa was roughly about 33% of the World average. It ranged between 19% in Eastern Africa and 113% in Southern Africa. In the Arab region it was about 51% of the World average. It ranged between 24% in both Arab Maghreb and the Nile Basin and Horn of Africa region, and 227% in Gulf and Arabian Peninsula region.

The indicator of the prevalence of severe food insecurity in the total population witnessed an increasing trend during the period (2014–

2017) either at the global level, Arab region level or Sub-Saharan Africa level. The percentage of the prevalence of severe food insecurity was comparatively high in Sub-Saharan Africa, either compared to the Arab or global levels. Its average was about 29%, while its range reached alarming levels in some countries of the region.

The relationship between income levels and prevalence of severe food insecurity in the total population was therefore examined. The average percentages of the prevalence of severe food insecurity during the period (2014 -2017) were regressed as dependent variable against three independent variables: the annual growth rates of the population, per capita gross domestic product and value of per capita food production. The results indicated positive relationships between the prevalence of severe food insecurity and population growth, and negative relationships between the prevalence of severe food insecurity and both the GDP per capita and pre capita value of food production. The results were statistically significant, based on the p-values, and t-statistics.

Food Stability in the two regions was assessed on the basis of Stability indicators for which recent data was available. Stability indicators analyzed were cereal import dependency ratio, percent of arable land equipped for irrigation, value of food imports over total merchandise exports, and Per capita food supply variability.

However, cereals and coarse grains provide a main source of energy supply for the Arab and Sub-Saharan Africa consumers, the domestic production of the two regions fell short of meeting domestic demand. Arab cereal production meets on average about 45% of the domestic demand, while SAA production meets more than eighty percent. Thus, the supply of grains is more critical in the Arab region than SSA due to its limited water resources and arid conditions. Cereal import

dependency ratio was very high in Arab region and increased from about an average of 75.5% during the period (2011- 2013), to about 81% for the period (2015 -2017). In Sub-Saharan Africa, the ratio was low and has stabilized over the past at about 18%.

The production of food in the Arab region depends mainly on rain-fed farming

Systems which are characterized by fluctuations, instability, and poor technological development being as one of the main factors behind poor and unstable food supply. Accordingly, there is a critical need to maximize returns from the use of rain water in the production of food in the two regions.

Per capita food supply variability represents the variability of “food supply in kcal/caput/day. It compares the variations of the food supply across countries and time, and corresponds to the variability of the net food production value divided by the population number. The variability was found to be high in Sub-Saharan Africa and much higher in the Arab region, compared to the World average. This could be related to a variety of factors such as price volatility, and environmental factors that cause higher fluctuations in food production. Diversifications, crop insurances, improvement of food reserve systems, support prices and public distribution systems can be suggested to have important impact on reducing food supply variability.

The value of food imports as a percentage of the total value of merchandise exports was higher than the global average in both regions, but it was much higher in the Arab region, with very high differences within countries. The percentages ranged from 3% to more than 600% in the Arab region, while it ranged from 1% to more than 800% in Sub-Saharan Africa. This suggests that the stability of national food security is fragile and weak because in many countries there are insufficient foreign

exchange reserves to meet the value of food imports, which negatively affects the stability of food security in these countries.

The food utilization indicators analyzed included: percentage of people using at least basic drinking water services, percentage of people using safely managed sanitation services, prevalence of anemia among women of reproductive age, and prevalence of obesity in the adult population, beside the analysis of the depth of the food deficit, food self-sufficiency ratios, and food gap in both regions.

The percentage of people using at least basic drinking water services averaged to about 91.1% at the global level. It was relatively low in the Arab region (87.4%) and was much lower in Sub-Saharan (65.3%).

The percentage of people using at least basic sanitation services was relatively high in the Arab region (75.3%) as compared to the World average of 69.6%, but it was much lower in Sub-Saharan Africa (29.9%). This implies that the proportion of those without sanitation services were about 25% in the Arab region, and about 70% in Sub-Saharan Africa. Compared to data from previous years, it is concluded that little progress was made towards achieving Millennium Development Goal 7 Target 7.C, “Halve, by the year 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation.

The percentage of the prevalence of anemia among women of reproductive age during the period (2011-2017) averaged to 32.7% in the Arab region, 38.4% in Sub-Saharan Africa compared a global average of 31.2%. These figures are however lower than the cut-off values for public health significance of 40%, but they are relatively high compared to the industrialized countries average of 20%.

The phenomenon of obesity and overweight is more prevalent in the Arab region than in Africa or the world. The percentage of obesity and overweight during the period 201 - 2017 was about 21% in Arab region, compared to 12% globally, and about 8% for Sub-Saharan Africa. Because the primary cause of obesity and overweight is the energy imbalance between calories consumed and calories spent, there is an urgent need for actions to support healthy diets and regular physical activities to reduce overweight and obesity in the Arab region.

The depth of the food deficit expressed in kilocalories per person per day as an averaged for the period (2011–2016) was about 56 kcal/person/day in the Arab region, 137 kcal/person/day in SSA, compared to 94 kcal/person/day as a global average. The value of this indicator declined by an annual rate of about 2 % in both Sub-Saharan Africa and the World, and declined by 3% in the Arab region.

In spite of the relatively low average values of depth of the food deficit indicator, some countries of Sub-Saharan Africa found to face high values of food deficit ranging between 400 and 260 kcal/ person/day, compared to food deficit ranging between 185 and 175 kcal/ person/day in some countries of the Arab region.

Despite the relatively low average values of the depth of the food deficit index, some countries in sub-Saharan Africa recorded high food deficit values ranging between 400 and 260 calories/person/day, while some Arab countries recorded food deficits ranging between 185 and 175 calories/person/day.

The analysis of per capita food consumption indicated low consumption levels of animal products, despite the large numbers of livestock in two regions. Regarding the consumption of food commodities of plant origin, per capita food consumption in Sub-Saharan Africa was relatively low compared to



the Arab region and World averages for all types of these food commodities, except for legumes, fruits. In Arab countries, per capita food consumption was higher than the World average for all of plant food commodities, except for vegetables.

Lower amounts of per capita food consumption could explain the poor food security indicators, especially prevalence of undernourishment, per caput protein supply, and dietary energy supply in Sub-Saharan Africa.

The analysis of self-sufficiency ratios and the value of the food gap gives an insight of the food security situation at the aggregate level, but not at the household or consumer level. The degree of dependence of the Arab region and Sub-Saharan Africa on foreign markets to meet consumption requirements varies according to different food commodities. The Arab region depends heavily on foreign markets to meet the consumption requirement of some food items, namely cereals, sugar, vegetable oils and legumes. Self-sufficiency ratios of these items ranged between 35.0% for vegetable oils and 42.8% for sugar.

In Sub-Saharan Africa, self-sufficiency ratios seem to be high for most food items, ranging between 91.3% for milk and 115.5% for potatoes. There however few commodities of moderate or above self-sufficiency ratios namely, such as cereals (85.3%) and poultry meat 72.4%, legumes (65.2%), and fish (64.4%).

Despite the high self-sufficiency ratios of most food commodities in Sub-Saharan Africa, the prevalence of malnutrition, and low energy and protein supply are common in the region. This could indicate a lack of, or limited access to food at the household and state levels.

The value of food gap of major food commodities in 2017 was estimated at 33.6 billion dollars in the Arab region, and at about \$18.76 billion in Sub-Saharan Africa. The food gap value represents the value of net imports of food commodities. Thus, it shouldn't be considered as an appropriate measure of the food security situation in any of the two regions. It reflects only the value of net imports of food commodities which is in turn affected by the capability of countries to import the needed amounts of food items.

Limited access capacities of countries or individual consumers impede the choices of countries to import more food to fill the gap and limit the consumers' choices of the food baskets components, as well as the amounts of food intakes. This is true in many African and Arab countries where the food gap is low and the proportion of undernourished people is high. Accordingly, this could explain the phenomenon of the increased numbers of undernourishment in some of low-income countries that enjoy relatively high self-sufficiency ratios and low food gap value.

Local food production in both regions does not meet the entire energy, protein and fats requirements. It provided about 84% of calories requirements in Sub-Saharan Africa, and only about 64% of these requirements in the Arab region in 2017.

Self-sufficiency ratio in calories decreased between 2015 and 2017 from 70.3% to 62.4% in the Arab, whereas it increased from 76.4% to 84% in Sub-Saharan Africa. The results are consistent with the limited increase of food production items in the Arab region, and the considerable increase in cereal production witnessed in Sub-Saharan Africa during the previous few years.

Protein supply from domestic production measured as percentage of total consumption



needs decreased in both regions during the period (2015-2017). It decreased in the Arab region from about 70.3% to about 62.4%, whereas it decreased from 84.3% to about 73.3% in Sub-Saharan Africa.

Fat supply from domestic production found to represent low percentage of total consumption needs in both regions. It amounted to 43.1% for the Arab region in 2017%. In Sub-Saharan Africa it amounted to about 44.4% in 2015 and decreased to about 36.9% in 2017.

Regarding the main causes of food insecurity in the two regions, population growth was found to be one of the main factors. The continuous population growth places great pressure on natural resources to provide an adequate supply of food. The steady decline in per capita availability of arable lands seemed to be a direct result of fast population growth. Per capita availability of arable lands in the Arab region decreased during the period (2000 – 2016) from 0.162 ha/person to about 0.146 ha/person. It decreased in Sub-Saharan Africa from 0.25 ha/person to 0.21 ha/person.

Other population-related phenomena with negative impacts on food security in both regions include rural-to-urban migration which is linked to low incomes and social services in rural areas, and the declining per capita agricultural land. It represents a potential threat to food security in the two regions, because most of the rural and urban households will shift from food producers to net buyers of food.

The percentage of rural to urban population in the Arab region decreased from about 48% at the beginning of the last century to about 41% in 2018. In Sub-Saharan Africa it decreased from about 68.6% to 60% in 2018.

Poverty and inequality are among the direct causes of the nutritional vulnerability of many people in Africa and the Arab region. Poverty

rates in Sub-Saharan Africa were increasing as forecasts have indicated that by 2030; nearly 9 in 10 extremely poor people will live in Sub-Saharan Africa. The percentage of those who live on less than \$1.9 a day amounted about 41.1% in 2015. Higher percentages were also recorded for those who live on less than \$3.20/day and on less than \$5.50/day in SSA.

In the Arab countries, the proportion of people living on less than \$1.9/day amounted to about 5% in 2015. Nevertheless, there are some Arab countries where the proportion of poor people is relatively high. High percentages of population living below either the national poverty lines, or the international poverty line were witnessed in some Arab countries. For those living below national poverty line, the percentages ranged between 8.9% as in Morocco and 48.6% as in Yemen.

Inequality drops off the impact of economic growth and jeopardizes the efforts of poverty reduction, which in turn increases nutritional vulnerability of people.

In spite, inequality trends data of 2018 revealed that high percentages of population lives in countries with very high to high levels of inequality in sub-Saharan Africa and some Arab countries. This was evidence from the Gini Index value which was relatively high in twelve Arab countries, and ranged between 27.6 in Algeria, and 45.3 in Comoros. It was also high in many countries of Sub-Saharan Africa where it ranged between 39.1 in Ethiopia, and 63.0 in South Africa.

In this respect (ECA), 2017, indicated that about 60% of the African population lives in countries with very high to high levels of inequality. These facts put emphasis on the critical needs to simultaneously address poverty and inequality, because the eradication of poverty without equality means the



continued fragility of food security in the Arab and African regions.

Low productivities in agriculture is another important factor responsible for reduced food production, and hence the persistent food insecurity in the two regions. Compared to World averages, the productivity of cereals and oil seeds were observed to be significantly lower in both regions. Yield gaps vary from 15.2% to 65% in SSA, and from 5% to 58% in the Arab region.

The agricultural technology gap is one of the main causes of low productivity in Africa and the Arab region where traditional agricultural systems predominate in crop and livestock production. Decline in investment in agricultural research and development is among the major constraints to improve productivity in both regions, where research intensity ratio is comparatively low. It averaged to about 0.84% for 39 of SSA countries, and to about 1.16% for 10 Arab countries compared to more than 3% in high income countries.

Food losses and wastes seemed to have their negative impacts on food and nutrition security in the two regions. The total amounts of food losses and wastes in the Arab region reached 77.21 million tons (34.75%) of Arab food production in 2017, including 14.4 million tons losses of cereal (30 %) of the total Arab cereal production in 2017.

In SSA, the estimate was roughly 37% or 120– 170 kg/year per capita. Post-harvest losses are estimated at 20% for cereals, 30% for dairy and fish, and 40% for fruit and vegetables. Much of this loss occurs because of technology lack, limited knowledge in supply chains, and limited access to markets, poor infrastructure and inadequate financing.

However, the magnitude of losses differs between geographical regions and over time, most of food losses and wastes estimates are mainly based on the FAO's loss and waste fixed ratios assumed for each commodity. Consequently, there is a crucial need to measure the amounts of losses and wastes along the value chain of various food commodities in each region, as well as at the country levels of the two regions. This will facilitate the development of appropriate measurement methods, accurate determination of losses, and determination of the causes of losses and waste. This, in turn, will help to develop appropriate policies and design strategic solutions to address food waste and waste with impact at all levels. Suggested solutions could include capacity building, research and pilot projects at the value chain level with farmers, producers and retailers.

Climate changes are expected to increase the risks of hunger and under nutrition through climate-related disasters especially in the Arab region, and many of the African countries which are known for being highly vulnerable to climate change impacts. Average temperatures in the Arab region are expected to increase by 1-2°C by 2030-2050. Selected potential impacts of climate change in Sub-Saharan Africa and the Arab region pointed out that rising temperatures threaten wheat production in North Africa, and maize yields region wide.

Besides, they are expected to result in a general decline in water availability, but a slight increase in Sudan and southern Egypt. Catch potential is also expected to fall by as much as 50% in some parts of the Mediterranean and Red Seas.

In Sub-Saharan Africa, the climate changes impacts studied indicated negative impacts on yields of cereals across the region, beside the increase of the frequency of extremely dry and



wet years, decline in agricultural production, soaring staple food prices and the degradation of rangelands in the Sahel.

In consequence, the expected negative impacts of climate change pose a major challenge for the Arab and African countries given the fragile food security situation in both regions, and the projected increase in population. Efforts of the public and private sectors, civil society organizations, research and academia are critical to support small producers and herders to mitigate climate changes.

## **6.2 Conclusion and Recommendations:**

The previous sections showed the multi dimensional nature of the problem of food insecurity in the Arab and African regions, being a major economic, social, health and environmental disruptor with its serious repercussions.

On the economic side, there is insufficient domestic production to meet consumption needs of all food items in many countries of the two regions. Besides, there is scarcity of financial resources to import food in many countries, and poor access to food for many segments of consumers.

The problem is magnified and becoming more complex as it relates to the social, technical and environmental aspects of poverty, unemployment, inequality, high rates of food losses and wastes, and poor agricultural productivity.

The results indicated that food insecurity in Sub-Saharan is on the rise and large percentage of the population is food insecure. In the Arab region large numbers of the population suffer from food insecurity and malnutrition in areas experiencing instability and adverse natural conditions. The region imports more than 60 percent of its grain needs and experiencing a food gap that ranges

between \$ 33 billion and \$39 billion. Moreover, many negative indicators of food security were prevailing in many countries of the two regions. They include protein and energy supply inadequacy, prevalence of undernourishment, severe food insecurity, anemia among pregnant women, increasing value of food imports, enormous food gap, and low percentages of self-sufficiency ratios of some main food commodities.

Given the enormous extent of the problem of food insecurity in the two regions, it is important that policy makers and societies at large consider engaging in addressing all factors responsible for food insecurity either at the country level or the regional levels. This entails intensification of efforts in several areas necessitated by the nature of the problem and its causes. These areas are briefly outlined below:

### **6.2.1 Agricultural Growth and Improve Productivity:**

Improving agricultural productivity and production will be the most important means of addressing the problem of long-term food insecurity as most the population of the two regions lives in rural areas. This requires a greater recognition to agriculture through allocation of increased funding in national budgets of countries of the two regions. Appropriate responses should include land tenure and conservation, access to credit and improved agricultural inputs to improve plant and animal productivity through:

- Raising farmers' efficiency in the use of agricultural inputs.
- Development of improved crop varieties to increase crop production.
- Development of water resources and raising the efficiency of irrigation water use.
- Intensify investment in research and development in the fields of plant, animal and fish production by focusing on



spreading, adapting and adopting a set of technologies necessary to produce the main strategic food commodities in SSA and Arab region.

- Capacity building and skills development: This includes the development of skills and the training of trainers, professionals, technicians and small agricultural producers.

### **6.2.2 Access to Food:**

Access to food found to be a main factor behind the persistence of food insecurity in most countries of SSA and the Arab region. Access to food needs be considered at both national and household levels. At national levels inadequate government spending and low gross capital formation compromise agricultural production and hence, limit access to food which leads to widespread of poverty and undernourishment. Economic and policy reforms along with external financial resources seem to be important for promoting economic and social development to facilitate access to food in lowincome countries of the two regions. At the household level suggested interventions to enhance access to food include:

- Improvement of employment and income sources of households.
- Conservation of natural resources for long-term accessibly.
- Food- and cash-for-work programs.
- Input subsidies.
- Consumer price support,
- Direct income transfers and other social protection policies.

**6.2.3 Equality and Social Justice:** The relatively high rates of wealth inequities and social injustice indicated to prevail in many African and Arab countries are among the major factors underlying high rates of food insecurity and undernourishment, which are also manifestation of poverty. Therefore, it is

essential to support the development and implementation of economic, social, and cultural policies that close the gaps between the wealthiest and the poorest individuals across the countries of the two regions. Such policies may include promoting economic growth to increase total income in society, building assets for working families, increase the minimum wages, and reduce unemployment as a major cause of poverty, and better targeting of social protection programs to help reducing income inequality.

### **6.2.4 Effective Population and Food Security Policies:**

Effective national population policies and programs are proposed to reduce population growth rates in the two regions. Such policies may include raising awareness of issues related to population increase, improved education especially for girls and women and provision of health services in rural areas. Implementation of the appropriate food security policies are also of great importance for promotion and support of maternal, infant, and young child feeding behaviors, support pregnant and lactating women to reduce prevalence of anemia among pregnant women, and provision of improved food security services. Other food security policies include nutrition policies to foster the production and consumption of healthy, nutrient-dense diets, and raising awareness on nutrition, provision of food security basic services, and nutrition interventions to prevent child malnutrition.

**6.2.5 Food Losses and Wastes:** Most food losses occur between the farm and the markets as a result of poor agricultural practices, poor food storage and food distribution systems, including transportation. Because most of food losses and wastes estimates are based on fixed projected ratios, while their actual volumes differ over time and between regions, addressing such problem in the two regions



requires conducting surveys, and in-depth studies. This will help determining the exact magnitudes, percentages and causes of losses along the value chains, and to develop appropriate programs and activities that ensure sustainability of losses reduction. Great attention in this respect should be given to improving the efficiency of agricultural practices of main food commodities, improving agricultural food storage, and distribution systems, as well raising awareness among all stakeholders about the importance of reducing food losses.

Most food waste occurs in high-income countries. Policies and programs should aim at reducing food waste by changing consumers' eating behaviors and raising their awareness of measures to reduce food waste at household levels.

**6.2.6 Food Security Monitoring:** The current and expected impacts of climate change and climate extremes are believed to jeopardize Africa-Arab achievements towards, food security and poverty reduction. The development of early-warning systems is of

**6.2.7 Africa-Arab Cooperation in the field of Agricultural Development and Food Security:**

JAP represents the main Africa-Arab cooperation mechanism in the field of food security and agricultural development. It was launched by the leaders of the countries of the two regions and thus represents a political will for cooperation to enhance food security and agricultural development. Beside the JAP, each of the two regions has its own strategies and programs to promote agricultural development and food security, such as CAADP, ASSAD, and EPAFS. Because of the increasing need for complementarities between these strategies while considering JAP main pillars and objectives, it is suggested to mainstreaming of JAP into (CAADP) and (ASSAD). This can be done by obtaining consensus strategy in the implementation of the ASSAD and the CAADP initiatives in a way that ensures coherence and synergy of purpose for both regions.

This will pave the way for actions in areas of common interest which could include cooperation in the following areas:

- Joint agricultural investment.
- Rural development projects.
- Food processing and added value.
- Adaptation to climate changes.

great importance in response to climate change and climate extremes. Furthermore, periodic monitoring and reporting of developments in food security situations are required to assist decision-makers addressing food insecurity in both regions. Such reports should therefore not to be limited to reviewing statistical data on production, trade, food gap and self-sufficiency ratios, but should include also results of valuation and monitoring of important food security indicators that clearly express developments in each of food security main pillars.

FAO's suite of indicators can be an appropriate choice because they are clearly separated under each of the four key food security pillars. They allow for the identification of efforts towards achieving the ultimate goals of food security, and thus allow for appropriate decisions. This would be mainly useful for low-income countries with severe food insecurity, while financial constraints limit the insurance of imports needed to bridge the food gap. Such situations usually lead to a calculation of the unrealistic low value of the food gap and superficially high levels of self-sufficiency.



- Empowering women and reducing poverty.
- Agricultural research and technology transfer.
- Agricultural trade.
- Capacity building and skill development.

## References:

1. Arab Organization for Agricultural development (AOAD), 2016: Arab-Africa Agricultural Trade and Investment.
2. Arab Organization for Agricultural development (AOAD), 2018: Arab Food Security Annual Report.
3. Astou, Dioume, 2015: “Food Imports as a Hindrance to Food Security and Sustainable development: The Cases of Nigeria and Senegal” (2015). CUNY Academic Works. [http://academicworks.cuny.edu/cc\\_etds\\_theses/554](http://academicworks.cuny.edu/cc_etds_theses/554)
4. Burchi, F., & De Muro, P. (2016a): From food availability to nutritional capabilities: Advancing food security analysis. *Food Policy* 60, 10–19.
5. Department for International Development, (DFID), 2008: growth building jobs and prosperity in developing countries, , International aid and development UK, 2008.
6. Economic Commission, for Africa (ECA) 2018: Economic Report on Africa 2017.
7. FAO NEWS Article, “Rockefeller Foundation 2018: FAO supporting Africa to halve food loss, 21 June 2018.
8. FAO, 1996: Report of the World Food Summit, 13-17 November 1996.
9. FAO, 2016: The State of Food and Agriculture: Climate Change Agriculture and Food security, 2016. Agriculture.
10. FAO, 2017: Africa Regional Overview of Food Security and Nutrition (The Food Security and Nutrition–Conflict Nexus: Building Resilience for Food Security, Nutrition and Peace).
11. FAO, 2018: Food outlook, November, 2018.
12. FAO, 2018: The State of food Security and Nutrition in the World.
13. Francesco Burchi, Margherita Scarlato, and Giorgio d’Agostino, 2018: Addressing Food Insecurity in Sub-Saharan Africa: The Role of Cash Transfers, Poverty & Public Policy, Vol. 10, No. 4, 2018.
14. Jean Marie Vianney Munyeshyaka, EunJeong Lee and Ousmane Diabre, 2018: “Analytical Report on Inflation in Consumer Price Index for Food (Sept. 2018), [http://webcache.googleusercontent.com/search?q=cache:yOWC2ifUXj4J:www.fao.org/fileadmin/template\\_s/ess/documents/consumer/September\\_2018.pdf+&cd=1&hl=en&ct=clnk](http://webcache.googleusercontent.com/search?q=cache:yOWC2ifUXj4J:www.fao.org/fileadmin/template_s/ess/documents/consumer/September_2018.pdf+&cd=1&hl=en&ct=clnk).
15. Jeske van Seters, Dolly Afun-Ogidan and Francesco Rampa, 2012: Regional approaches to food security in Africa The CAADP and other relevant policies and programmes in ECOWAS, European Centre for Development Policy management, No. 128 Feb. 2012.
16. Lydia Anne, 2018: Water-Energy-Food Nexus Climate Change Impacts in the MENA Region, Eco MENA Echoing Sustainability in MENA Blog.
17. Mekki El Shibly, 2014: Afro-Arab Food Security-Present and Future Expectations, Arab Bank for Economic Development in Africa, Khartoum, 2014, in Arabic.
18. Menamo Eyasa Desta. 2014: Impact of Household Food Security on Adherence to antiretroviral Therapy (ART) among urban PLHIV. The case of Hawassa City Ethiopia.
19. Palestinian Central Bureau of Statistics, 2018: Poverty Profile in Palestine, 2017.

20. Pradeep K. Naik (2016): Water crisis in Africa: myth or reality?, International Journal of Water Resources Development, (Online) Journal homepage: <http://www.tandfonline.com/loi/cijw>.
21. Salah A. Abdelmagid, 2010: Food security and Afro-Arab cooperation, working paper presented to the High-level Forum on Arab-African Cooperation in the field of investment and trade Tripoli-Libya 25-26 September 2010.
22. Salah A. Abdelmagid, 2018: Arab - Africa Inter-regional Trade: Current situation and Future prospects, working paper presented to Arab–Africa First Trade Promotion Forum, Addis Ababa Ethiopia 22 -23 November 2018.
23. Salah A. Abdelmagid, 2017: Food security in the Countries of the Cooperation Council, current situation and development prospects, working paper presented to «Food and water security concerns in the Arab Gulf states» Forum, Manama - Kingdom of Bahrain, 19 - 20/4/2017.
24. Tariq Moosa AL-Zadjali and Salah A. Abdelmagid, 2013: “Arab-African Cooperation in the Field of Food Security, Technical Paper Submitted to: The Arab-African Economic Forum Kuwait, 11-12 November, 2013.
25. Tsedeke Abate, D. Alene, Bekele Shiferaw “ICRICAT, CIAT”, IITC, 2012: Tropical Grain Legumes in Africa and South Asia Knowledge and Opportunities.
26. U.S. Agency for International Development (USAID), 1999: Food Security Indicators and Framework for Use in the Monitoring and Evaluation of Food Aid Programs.
27. UNDP and Oxford University 2018: The 2018 Global Multidimensional Poverty Index (MPI).
28. United Nations Commission for Africa U, 2018: Economic report on Africa, 2017. Africa.
29. United Nations New York, 2015: The Millennium Development Goals Report 2015.
30. USAID, 2015: Regional Development Cooperation strategy, 2015-2019.
31. Vogel C and Smith, J. (2002): The politics of scarcity: Conceptualizing the current food security crisis in Southern Africa. South African Journal of Science 98. pp 315-316.
32. WFP, 2014, Climate Impacts on Food Security and Nutrition: A Review of Existing Knowledge, Nov. 2014.
33. WHO, 2007: Technical Report on protein and amino acid requirements in human nutrition (2007).
34. World Bank, 2018: PovcalNet and Poverty & Equity: Data portal 2018.
35. World Bank, 2018: <https://data.worldbank.org/indicator/SN.ITK.DFCT>.
36. World Bank, 2018: Poverty and Shared Prosperity 2018.
37. World Health Organization (WHO), United Nations Children’s Fund (UNICEF), and United Nations University (UNU) 1993: “Iron Deficiency Anemia Assessment, Prevention, and Control, A guide for program managers.