Status of food security in the Arab region along the four food security dimensions (availability, access, utilization and stability)

Panos Konandreas
Expert on Food Security Policy
pkonandreas@yahoo.com

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ACRONYMS

ADER	Average Dietary Energy Requirement
AHDR	Arab Human Development Report
DES	Dietary Energy Supplies
ESCWA	Economic and Social Commission for Western Asia
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FBS	Food Balance Sheets
GAFTA	Greater Arab Free Trade Area
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
IDPs	Internally Displaced Persons
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IPCC	Inter-Governmental Panel on Climate Change
LAS	League of Arab States
LDCs	Least Developed Countries
MDER	Minimum Dietary Energy Requirement

OECD	Organization for Economic Co-operation and Development
OcPT	Occupied Palestinian Territory
RNE	FAO Regional Office for Near East
SSR	Self Sufficiency Ratio
UAE	United Arab Emirates
UN	United Nations
UN DESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNRWA	United Nations Relief and Works Agency for Palestine Refugees
WFP	World Food Programme
WHO	World Health Organization
WTO	World Trade Organization

I INTRODUCTION

The rise and volatility in agricultural commodity and food prices in recent years triggered renewed concerns about food security throughout the world. While the threat of a prolonged food-price shock receded with falling energy and commodity prices and a weakening global economy, many factors underlying higher and volatile food prices remain and will require careful consideration by all countries, especially those highly dependent on food imports.

The emphasis in the paper is on underlying food security trends and drivers, highlighting in particular the following:

- the broad demographic trends in the region and the related challenges due to these and other factors, affecting food security;
- trends in national and regional food availability and its adequacy at aggregate national level, issues of access to food, issues in the utilization of available food supplies and the implications for undernourishment/malnutrition and finally threats to food security emanating from year to year instability of food supplies;
- extent of domestic food production lagging behind consumption requirements and the growing import dependence;
- the burden of food imports in relation to other imports and export earnings, and the extent to which countries may be able to base their food security on growing import dependence;
- following this historical food security perspective, the last part of the analysis presents supply and demand trends to 2030 which provides a very rough indication of how food security in the region may evolve in relation in the years ahead.

The paper recognizes the diversity of food security situations pertaining to countries and sub-regions within the overall Arab region[1] due to geography, resource endowments and the stage of their economic development.

[1] See Annex 1 on the country composition of the region.

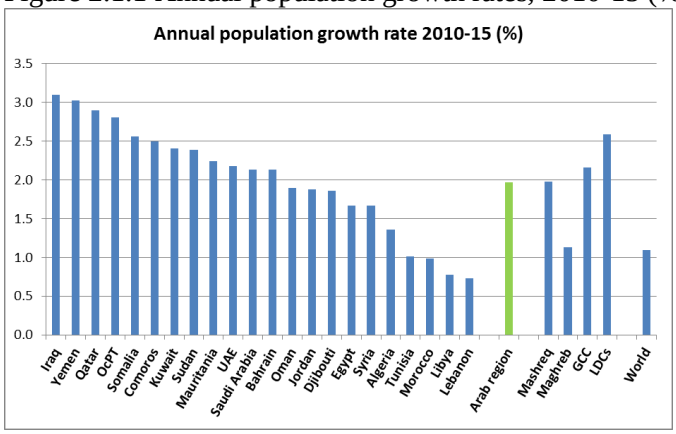
II FOOD SECURITY CHALLENGES IN THE ARAB REGION

2.1 Demographic trends

The countries of the Arab region are undergoing a period of marked demographic transformation characterized by a combination of relatively high population growth and increasing urbanization. Population of the region increased by nearly five times from 1950 to 2010. It stood at 394 million in 2015. By comparison, world population during the same period increased by less than three times and that of Western Europe by 1.3 times. Only the least developed countries of the world have experienced a population growth rate comparable to that of the Arab region.

Current overall average annual population growth rate for the Arab region (2010-15) is estimated at 2% compared to the world average of 1.1%. However, there are substantial differences within the region with the LDCs of the region having an annual growth rate of 2.6%, followed closely behind by the GCCs at 2.2%, Mashreq nearly at 2% and finally Maghreb at 1.1% (Figure 2.1.1). Even within the same sub-region differences in demographic trends are pronounced. This is the case, for example, between Iraq and Lebanon, two countries in the Mashreq region with population growth rates of 3.1% and 0.7%, respectively.

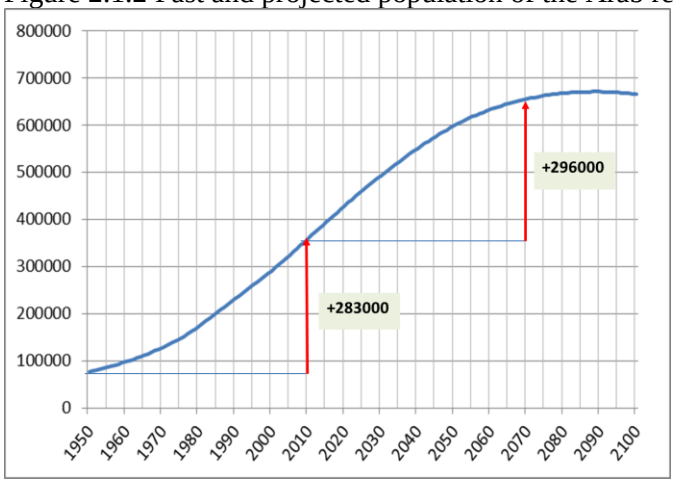
Figure 2.1.1 Annual population growth rates, 2010-15 (%)



Source: UN DESA, Population Division

In absolute numbers the population increase of the Arab region in the next 60 years would be even greater than the increase in the previous 60 years, by some 296 million and 283 million, respectively (Figure 2.1.2). It is projected to increase by 183% from 2010 to 2070 (to reach 656 million), compared to a projected increase of world population by 137% during the same period. The population of the region is projected to reach its maximum in 2090 (fifteen years later than the total world population which is expected to peak in 2075), compared to the projected peak for Asia in 2050, and Western Europe where it has already peaked. For several countries of the region this transition to a steady/declining population will happen much earlier than 2090, mostly in line with other developing regions, while for other countries (the LDCs of the region) much later.

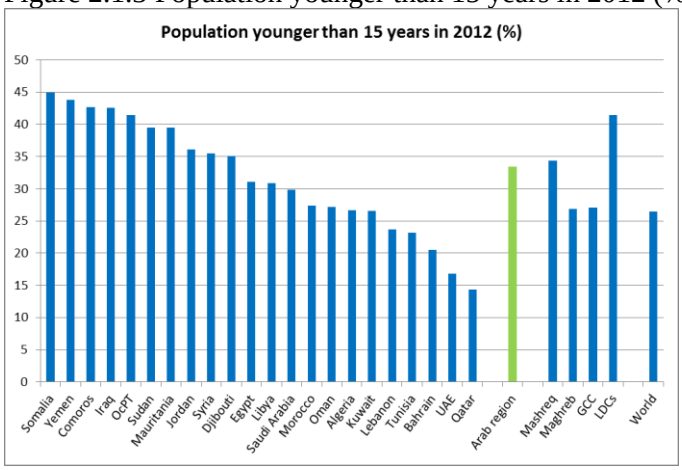
Figure 2.1.2 Past and projected population of the Arab region (1000)



Source: UN DESA, Population Division

A statistic highly relevant to demographic dynamics is the percentage of population under 15 years of age (Figure 2.1.3). For the region as a whole this ratio stands at over 33% compared to world average of about 26%. Among sub-regional groups, the LDCs of the region have the highest ratio with more than 40% of the population being under 15 years of age. Combined with their very high population growth rates, this presents a particular challenge for these countries in meeting present and future food needs. On the other hand, this "youth dividend" as is often being called, can potentially be a demographic gift; under favourable development policies a young workforce can be a driver of growth.

Figure 2.1.3 Population younger than 15 years in 2012 (%)



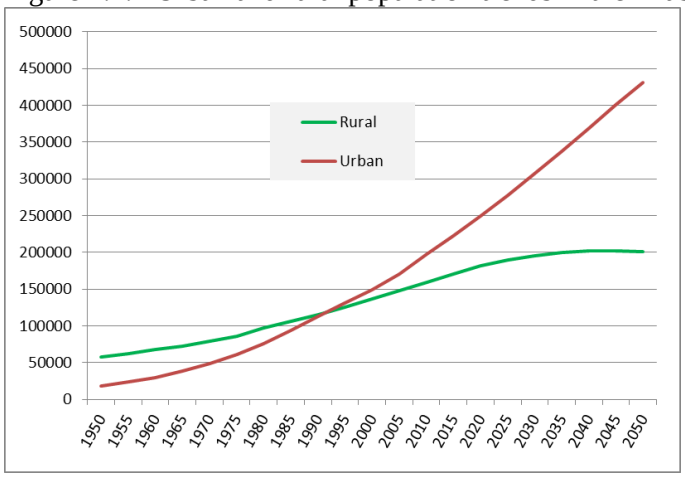
Source: UN DESA, Population Division

For the region as a whole, urban population surpassed rural in about 1990 (Figure 2.1.4). By 2015, an estimated 58% of the population of the region was urban compared to 52% for the world as a whole. Rural population in absolute numbers will increase only modestly, stabilize by 2040s and start declining, while urban population will continue to grow nearly exponentially. Nearly 90% of the increase in the population of the region in the years to come will be in urban areas[2], so that by 2050, close to 70% of its population will be living in cities (Figure 2.1.5).

[2] This includes migration from rural areas.

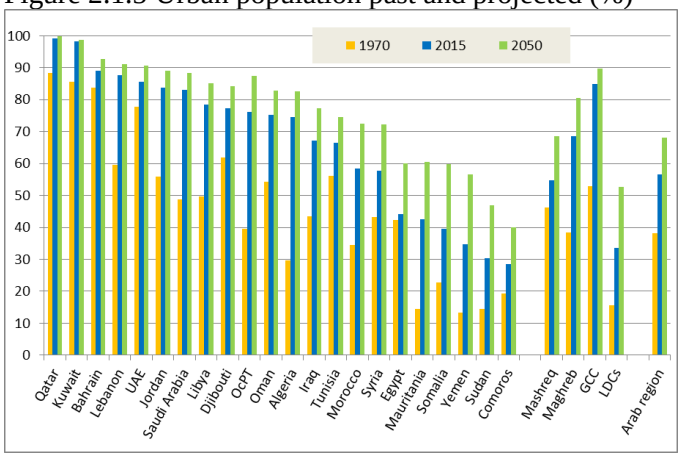
The different sub-regions are distinctly dissimilar as regards their urbanization process, with the GCCs already at 84% urban (of which Kuwait and Qatar close to 100%), followed by Maghreb at 67%, Mashreq at 54% and finally the LDCs at some 34%. However, even the latter will become predominantly urban by 2050 (with some 53% of the population living in cities). This phenomenon of rapid urbanization is not unique to this region but has been experienced in many parts of the world with similar demographic trends.

Figure 2.1.4 Urban and rural population trends in the Arab region (1000)



Source: UN DESA, Population Division

Figure 2.1.5 Urban population past and projected (%)



Source: UN DESA, Population Division

2.2 Implications of demographic trends for the food system

A rapidly increasing urban population with distinctly different food consumption habits and a greater dependence on the market than rural population is a particular challenge for the food system [3]. Aside from making food physically available in the quantity and variety demanded by urban consumers, the challenge to the food system, and to related public policy, is how to best respond to the phenomenon described as "the primary mismatch between human biology and modern society" (Popkin, et al, 2012). Living in cities alters lifestyles and physical activity: people consume more foods prepared outside the

[3] The latest *State of Food and Agriculture 2013* (FAO, 2013a) emphasizes the role of the entire food system – from inputs and production, through processing, storage, transport and retailing, to consumption – in the eradication of malnutrition by promoting more nutritious and sustainable diets.

home; they consume a higher share of animal-source products and processed foods which lead to higher intakes of fats, salt and sugars. With higher energy intakes and lower energy expenditure, urban dwellers incur a higher risk of overweight and obesity than rural dwellers.

These changes in activity and dietary patterns, seen primarily in industrialized and middle-income countries, are also common now in many developing countries and they are particularly evident in many countries of the Arab region. They are part of a "nutrition transition" in which countries simultaneously face not only the emerging challenge of rising levels of overweight, obesity and related cardiovascular diseases and other chronic illnesses, but continue to deal with problems of undernutrition and micronutrient deficiencies for a sizable part of their population (Bray and Popkin, 1998).

But there are also opportunities for the food system from urbanization. In general, urban consumers demand a wide variety of food products, and urban lifestyles lead the consumption of more convenience foods, because urban dwellers have less time available or simply wish to devote less time to food acquisition and preparation. In turn, while food supply chains may become more complex due to the necessary additional transformation of products by processors, they become also more responsive to consumer needs. Economies of scale associated with these developments imply lower unit costs thus increasing the efficiency of the food system, which under a competitive environment would benefit consumers. While urbanization leads inevitably to growth of supermarkets, this also implies a better organization of food distribution channels and more accountability as regards the quality and safety of the food being sold and consumed.

These developments represent opportunities for expanding the production of value-added domestic products, thus contributing to the creation of profitable business for farmers, agro-industries and others throughout the domestic supply chain (using modern transformation, marketing and distribution channels) in competition with imported foodstuffs. This phenomenon is already happening in situations where incentives exist and infrastructure is in place for efficient links between the farm and city markets. It is growing rapidly in several countries of the region, thus creating new profitable alternatives in the domestic food supply chains, especially for value-added products, as well as offering quality domestically produced foods that consumers value.

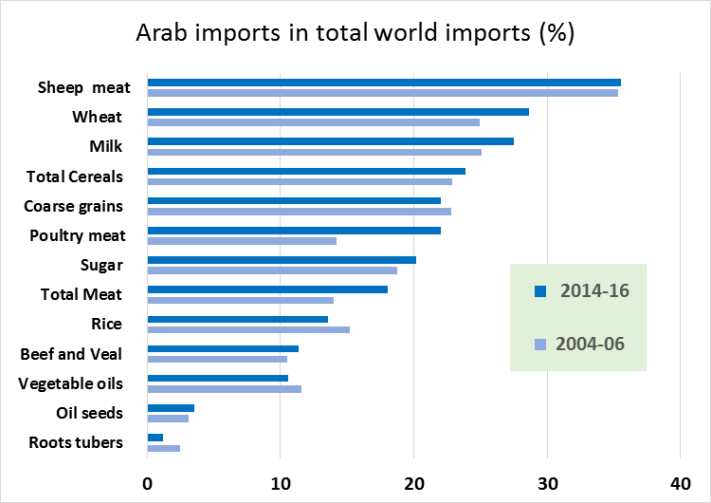
For better or worse, shrinking rural populations and growing cities has been the experience of all countries in their development path. The challenge is how to better harness the positive developments associated with this transition and minimize its undesirable effects by pro-active public policy, thus avoiding uncontrolled and often chaotic urban expansions and associated malnutrition shifting from the rural to urban areas.

2.3 Challenges from import dependence

Another important challenge to the food systems of the countries of the Arab region is their growing dependence on imported supplies to meet the needs (quantity and quality) of a rapidly growing population with changing food consumption habits and lifestyles. The Arab region as a whole is the largest food importer globally, commanding as much as over 1/3 of world imports in some key foodstuffs (Figure 2.3.1). As a large and growing importer of basic foodstuffs, the region is more vulnerable than other regions to increases in world food prices, to year-to-year price volatility and, potentially, to physical access to available food supplies. This is more so the case in view of limited capacity in most countries to increase domestic food production in the face of the severe water scarcity and land constraints.

Many countries all over the world manage their food security through a partial or complete dependence on the world market and, in fact, many Arab countries have been in that category for many years and have been successful in doing so. However, such dependence has been seen as a concern by some countries in recent years when the world food balance in basic food commodities was disturbed by weather leading to temporarily dramatic increases in world market prices and an imposition of export prohibitions and restrictions. While these events were short-lived and the market returned to normality relatively soon, these incidences brought to the front the challenges of attaining national food security in the face of a potentially volatile and unreliable world food market.

Figure 2.3.1. The importance of Arab countries in world food markets



Source: FAO CCBS database

Several factors combined to support that change of sentiment. Concerns about agricultural sustainability and climatic change have been a major preoccupation of the international community in recent years. There is now greater awareness about the state of global agricultural resources, the rate and manner at which they are used, and how global agro-ecological systems are interconnected. The broad consensus by experts in this area following the 2007/08 price spike was that global supplies of food and agricultural commodities were likely to be tighter in the future on account of several factors[4], including scarcity of land and water resources, climate change[5], higher energy prices[6], and decreasing returns from existing productivity increasing technologies. Although at least the pressure from the energy sector subsided considerably in recent years, these longer-term structural changes are likely to affect the level, and perhaps the volatility, of food prices in the future.

This debate on the potential limitations of the global food system to continue providing for ever increasing food needs, coincided with the recent political upheaval in several countries of the Arab region and has raised renewed calls for reappraising of national food security strategies. Some governments in this region and elsewhere have questioned the policy of increasing reliance on food imports and supported the notion of "food sovereignty". In some cases, this manifests itself as either a

[4] See in particular FAO (2006b) and FAO (2007a).

[5] Climate change is also associated with greater variability in precipitation and temperatures, increasing the frequency and intensity of droughts and floods that will significantly magnify the impacts of climate shocks on agriculture. Developing country regions including Africa will be negatively affected by these developments (Cline, 2007).

[6] While oil prices have come down considerably from their peak witnessed in 2008, there is broad agreement that over the longer term, prices of fossil fuels would be higher than the average prices experienced in the past. This would lead to higher agricultural production costs than in the past (through pressure on the cost of machinery, fuel and other energy dependent inputs such as fertilizer). Beyond the farm gate, costs of inputs and long-distance food distribution would also be affected by higher transport and refrigeration costs.

renewed emphasis on greater food self-sufficiency and in other cases as targeted investments (e.g. land acquisitions) in third-party countries to secure direct access to food supplies.

The challenge for countries of the region is to place the food system (domestic production, consumption and trade) on a more sustainable footing. Self-sufficiency is hardy an option for any country as is also the case of complete reliance on food imports. There is scope for judicious approaches which recognize the rationale of making the optimum use of limited domestic resources by increasing production and productivity in food crops that countries have a comparative advantage especially in value added terms; reducing excessive food losses and food waste; the paramount importance of having physical and economic access to reliable and predictable world markets; the critical importance of enhancing greater regional cooperation in all aspects of the food supply chain; and all along, the responsibility of maintaining an adequate and nutritious diet for a growing population through support mechanisms that are effective and sustainable.

III STATUS OF FOOD SECURITY IN THE ARAB REGION

The scope of this chapter is to take stock of the food security of the countries in the Arab region along the lines of the four components of food security as identified in the 1996 World Food Summit, namely in terms of *availability*, *access*, *utilization* and *stability* of food supplies.

Availability concerns the supply side of food security which for a given point in time depends on the level of domestic food production, level of national food stocks and the country's capacity to import supplies to augment those available domestically. It follows that availability of food at the national level depends on many factors including first and foremost the country's resource endowment especially in land and water, soil conditions, weather, planting decisions, transport and storage infrastructure, but also the foreign exchange position of a country as well as factors beyond its control such as world market conditions and trade policies of exporting countries.

Economic and physical access by households to available food, is largely determined by household income and market food prices as well as its own capacity to produce food. In addition, access to food depends on the access households may have to food assistance transfers and other entitlements from social safety net programmes. How much of disposable income is spent on food depends also on non-food expenditures by households for other essential needs (such as basic housing and health) and the extent to which such necessities are covered by social programmes.

Utilization of food refers to the consumption of available food within households and how that affects the nutritional outcome for the family. This is closely linked to choices of food items acquired, feeding practices, preparation and distribution of food within household members. Access to health, drinkable clean water and sanitary services critically determine individual's ability to digest food and achieve an overall positive nutritional outcome.

Stability refers to the inter-temporal attainment of food security. The conditions that make households food secure at one point in time may abruptly change for reasons beyond their control. Shocks of different types, such as a reduced harvest due to pests or other calamities, loss of employment of the household bread winner, high food prices in local markets, unexpected expenses due to illness, etc. may bring destitution to a normally food secure household.

These four dimensions of food security are assessed in turn for the 22 countries of the Arab region based largely on available aggregate national statistics. By their nature such statistics provide a broad picture of food security in each country with an emphasis on the input side (aggregate food availability) and the output side (prevalence of different aspects of malnutrition). Statistics are generally weak in revealing fully the process and the reasons of household food security, especially when dealing with such a diverse region as the 22 Arab countries. While certain patterns of food insecurity at the sub-regional level are highlighted, the insights here are short of making country-specific inferences for which more disaggregated data and comprehensive analysis are necessary.

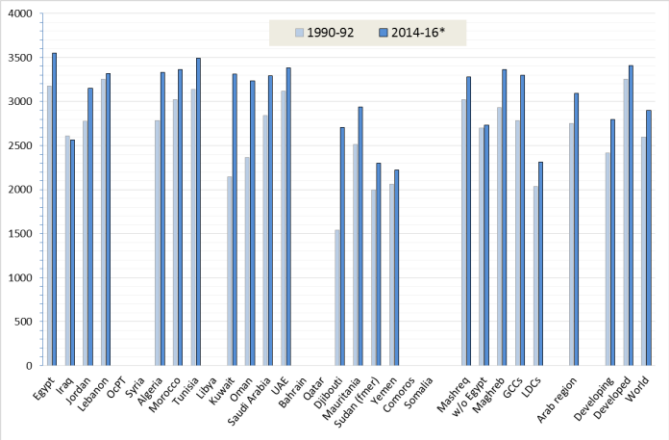
3.1 Food availability in the Arab region

3.1.1 Food availability in the Arab region better than in other developing regions

The starting point in assessing food availability is the total average calories in a country, expressed as the Dietary Energy Supplies (DES) which is the average calories per caput per day derived from all food supplies over a specified period of time (calculated as a 3-year average to avoid problems from

imprecise inventory data)[7]. At nearly 3100 kcal/caput/day in 2014-16 (Figure 3.1.1), the region as a whole has an average DES well above the average of developing countries (2796) as well as the world average (2903), but below that of developed countries (3408). The region has also made gains in its DES compared to 25 years earlier (1990-92) of some 12%, compared to the gains of the developing countries of 16% (however, the later from a much lower base).

Figure 3.1.1 Dietary Energy Supply (kcal/capita/day)



Source: FAOSTAT Food Security Indicators

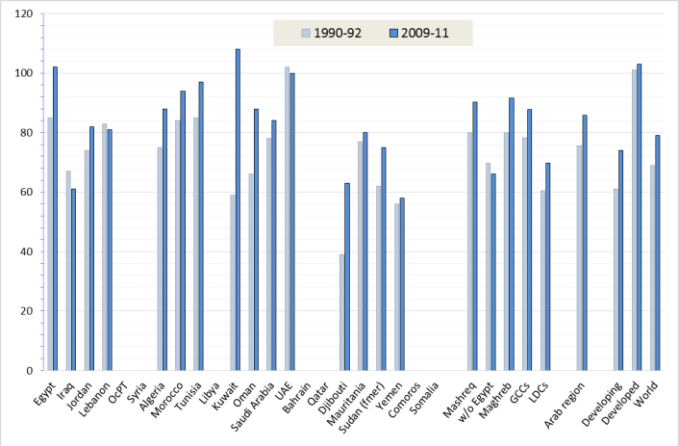
Within the Arab region, the highest DES are enjoyed by the Mashreq and Maghreb sub-regions, with the GCC very closely behind them. Within Mashreq Egypt weighs heavily on the sub-regional average. In fact, the aggregate DES of Mashreq w/o Egypt is by some 17% lower than that of the overall Mashreq. What is also important to highlight is that the average DES of the Mashreq w/o Egypt sub-region has stagnated at the level it was 25 years ago.

The DES of the LDCs of the region, at some 2300 kcal/caput/day in 2014-16, is more than 25% below the regional average, but nevertheless having registered some gains from its level in 1990-92. Within the LDCs, Mauritania enjoys a DES about the same average as that of developing countries, while the DES of the other LDCs are much lower, lagging well behind the average of the developing countries. On the other side of the spectrum, the GCCs experienced high gains in DES over the 25 year period and their average now is comparable to that of Mashreq and Maghreb.

Turning to the availability of proteins, a fairly similar picture to that of calories is observed (Figure 3.1.2). The region as a whole (and three of the sub-regions within) has an average protein supply well above the averages for developing countries and the world aggregate. The two sub-regions that falls substantially behind are the Mashreq w/o Egypt and the LDCs of the region, with an average protein supply at about 20% below the regional average. Again the case of Mashreq w/o Egypt is worth noting as its average protein availability per capita in 2014-16 is actually below its level of 25 years earlier by some 5%. Both LDCs and Mashreq w/o Egypt have an average protein availability below the average of developing countries.

[7] FAOSTAT database on Food Balance Sheets (FBS) are used as the main source of information on food availability. FBS include all recorded commodities consumed in a country in a given year. The prolonged period of conflicts that has affected several countries of the region has taken a heavy toll on national statistical offices and the data in the FAO databases for these countries is not of the quality to be reliable. Therefore, those countries for which reliable data do not exist on some of the parameters involved in the calculation of national food consumption as well as countries that have not reported to the FAO in recent years, are excluded from the FBS database.

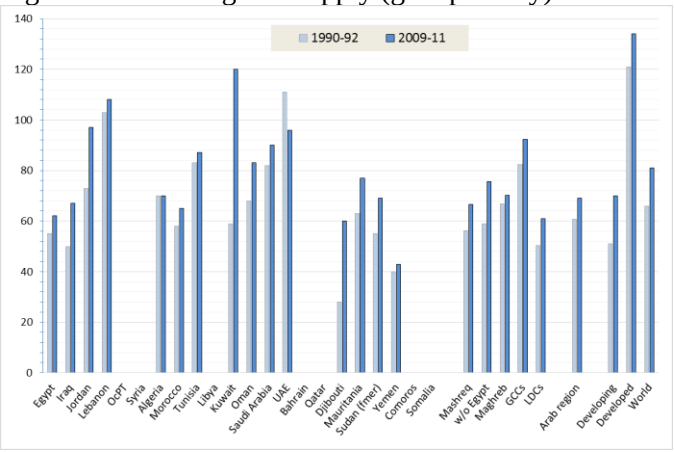
Figure 3.1.2 Average protein supply (gr/capita/day)



Source: FAOSTAT Food Security Indicators

The average availability of fats in the Arab region is at about the same level as in the developing countries overall with the GCCs being at the top of the sub-regional averages although still well below levels experienced in developed countries (Figure 3.1.3). For other sub-regions, Mashreq w/o Egypt presents an interesting case with a higher level of fat availability than that of Mashreq overall, unlike the pattern noted above concerning calories and protein. This may be the result of fatty foods compensating in the diet due to the difficulties this sub-region has experienced over the years.

Figure 3.1.3 Average fat supply (gr/capita/day)



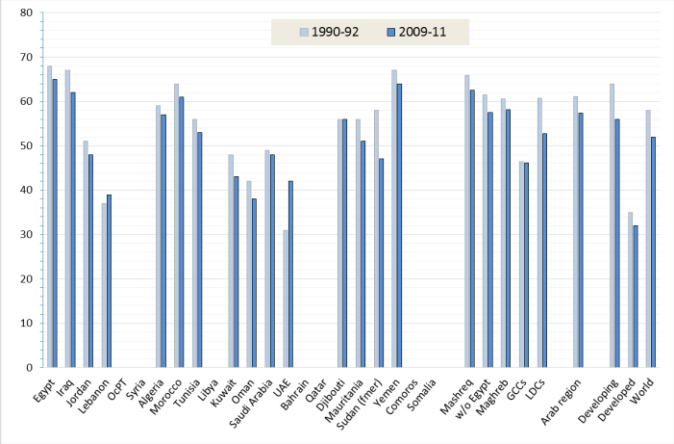
Source: FAOSTAT Food Security Indicators

Cereals, roots and tubers provide the lion's share of calories for the countries of the region (Figure 3.1.4). Overall, they accounted for over 56% of calories in 2009-11[8], compared to the world average of 52% (and that of developed countries of 32%). Within Arab region, GCCs have the lowest share of cereals, roots and tubers in their diet due to the higher consumption of animal products in these countries. In turn, GCCs have the highest share of proteins of animal origin in their diet (Figure 3.1.5). Also, worth noting is the high share of protein from animal origin in the LDCs sub-region due to the predominance of pastoral communities in these countries and the high share of milk and meat in their diet.

[8] The latest period reported in the FAO database.

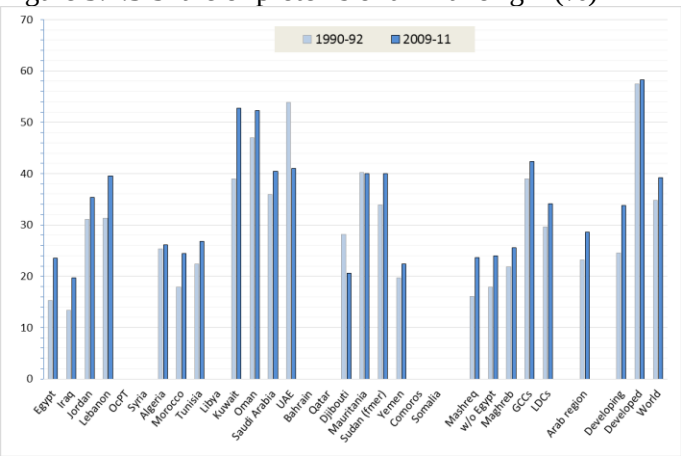
In terms of source of calories from all commodity groups, Figure 3.1.6 provides the shares of the main commodity groups in the diet of four countries, one from each of the four main sub-regions. In addition to cereals which are the main commodity group in all countries, other commodities which are also important across countries include sugar and vegetable oils. Animal products (meat and milk) are also important sources either due to income (e.g. Kuwait) or to the predominance of extensive pastoral societies (e.g. Mauritania).

Figure 3.1.4 Share of DES derived from cereals, roots and tubers (%)



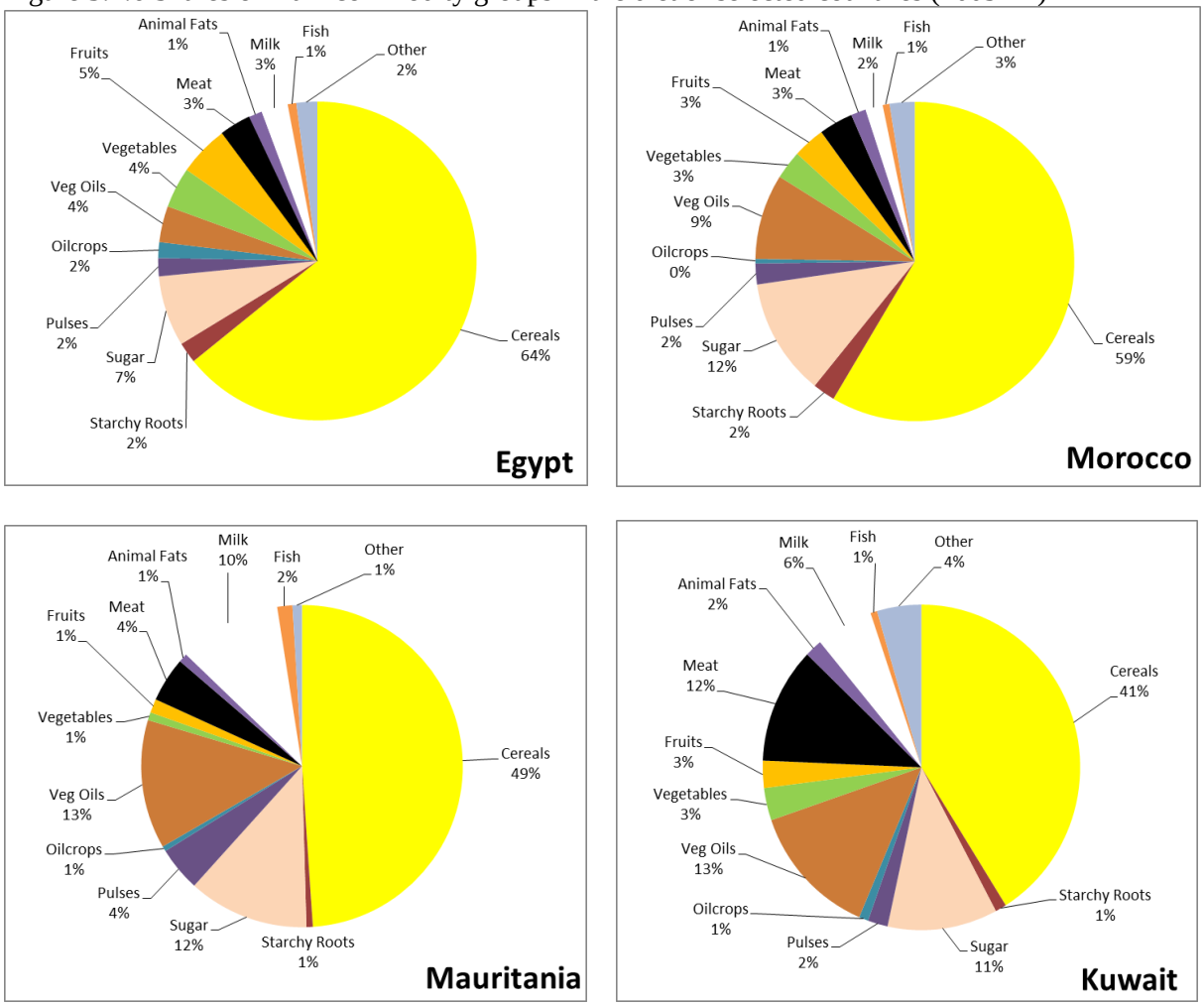
Source: FAOSTAT Food Security Indicators

Figure 3.1.5 Share of proteins of animal origin (%)



Source: FAOSTAT Food Security Indicators

Figure 3.1.6 Shares of main commodity groups in the diet of selected countries (2009-11)



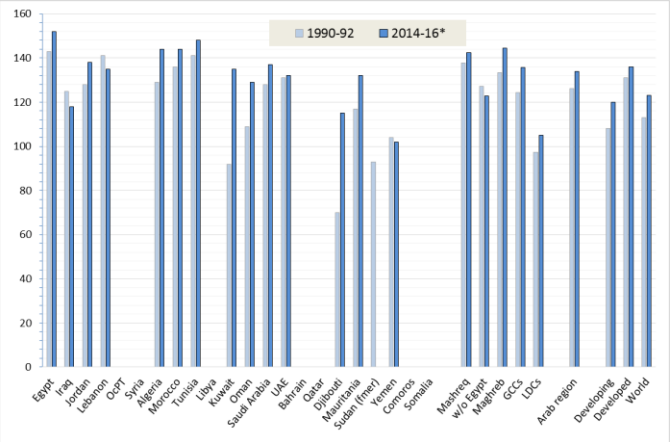
Source: FAOSTAT

3.1.2 Aggregate supplies well above region's requirements but unevenly distributed

The average level of food availability in a country (the DES) on its own does not provide a satisfactory picture of food adequacy and food security for the whole population. There are two important considerations that have to be taken into account for the later: (a) a comparison of the average dietary energy supply with an average normative dietary requirement; and (b) how available supplies are distributed between different households in a country (i.e. access of individual households to available supplies - see section on access below).

The normative reference measure for adequate calorie intake of the average individual in a country for a healthy life and a normal level of activity used in the FAO methodology is the Average Dietary Energy Requirement (ADER). The ratio between DES and ADER is an indicator of average dietary supply adequacy (Figure 3.1.7). A value greater than 100 indicates that, on average, the total dietary energy supplies available in a country are more than enough to meet the needs of the population for a healthy and active life. An important proviso, of course, is how these supplies are distributed among the population as we will see below.

Figure 3.1.7 Average dietary energy supply adequacy (%)



Source: FAOSTAT Food Security Indicators

The average dietary energy supply adequacy for the region as a whole is some 134% in 2014-16, well above the level of developing countries (120%) and the world overall (126%), and fairly close to the level of developed countries (136%). This implies that dietary energy supplies of the region as a whole stand at 34% more than what would be required for a healthy and active life. However, there is a wide variation in the dietary energy supply adequacy within the region. LDCs barely make it with a ratio just above 100% in 2014-16, a modest improvement from 97% 25 years earlier, although some countries in that sub-region have reached high levels of supply adequacy, notably Mauritania. At the other extreme, the ratios for Maghreb and Mashreq are well above 140%, even higher than the average of developed countries. Egypt has the highest dietary energy supply adequacy with a ratio of over 150% in 2014-16, followed by Tunisia, Morocco and Algeria, as well as the GCCs. Following the pattern that has been already noted above, Mashreq w/o Egypt has a level of supply adequacy well below that of Mashreq overall by some 14% in 2014-16.

3.2 Access to food supplies in the Arab region

As the average dietary energy supply adequacy ratio discussed above measures the degree to which available dietary energy supplies cover dietary energy requirements at the aggregate national level, it says very little about the food security of households within the country. The food security of the latter depends critically on whether they have physical and economic access to food supplies available.

3.2.1 Important inequalities in accessing food in the Arab region

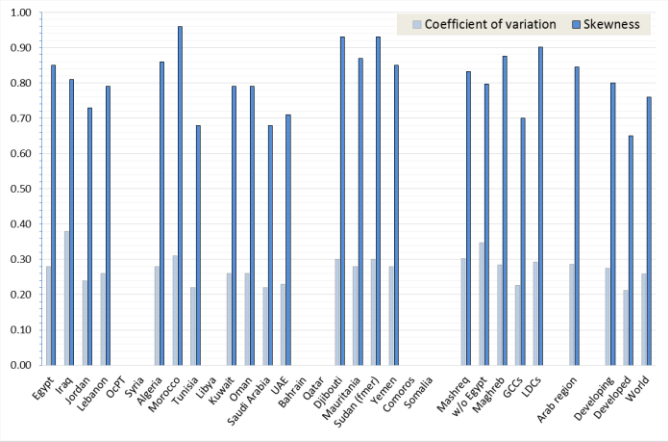
An important metric on the extent of widespread access to food in a country is the degree of distribution of aggregate available food supplies[9]. Two measures indicative of access to food by individual households have been calculated by FAO. The first is the *coefficient of variation* of habitual calorie consumption within the general population, derived from available household surveys that collect data on both food consumption/acquisition and income/expenditure. The greater the coefficient of variation, the less uniform is the food consumption in a country, implying that there are individuals with very low

[9] Income inequality (typically expressed by the Gini index) is the key determinant of the deviation of the distribution of food consumption from a perfectly equal distribution. The more unequal the income distribution is (the higher the Gini index), the more unequal the distribution of food, implying that the average DES has to be much higher than otherwise to ensure adequacy for a greater part of the population.

consumption levels as well as others with much higher consumption levels than the average consumption for that country. The second measure is the *skewness* of habitual caloric consumption distribution which is an indicator of the asymmetry of the consumption distribution. The higher the value of that indicator for a country indicates more skewedness in the distribution of food consumption, implying that the share of the population with very low levels of consumption is more than the share of the population with very high levels of consumption[10].

It follows from Figure 3.2.1 that the distribution of habitual caloric consumption for most countries of the region is more uneven and more skewed than it is in both developing and developed countries and the world as a whole. Within the Arab region, only for the GCCs the distribution is more even and approaching that of developed countries. This is the result of the generally much higher income in the GCC countries which affords a high level of caloric consumption for the majority of the population (but perhaps not necessarily in terms of the quality and variety of the food consumed). For the other three sub-regions, habitual consumption is relatively more unequally distributed than the world and developing countries, with the highest inequality in the LDCs of the region. It is actually in the latter sub-region that the prevalence of undernourishment is the highest (see below).

Figure 3.2.1 Coefficient of variation and skewness of habitual caloric consumption



Source: FAOSTAT Food Security Indicators

3.2.2 Poverty and conflicts hampering household access to food

The underlying factors limiting access to food are complex, with income inequality and poverty being the determining factors, to the extent that households have physical access to markets. By global standards, poverty in the Arab region overall is not high, averaging about 22% (WFP/IDS, 2015). Yet, as for all other socioeconomic indicators of the region, there is wide variation between the better-off and the very poor. For example, in the oil-rich countries of the region poverty levels are very low comparable to those in developed countries. Even in the middle income countries of the region, such as Jordan, the absolute poverty rate stood at 14.4% in 2010, while at the other end of the spectrum in Yemen, one of the poorest countries in the Arab region, the poverty headcount was 54.5% in 2012 and chronic child malnutrition stood at 47% (WFP/IDS, 2015).

Expenditure on food claims a high share of the household budgets even in normal times in several countries of the Arab region. For example, households in Tunisia spend some 35.8% on food, in Egypt 38.3%, in Morocco 40.3%, in Jordan 40.8% and in Algeria 43.8%. At the other end of the scale are the better-off oil-rich GCC countries, where household expenditures on food are much lower (UAE, Qatar

[10] In statistical terms the distribution is positively skewed which implies that the mode of the distribution is less than the median and that is less than the mean (Doane and Seward, 2011).

and Kuwait at 9.0%, 12.8% and 14.6%, respectively)[11]. These compare to averages of most Western European countries (ranging from 10-15%), and USA (6.8%), the lowest in the scale.

Economic access is necessary but not sufficient condition for accessing food. In several countries of the Arab region where populations have suffered from prolonged periods of conflicts and political and economic instability, physical access to food is hardly a given. Trade flows and the functioning of markets have been seriously disrupted in many instances, and people's mobility to access markets restricted, even when such markets exist. Also, the escalation of armed conflict in several countries of the region since the Arab Spring has created a surge in refugees and Internally Displaced Persons (IDPs), who typically lose both their economic and physical access to food. In the first instance, such conflicts and related political instability seriously undermine physical access to food, by depriving displaced people from the most important source of food supplies which in many situations used to come from their own fields and household gardens (more on this in next section of the paper).

Within these broad economic and physical constraints in accessing food, there are important differences between and within countries, differentiating access to food between urban and rural areas, the gender of the head of household, as well as an important temporal dimension due to the frequent and often violent political and social changes afflicting the Arab region.

3.2.3 Most of the poor and food insecure are still in rural areas

As is the case in other parts of the developing world, much of the poverty and food insecurity in the Arab region is a rural phenomenon. Rural areas account for the bulk of the poor, especially in the most populous countries of the region (Table 3.2.1). Events of recent years may have changed this picture somewhat as a growing number of food insecure people moved from the countryside to urban areas, in addition to the newly-arrived refugees and IDPs (Breisinger et al., 2013). A case in point is Jordan where more poor people now live in urban than in rural areas and this trend is likely to be seen elsewhere in the context of high out-migration from rural areas (WFP/ODI).

Table 3.2.1 The poor are concentrated in rural areas

Country	Percent of urban people who are poor	Percent of rural people who are poor	Percent of poor in rural areas
Yemen	21%	40%	84%
Egypt	10%	27%	78%
Sudan	27%	85%	81%
West Bank and Gaza	21%	55%	67%
Jordan	12%	19%	29%
Algeria	10%	15%	52%
Morocco	5%	15%	68%
Tunisia	2%	8%	75%

Source: WFP/ODI (2015) based on World Bank, FAO and IFAD (2009).

[11] Numbers are for 2008. USDA: www.vox.com/2014/7/6/5874499/map-heres-how-much-every-country-spends-on-food.

The concentration of poverty and food insecurity in rural areas, highlights the continuing importance of agriculture and food production in addressing food insecurity in the region. Even though most rural households rely on the market for a large share of their food needs, farming is an important source of employment and income in most countries of the region. Agriculture employs around 40% of the workforce in Morocco and between 20%-30% in Yemen and Egypt (World Bank, 2014). In addition, in several countries such as Morocco, Tunisia and Egypt, agriculture produces a large share of export earnings which these countries use, in turn, to import basic foodstuffs.

Turning to the urban poor, who purchase most of the food they consume in the market, their income earning capacity is paramount to attaining food security. While the urban poor generally have access to more stable food markets than their rural counterparts, they also face serious challenges to find a steady and remunerative employment. Unemployment rates in several countries in the Arab region are high, especially among the urban populations, particularly the young. Even when they are employed, their income can be eroded by higher prices for food and other necessities. Urban employment from sectors such as tourism or construction is often seasonal, which presents difficulties in accessing food on a regular basis. Also, while the urban poor have better access to social safety nets than their rural counterparts, the benefits from such networks during difficult times tend to get eroded (WFP/ODI, 2015).

The large numbers of refugees, IDPs and migrants in several host countries of the Arab region are also largely in urban centres and are usually subject to irregular employment and poorly paid. These doubly-destitute people hardly have any entitlements to social protection from either their home or host countries. Informal and semi-formal social protection plays a significant role, notably through religious redistributive mechanisms such as Zakat (WFP/IDS, 2015).

3.2.4 Female-headed households face additional difficulties in accessing food

Gender inequalities are generally high in the Arab region, where women's rights are limited and females are disadvantaged in multiple ways throughout the lifecycle (WFP/IDS, 2015). For example, in Iraq, the economic position of women is generally worse than men, largely due to the lower participation of women in the formal labour market. Yemen ranks very low on the gender equality index, due to the exclusion of women from much of social, economic and political life. Even in progressive Lebanon where women's position is generally better than other parts of the Arab region, a survey in 2004 found that less than one in four (23%) of working adults were female.

An indication of the gender differentiation as regards access to food comes also from an analysis of household expenditure surveys from Saudi Arabia. Saudi female-headed households spend on average 18.9% of their budget on food compared to Saudi male-headed households who spend 16.8%, even though the latter have an aggregate budget by 50% greater than that of female-headed households (Konandreas, 2016). This phenomenon of a substantially greater burden for food by female-headed households is even much more pronounced for the non-Saudi migrant population. On average, non-Saudi female-headed households spend 27.3% of their aggregate budget on food compared to non-Saudi male-headed households who spend 22.2%. For the poorest of the population which is likely to include female-headed households, the expenditure on food is as high as 37% of their aggregate expenditure.

The Arab Spring brought some isolated but hopeful signs towards women's empowerment in some countries. For example, in Tunisia gender activists reacted on the language used in the draft new constitution, which referred to women as being "complementary" to men. As a result, the wording was altered to recognize full gender equality, whereby "All citizens, male and female, have equal rights and duties, and are equal before the law without any discrimination" (Constitute 2014, as cited in WFP/IDS, 2015).

3.2.5 The fragility of access to food in the countries of the Arab region[12]

Hitherto food secure households in the Arab region may fall into poverty and food insecurity due to circumstances beyond their control. For example, the 2007/08 food price spike had a major impact on poverty and food insecurity in the region: estimates suggest that around 2.6 million additional individuals entered into poverty and some 4 million people were added to the number of undernourished following the crisis. Households struggling to afford food also often cut back on other essentials. For example, analysis by WFP suggested that between 2006 and 2008 almost half of poor Yemenis cut back on healthcare spending (WFP/ODI, 2015).

Besides external shocks due to the volatility in world food markets, loss of access to food is more often due to internal political instability and prolonged conflicts in several countries of the Arab region. A number of examples from the region (based on WFP/IDS, 2015) illustrate the seriousness of such incidents for food security.

In **Egypt**, a combination of economic shocks and political instability over the past few years has increased the poverty level to 26.3% in 2013, up from 16.7% in 2000. An estimated 55% of Egyptians experienced at least one episode of poverty or near-poverty condition between 2005 and 2008. During the last quarter of 2014, about 13% of the country's 27.6 million labour force remained unemployed, with 70% of them being under 30 years of age.

Poverty in **Iraq** was very low in the 1980s, at around 3% in urban areas and 8% in rural areas. Following the imposition of economic sanctions on Iraq, poverty rates rose by 1993 to 25% and 33% in urban and rural areas, respectively. A survey in 2007 found that 23% of the Iraqi population – 16% of urban residents and 39% of rural residents – were living below the national poverty line. The most recent household budget survey, in 2012, concluded that the poverty rate had fallen to 19%, implying that some 6 million people were below poverty line. Yet, vulnerability to poverty in Iraq remains high, with a large proportion of the population clustered around the poverty line.

Poverty in **Lebanon** fell from 31% to 25% between 1995 and 2005, before rising to 28% in 2008, based on an 'upper poverty line' equivalent to US$4 per capita per day. For the same three years, the absolute or extreme poverty rate fell from 7% to 5% and then rose to 8%, based on a 'lower poverty line' equivalent to US$2.40 per capita per day. Poverty is most prevalent among the unemployed and among unskilled agricultural and construction workers. Unemployment was estimated at 22% in 2014 (compared to 8% in 2004), partly due to the influx of Syrian refugees which boosted the labour force by approximately 30% and increased competition for low-skilled jobs, especially in the informal sector which absorbs more than half of the workforce.

The poverty headcount in **Palestine**, based on the national poverty line, was 25.8% in 2011, but is higher among Palestinian refugees and IDPs, and varies by location: 29% for displaced people in occupied Palestine, 66% among refugees in Lebanon, and 73% for refugees living in camps. Unemployment among Palestinian refugees is estimated at 44% for women and 20% for men.

Poverty in **Sudan** is extremely high, at 46.5%, with an estimated 57.6%of the rural population and 26.5% of urban living under the national poverty line in 2010. Poverty is highest in conflict-affected states, touching 70% in parts of Darfur and 60% in South Kordofan. Poverty and indicators of deprivation have worsened in recent years, due to conflict in western and southern states, as well as the implementation of economic stabilization policies that halved government spending, severely affecting

[12] Largely based on WFP/IDS, 2015.

social services, infrastructure and public sector investment in economic sectors such as agriculture. It is estimated that the removal of fuel subsidies in 2013 raised the national poverty rate to 49%.

In **Yemen,** more than half the population of is poor (54.5%), per capita GDP was US$1,209 in 2012, and the country ranked at 160 of 187 countries in the 2014 HDI. Some 10.5 million people in Yemen were food-insecure, 13.1 million had no access to safe water and sanitation, 8.6 million lacked access to adequate health care, and more than 1 million children under five were acutely. An estimated 14.7 million people (58% of the population) are affected by the ongoing crisis and need humanitarian assistance. Causes of the crisis include: governance failures, political instability, internal conflict, collapsing social services, high food and fuel prices, demographic pressure and environmental stress, all of which are exacerbating poverty and vulnerability in Yemen.

3.3 Utilization of food supplies and different facets of malnutrition in the Arab region

3.3.1 Overall undernourishment low but very high in the region's LDCs

The term 'undernourishment' or undernutrition refer to a continued inability of individuals to obtain enough food, i.e. the quantity of food sufficient to conduct a healthy and active life[13]. It is an extreme form of food insecurity, arising when an individual's habitual dietary energy intake is below the minimum level nutritionists deem appropriate. Operationally, FAO defines the prevalence of undernourishment as the proportion of the population whose dietary energy consumption is less than a pre-determined country-specific threshold, inadequate to cover even minimum needs for a sedentary lifestyle[14].

The generally high levels of DES in the region (section 3.1) suggest that the prevalence of undernourishment would be low, although as discussed above this is unlikely for those countries with relatively low average DES and/or relatively high inequality in the distribution of available supplies.

The prevalence of undernourishment for the region spans the whole range from very low to very high levels (shown in Table 3.3.1, together with other key dimensions of malnutrition). For most of the countries in the Mashreq, Maghreb and GCC sub-regions, undernourishment is hovering around 5%, the order of magnitude encountered in developed countries. However, there are certain outliers even within these sub-regions with high levels of undernourishment in recent years, notably Iraq estimated by FAO at 22.8% in 2014-16, a high 31% (2010-12) in Occupied Palestinian Territories (OcPT) and a surprising 19.8% (2010-12) in Qatar (perhaps among the large migrant population).

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[13] The term 'malnutrition' is a more encompassing concept and includes not only situations of inadequate calorie supplies but also the quality of the diet, especially lack of essential micronutrients essential for a healthy life. Malnutrition also includes situations of excessive intake of food leading to obesity.

[14] The prevalence of undernourishment (PoU) indicator has its limitations, inter alia, it does not tell us who are the food insecure or the seasonality of food insecurity (for the definition of PoU and methodology, see FAO, 2012). It also requires large amounts of household data which limit comprehensive and regular assessments. Recognizing these limitations, the FAO *Voices of the Hungry* project developed an experience-based food insecurity scale module called the *Food Insecurity Experience Scale* (FIES). The FIES is used as a common metric for measuring food insecurity at several levels of severity, across different geographic areas and cultures. The FIES Survey Module consists of eight short questions that refer to the experiences of the individual respondent or of the respondent's household as a whole. The questions focus on self-reported food-related behaviours and experiences associated with increasing difficulties in accessing food due to resource constraints (Ballard, et al, 2013). The FIES provides estimates of the proportion of the population facing difficulties in accessing food, at different levels of severity, based on data collected through direct interviews; the PoU is an estimate of the adequacy of dietary energy intake in a population, based on national-level estimates of food availability, food consumption and energy needs.

Table 3.3.1 Prevalence of malnutrition in the Arab region

	Prevalence of stunting among children (%)	Prevalence of deficiencies among children (%)			Prevalence of under-nourishment (%)	Depth of food deficit (kcal/capita/day)	Depth of food deficit (%)	Depth of food deficit in cereal equivallent (MT)	Prevalence of obesity among adults (%)
		Anaemia	Vitamin A	Iodine					
	Most recent observation				2014-16*	2014-16*	2014-16*		2008
Algeria	11.7	42.5	15.7	77.7	<5.0	20	0.6	69,511	16.0
Bahrain	13.6	24.7	..	16.2	<5.0 (2010-12)	..	..	..	32.9
Comoros	32.1	65.4	21.5	..	70.0 (2010-12)	..	..	..	4.4
Djibouti	33.5	65.8	35.2	..	15.9	118	4.4	10,261	9.4
Egypt	22.3	29.9	11.9	31.2	<5.0	12	0.3	100,497	33.1
Iraq	22.6	55.9	29.8	..	22.8	185	7.2	605,767	27.0
Jordan	7.8	28.3	15.1	24.4	<5.0	13	0.4	8,253	30.0
Kuwait	5.8	32.4	..	31.4	<5.0	21	0.6	6,473	42.0
Lebanon	16.5	28.3	11.0	55.5	<5.0	29	0.9	11,712	27.4
Libya	21.0	33.9	8.0	..	<5.0	..	..	..	27.8
Mauritania	22.0	68.2	47.7	69.8	5.6	36	1.2	12,260	12.7
Morocco	14.9	31.5	40.4	63.0	<5.0	31	0.9	97,112	16.4
OcPT	7.4	30.0	..	..	31.0 (2010-12)	..	..	..	..
Oman	9.8	50.5	5.5	49.8	<5.0	33	1.0	15,328	20.9
Qatar	11.6	26.2	..	30.0	19.8 (2010-12)	..	..	..	33.2
Saudi Arabia	9.3	33.1	3.6	23.0	<5.0	9	0.3	23,761	33.0
Somalia	25.3	..	61.7	..	.. (2010-12)	..	..	..	4.8
Sudan	37.9	84.6	27.8	62.0	39.0 (2010-12)	176	7.7	766,544	6.0
Syria	27.5	41.0	12.1	..	<5.0 (2010-12)	..	..	..	27.1
Tunisia	10.1	21.7	14.6	26.4	<5.0	3	0.1	2,979	22.3
UAE		27.7	..	56.6	<5.0	18	0.5	8,530	32.7
Yemen	46.8	68.3	27.0	30.2	26.1	182	8.2	461,996	14.5
Mashreq	**22.1**	**37.0**	**15.7**	**31.8**	..	..	..	..	**31.3**
w/o Egypt	**21.8**	**45.7**	**20.3**	**36.5**	..	..	..	..	**27.5**
Maghreb	**13.5**	**35.1**	**24.3**	**64.9**	..	..	..	..	**17.0**
GCC	**8.2**	**34.0**	**2.9**	**30.6**	..	..	..	..	**32.7**
LDCs	**38.4**	**68.7**	**32.4**	**51.2**	..	..	..	..	**9.1**
Arab region	**22.3**	**43.6**	**20.1**	**35.9**	..	..	..		**22.6**
Developing	**28.0**	**52.4**	**34.0**	**29.6**	**12.9**	**96**	**3.4**	..	**8.7**
Developed	**7.2**	**11.8**	**3.9**	**37.7**	**<5.0**	**8**	**0.2**	..	**22.2**
World	**25.7**	**47.9**	**30.7**	**30.3**	**10.8**	**81**	**2.8**	..	**11.7**

Source: FAOSTAT Food Security Indicators and FAO (2013b);

The problematic countries in terms of undernourishment are the LDCs of the region where the prevalence of undernourishment persists at high levels. Aside from Mauritania where the latest FAO estimate is reported as 5.6%, all the other countries are reported to experience high undernourishment rates. The levels of undernourishment are staggering for some of them, as high as 70% for Comoros, 39% for Sudan and 26% for Yemen. As several countries in the region remain under protracted conflicts, reliable data remains unavailable for these countries, and hence actual rates may be even higher than those reported in Table 3.3.1.

Another useful indicator of food deprivation computed by FAO is the *depth of the food deficit* which calculates the calories that would be needed to lift the undernourished from their status (expressed in per capita basis of the whole population of a country). As expected, the depth of the food deficit is the highest for the LDCs of the region (Table 3.3.1). In the case of Yemen, 182 Kcal/capita/day more would be required so that the whole population of the country could lead a normal and active life, while in the case of Sudan the depth of the food deficit is estimated at 176 Kcal/capita/day, 8.2% and 7.7%, respectively, of their average calorie availability. These imply that in the case of Yemen available

calories would have to increase by 8.2% to lift the undernourished out of their status, while in the case of Sudan the necessary increase would be 7.7%. Outside the LDCs the only other country with a high depth of food deficit is Iraq at 185 Kcal/capita/day implying a necessary increase in average caloric availability by 7.2% to lift the undernourished out of their status.

It is also possible to arrive at a rough estimate of the absolute amount of cereal equivalent that corresponds to the estimated depth of food deficits[15]. In the case of Yemen some 462 thousand MT of cereals equivalent would be required, in the case of Sudan 767 thousand MT, and in the case of Iraq about 606 thousand MT. These are not large quantities compared with the amounts produced in these countries or imported. However, even if the aggregate supply were to increase by these amounts there is no guarantee that undernourishment would be eradicated unless these supplies were to be targeted specifically to the undernourished individuals.

3.3.2 Micronutrient deficiencies contribute to malnutrition

The prevalence of undernourishment measured in terms of calorie deficits does not tell the full story of malnutrition. In diets consisting mainly of staple cereals or root crops, it is possible to consume enough calories without consuming enough micronutrients (foods rich in micronutrients, such as fruits, vegetables and animal-source proteins). Malnutrition of young children (including during foetal development brought on by the malnourished mother) are manifested in weight loss and growth faltering, reflected as underweight and wasting, a condition referred to as chronic malnutrition or *stunting*[16]. More than a quarter of children in the bottom income quintile in Egypt, Morocco, and Syria are chronically malnourished (World Bank, 2012a). The consequence of this is poor physical, mental and social development of the child, inhibiting an individual's lifelong mental development leading to chronic ill health, less opportunities for educational growth and low productivity (The Lancet, 2013) [17].

While again the averages of micronutrient deficiencies of the Arab region are generally below the averages for the world as a whole (aside from iodine deficiency) individual statistics provide a much more worrisome picture (Table 3.3.1) [18]. Many household diets across the Arab region lack the essential micronutrients (iron, iodine, zinc, calcium, folic acid and vitamins A and D) for a healthy life. Prevalence of anaemia and micronutrient deficiencies (vitamin A and iodine) is very high in the LDCs of the region, whether compared with the Arab averages or those of the world as a whole. As a result, the LDCs of the region fare very badly with 43.4% of children under 5 years of age estimated stunted (much higher for some countries such as Comoros at 46.9% and Yemen at 57.7%). The situation is worst in countries in protracted emergency situations and for vulnerable groups including women of childbearing age, pregnant and breastfeeding mothers and children under the age of two (WFP/ODI, 2015). Micronutrient deficiencies are also high in wealthier countries where people follow unbalanced diets.

In general, the high prevalence of stunting among children is associated with high prevalence of food (caloric) inadequacy, as evidenced by the high correlation between these two indicators (Table 3.3.2)[19]. However, caloric inadequacy is not the only determinant of stunting among children as is evident by the

[15] The calculation entails multiplying the depth of the food deficit (Kcal/capita/day) of Table 3.3.1 by the population of each country and by 365 days, and then dividing by the number of Kcal contained in a Kg of cereals (about 4,000 Kcal/Kg)

[16] Children under 5 years of age are considered stunted when their height-for-age is 2 standard deviations below WHO's 2006 child growth standards. They are considered anaemic when their haemoglobin levels are less than 110 grams per litre, and they exhibit vitamin A deficiency when their serum retinol is less than 0.70 µmol/litre or 20 µg/dl. Finally, as regards iodine-deficiency, children aged 6–12 years are considered deficient when their urinary iodine is below 100 µg/litre.

[17] In some situations it is not only diet the only cause of stunting, but the causes are multifactorial. In South Africa, the immediate and underlying causes of malnutrition are reflected by the basic economic and socio-political inequalities leading to inadequate access to basic services such as primary health care, clean water, sanitation and education (Theron, et al, 2006).

[18] Across the world, 2 billion people suffer from one or more micronutrient deficiencies (Burchi, et al, 2011).

[19] Stunting is also a result of lack of access to clean drinking water, education of mothers, breastfeeding practices, health and nutrition programs (or the lack thereof).

relatively high levels of stunting in the case of Egypt (22.3%) despite the apparently very low caloric inadequacy (less than 5%). Even though Egypt has witnessed a remarkable increase in dietary caloric intake in recent years (encouraged by high subsidies), the bulk of the diet is dominated by cereals and other basic products (sugar and oil) that are energy rich but micronutrient poor. Indeed the prevalence of anaemia and vitamin A deficiency remain high in Egypt. Legumes and cereal grains which are the main staples of poor households often contain "antinutrients" (such as phytates) which inhibit the absorption of essential micronutrients, especially iron and zinc (Welch and Graham, 2002). In slums in urban areas and isolated rural areas where poverty is prevalent, access to basic services, such as antenatal care and clean water, is lacking, so that human development indicators are considerably below the national average. For instance, a child in rural Upper Egypt is 3.4 times less likely than a child in urban Lower Egypt to attend primary school (World Bank, 2012a).

Table 3.3.2 Correlation between stunting and food inadequacy/deficiencies in the Arab region

	Prevalence of stunting among children	Prevalence of food inadequacy	Prevalence of deficiencies among children		
			Anaemia	Vitamin A	Iodine
Prevalence of stunting among children	1.00	0.83	0.77	0.56	0.14
Prevalence of food inadequacy		1.00	0.79	0.56	0.02
Prevalence of anaemia			1.00	0.63	0.35
Prevalence of vitamin A deficiency				1.00	0.48
Prevalence of iodine deficiency					1.00

Source: Calculated by the author, based on data in Table 3.3.1.

In general, the increasing urbanization that the region experienced in recent years is associated with a number of positive socio-economic trends with important impact on human welfare including on nutrition. In particular, there is an observed substantial improvement in the nutritional status of children as countries become more urbanized[20]. Except for breastfeeding practices, which are generally more prevalent among rural mothers, children's diets in urban areas are generally more diverse and more likely to include nutrient rich foods such as meat, dairy products and fresh fruits and vegetables (Ruel, 2000; Arimond and Ruel, 2002). An analysis of 11 demographic and health surveys show the consistently higher intake of milk and meat products by toddlers in urban areas compared with rural areas (Arimond and Ruel, 2004)[21].

Better access to food in urban areas leads to stark reductions in child mortality rates, which is followed by a rapid reduction in fertility rates. As seen from Annex 3, there is a high negative correlation between urbanization and mortality rates (maternal and children under 5 years). The same high and negative correlation is observed between urbanization and fertility rates, indicating perhaps that urbanization is an inevitable evolution in the transition to lower population growth. Life expectancy is also positively correlated with urbanization, while the proportion of the population of less than 15 years is less as

[20] On average, the prevalence of underweight children was higher in rural areas than in urban areas in 82 out of 95 developing countries for which data were available (UNICEF, 2013). For a detailed discussion on these and other assessments, see also FAO (2013a).

[21] Yet, there seem to be exceptions to that, as for example in Egypt, where urban child stunting has been increasing and is now as high as in rural areas. One reason is the often the chaotic growth of urban slums and "migration into poverty" by rural populations.

countries become more urbanized. These tendencies are observed consistently for both the Arab region and more generally for the world as a whole.

The generally positive association of urbanization with more favourable socio-economic trends compared to rural areas appears to be the result of the cumulative effect of a number of complimentary factors, which amplify the effect of a better access to food as well as other basic amenities. Among the key socio-economic factors is the much higher education of urban mothers as well as considerably higher decision-making power than their rural counterparts (Garrett and Ruel, 1999; Menon, et al, 2000).

The positive influence of women's education on several aspects of human welfare is evident also in the correlation statistics provided in Annex 3. Thus, for example, high enrolment of girls in primary and tertiary education is associated with low fertility rates, low mortality rates (maternal and under 5 years) and high life expectancy at birth. Other important corroborating factors, evident from the correlations given in Annex 3, include greater access to drinking water and sanitation which are associated with better demographics and other statistics indicative of improved human welfare for urban children compared to their rural counterparts[22]. Again, these strong positive correlations are evident in both the countries of the Arab region and the world as a whole.

3.3.3 Prevalence of obesity among the highest in the world

In 2008, 35% of adults worldwide over the age of 20 were overweight (BMI ≥ 25 kg/m2) [23]. An estimated 205 million men and 297 million women over the age of 20 were obese (BMI ≥30 kg/m2) in 2008, corresponding to 10% of men and 14% of women in the world. These compare with prevalence of obesity of 5% for men and 8% for women in 1980, implying nearly double levels in the span of a generation.

The prevalence of overweight and obesity is increasing in nearly all countries, including low-income countries where it coexists with high rates of undernutrition and micronutrient deficiencies. Obesity in the Arab region is among the highest in the world with nearly one-quarter of the population of the region being obese (Table 3.3.1). This is double the world average, slightly above the prevalence in developed countries and nearly three times that of developing countries as a whole[24]. Within the Arab region, the GCCs have the highest prevalence of obesity averaging 33% (ranging from 22% for Oman to a staggering 42% for Kuwait), followed closely behind by Mashreq at about 31% (largely on account of Egypt at 33%), Maghreb with 17% (ranging from 16% for Morocco to 28% for Libya) and finally the LDCs of the region with about 9% obesity rate (ranging from 4.4% for Comoros to 14.5% for Yemen).

Globally, obesity of women is generally higher than men's, with the exception of high income countries where they are about equal. In low and lower middle income countries, the obesity of women is significantly higher than men's, approximately by a factor of two[25]. Poorly educated women are two to three times more likely to be overweight than those with high levels of education, but almost no disparities are found for men as regards this trait (OECD, 2012).

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[22] While the generally greater availability of food in the cities together with dietary diversity improves micronutrient intake, the health implications of urban living also critically depend on the availability of other basic amenities such as clean water, sanitation and basic health services, as well as basic nutritional education. To the extent these essential amenities exist or can be expanded fast enough to ensure broad coverage of growing urban populations, the adverse effects of urban living can be minimized.

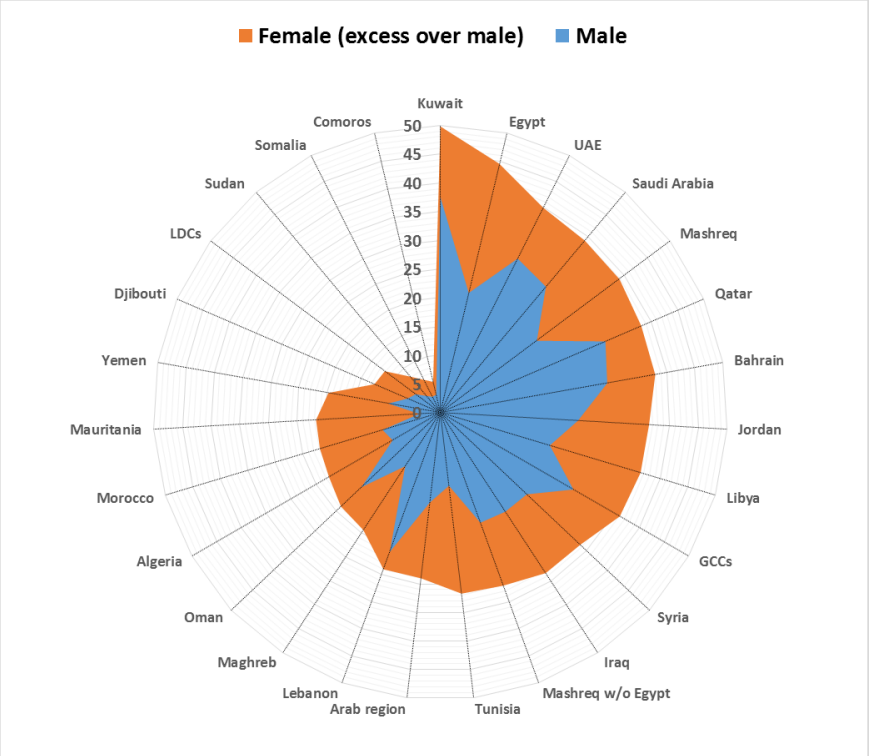
[23] Overweight and obesity, defined as abnormal or excessive fat accumulation that may impair health (WHO, 2013), are most commonly measured using the body mass index (BMI=body weight in kilograms/height in meters squared).

[24] Other regions with high levels of obesity include the Pacific Islands, Central and South America, Northern America and Southern Africa.

[25] www.who.int/gho/ncd/risk_factors/obesity_text/en/.

These gender obesity differences generally observed elsewhere are very much pronounced in the Arab region with an average prevalence of obesity of nearly 30% for women compared to about 16% for men (Figure 3.3.1). Within the sub-regions, the greater gender differences are to be found in the Maghreb and the LDCs sub-regions (with the highest in Mauritania where the prevalence of obese women is over five times that of men, albeit both at relatively low levels), followed by Mashreq (especially Egypt with nearly two to one) and finally the GCCs (with about 30% more obese women than men). The only country of the region with nearly a gender equality as regards obesity is Lebanon.

Figure 3.3.1 Obesity prevancences in 2008 in the Arab region by gender (%)



Source: Compiled from WHO data <www.who.int/nmh/countries/en/>

Identifying the causes of obesity is important in the search for preventive measures. Fundamentally, obesity is the result of an energy imbalance between calories consumed and calories expended. Changing lifestyles everywhere in the world have resulted in increased intakes of energy-dense and convenience foods that are high in fat, and a reduction in physical activity due to an increasingly sedentary lifestyles both at work and at home. In identifying the underlying factors for these trends, studies from developed countries have pointed, inter alia, to (a) *supply-side factors*, including: the changing roles of the industries that supply lifestyle commodities, increasingly sophisticated use of promotion and persuasion methods to entice consumption and changes in productivity dynamics that have changed relative prices in favour of processed food products; (b) *government policies*, including: subsidies and taxation affecting the prices of food commodities, public transportation policies some of which have encouraged the use of private cars, urban planning policies without provision of facilities for physical activity and other infrastructures that promote healthy lifestyles; and (c) c*hanges in working conditions*, including: decreased physical activity at work due to changes in the nature of human activity, greater work-related stress, job insecurity and longer working hours (OECD, 2010).

While the above identified factors responsible for increased obesity are based on evidence from OECD countries, they are increasingly applicable to many countries of the Arab region. Of particular relevance is the role of government policies, especially untargeted subsidization of food commodities. In fact, for some countries of the Arab region food subsidies are seen as being primarily responsible for increasing obesity.

3.3.4 Heavy social and economic costs of malnutrition [26]

Malnutrition, irrespective of its causes, is associated with social and economic costs both in cases of undernourishment and in cases of overweight and obesity.

Good nutrition is the foundation for human health and well-being, physical and cognitive development, and economic productivity. Nutritional status is a critical indicator of overall human and economic development, and good nutritional status is an essential social benefit in its own right. As an input to social and economic development, good nutrition is the key to breaking intergenerational cycles of poverty, because good maternal nutrition produces healthier children, who grow into healthier adults. Good nutrition reduces disease and raises labour productivity and incomes, including of people working in agriculture.

The economic costs of undernutrition are cumulative through an inter-generational life cycle of deprivation. Stunted girls grow up to be stunted mothers, and maternal stunting is one of the strongest predictors for giving birth to a low-birth-weight infant. Maternal and child malnutrition thus perpetuate the cycle of poverty. Micronutrient deficiencies also impose significant costs on society. For example, the median total economic loss due to physical and cognitive impairment resulting from anaemia was estimated at 4% of GDP for ten developing countries (Horton and Ross, 2003).

The economic costs to society from undernutrition arise through its negative effects on human capital formation (physical and cognitive development), productivity and economic growth. Such costs may reach as high as 2–3% of global GDP, but can be much higher in individual countries than the global average implies. In absolute amounts the global cost of undernutrition has been roughly estimated at US$1.4–2.1 trillion (World Bank, 2006).

Overweight and obesity also impose economic costs on society directly through increased health care spending and indirectly through reduced economic productivity. A high body mass index is recognized as increasing the likelihood of incurring various non-communicable diseases and health problems, including cardiovascular diseases (high blood pressure, high blood cholesterol and other lipid disorders), type-2 diabetes, osteoarthritis and increasing risk of cancer of the breast, colon, prostate, endometrium, kidney and gall bladder (WHO, 2011).

In terms of direct economic costs, the obese tend to have more days of absence from work, a lower productivity on the job and a greater access to disability benefits than people of normal weight. An obese person incurs 25% higher health expenditures than a person of normal weight in any given year. Negative externalities linked to obesity include also other costs not being fully reflected in private costs such as, for example, the additional costs to health systems of obesity related diseases or to hospitals of having to buy equipment to cope with larger patients. It has been estimated that obesity is responsible for 1-3% of total health expenditures in most OECD countries (5-10% in the United States) (OECD, 2012)[27]. Externalities are also associated with the social mechanisms which make unhealthy behaviours spread within families, social networks and peer groups as a true multiplier effect (OECD, 2010).

[26] This discussion is based largely on FAO (2013a).

[27] There is no conclusive evidence, however, as to whether the additional health care expenditures generated by obesity may or may not be offset by decreased expenditures due to a reduced life expectancy of an obese person.

All in all, although comprehensive estimates of productivity losses and health costs associated with all types of malnutrition does not exist, an estimate based on partial estimates suggest a very heavy toll of malnutrition in all its forms. This very rough estimate of the cost amount to a staggering US$2.8–3.5 trillion, equivalent to 4–5 percent of global GDP, or US$400–500 per person[28].

Beyond monetary considerations, society pays a high price from malnutrition in terms of premature deaths. WHO estimates that at least 2.8 million people worldwide die each year as a result of being overweight or obese. Simple extrapolation of these global deaths to the Arab region (based on the relative population and obesity rates) yields some 360,000 deaths annually for the region that may be attributed to overweight and obesity.

Box 1. Overlapping dimensions of malnutrition in the Arab region

While undernutrition, micronutrient deficiencies and obesity were discussed separately above, these different aspects of malnutrition often overlap. In the typology characterizing malnourished populations developed by FAO (2013a) and further elaborated in WFP/ODI (2015), four groups of countries (not mutually exclusive) of multiple burdens of malnutrition were identified.

The first category includes countries where rates of child stunting, maternal undernutrition and micronutrient deficiencies are widespread and at moderate or severe levels as classified by WHO. The six LDCs of the Arab region all fall under this category: Comoros, Djibouti, Mauritania, Somalia, Sudan and Yemen. Areas in prolonged and complex emergencies in these and other countries are most seriously affected.

The second category includes countries where stunting rates have declined but significant malnutrition remains, particularly high levels of acute and chronic child malnutrition, widespread micronutrient deficiencies and emerging overweight obesity and malnutrition of affluence in certain socio-economic groups. These countries illustrate that simply increasing the energy content of diets, is not sufficient to provide the necessary quantity and range of micronutrients. Countries that fall under this category include Algeria, Morocco, Iraq and Yemen, and some population subgroups in Palestine, Tunisia and the GCCs.

The third category includes countries in early nutrition transition (traditional diets high in cereals and fibre), where undernutrition, moderate stunting and micronutrient deficiencies, and moderate levels of overweight and obesity occur simultaneously. Countries that fall in this category include Egypt, Libya, Iraq and Syria but also specific population and age groups in Jordan, Lebanon, Morocco and Palestine.

Finally, the fourth category includes countries in advanced nutrition transition (diets with high sugar and fat content) where the prevalence of stunting has declined but micronutrient deficiencies remain in some population subgroups and obesity is a significant problem. Countries and population subgroups that fall under this category include Tunisia, Kuwait, Lebanon, Oman, Saudi Arabia and UAE.

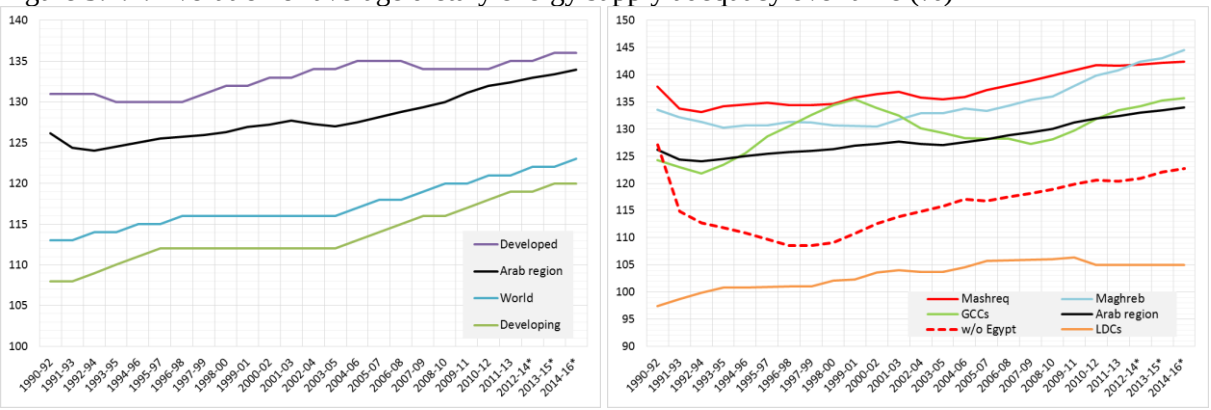
[28] Of which, US$1.4–2.1 trillion for undernutrition and micronutrient deficiencies, and US$1.4 trillion for non-communicable diseases.

3.4 Stability of food supplies in the Arab region and threats from climate change

3.4.1 Important differences in the stability of food supplies within the Arab region

Over the past 25 years the average supply adequacy of the Arab region shows a steady trend and one that is gradually 'catching up' to the average level of developed countries (Figure 3.4.1). Year-to-year fluctuations are small at the aggregate regional level, as is also the case for the aggregate of other world regions. However, this overall picture changes when the region is seen at a more disaggregated level. The historical record reveals important differences within the Arab region, notably: the sharp dive in average supply adequacy for the Mashreq w/o Egypt sub-region during the 1990s largely on account of conflicts in Iraq, the large gains experienced by the GCCs during the second part of the 1990s linked to increased petroleum revenues, and the relative stagnation of average supply adequacy in the LDCs of the region. In fact, the latter have experienced a worrisome downward trend in average supply adequacy during the past decade.

Figure 3.4.1. Evolution of average dietary energy supply adequacy over time (%)



Source: FAOSTAT Food Security Indicators

3.4.2 Growing conflicts aggravating short-term food insecurity in the region

The prevalence of national and regional civil and military conflicts and violence seriously aggravates food insecurity in the region[29]. Several countries of the region have been subjected to appalling warfare in recent years. Most of these conflicts are protracted and have inflicted a heavy toll on all aspects of human welfare, including heavy loss of life, displacement of large segments of the population, devastation of livelihoods, severe deprivation and systemic food insecurity. By far, the region is afflicted by the highest number and intensity of conflicts in the world (Breisinger et al, 2013).

Beyond the long standing food security structural causes, conflicts and civil insecurity remained the single most important driving factor of food insecurity in the region in recent years. For instance in parts of Yemen, Afghanistan, Somalia, Sudan, Iraq, Pakistan, Syria and neighbouring affected countries, the increase in the number of food insecure was mainly due to the on-going conflicts. Several assessments and studies by FAO, WFP and IFPRI[30] in some of the countries experiencing conflict and civil insecurity confirm the existence of large number of people in extreme food insecurity. Within Syria, for instance, it is now estimated that 6.8 million people are acutely food insecure and are in need of humanitarian assistance, including 5 million internally displaced persons (IDPs). Similarly, the countries affected by the Syrian crises continue to receive influx of refugees in border communities. The total number of

[29] This section is largely based on ESCWA (2010).
[30] Examples of these assessments include FAO (2013c) and FAO, WFP and the Government of Syria (2012).

registered Syrian refugees has reached more than 1.4 million as of May 2013. These refugees are mostly residing in Turkey, Iraq, Jordan and Lebanon.

Conflicts have a direct and indirect effect on food security, undermining it through various channels. Direct effects include razing farm land, spreading cluster bombs and mines, killing livestock, destroying machinery and blockading access to markets. Conflict disrupts access to markets by both consumers and producers. It discourages investment into agricultural modernization, thereby reducing the availability of food. It strips government of tax revenues that prevent the establishment of social safety nets. In addition to constraining economic growth, natural resource scarcity plus projected strong impacts of climate change may also exacerbate conflicts in the region. Furthermore, conflict deteriorates the environment for the utilization of food. The political and economic ramifications of conflict beyond its geographic borders is an important indirect effect as well, which is manifested in refugee migration, the deterioration of regional investment climate and the crowding out of pro-growth policy priorities that would otherwise receive more attention.

Food insecurity and more generally resource scarcity, and the outbreak of conflicts are mutually reinforcing, although the general causality usually goes from conflict to food insecurity. Consequently, while food insecurity has historically not been necessarily a major source of conflict in the region, it can act as a "threat multiplier" by adding pressure to people who already suffer from problems of underdevelopment, marginalization, repression or conflict. Consequently, providing greater food security could well be a source of conflict mitigation.

3.4.3 Climate change poses a serious threat to the region's longer-term food security

Climate change is an especially pressing issue for the predominantly dry countries of the region which are already prone to frequent droughts and a looming water supply shortage. Climate change presents a great risk to food security and poverty reduction in the region, threatening to unravel many of the development gains that have been achieved (World Bank, 2012b). The majority of countries in the region have a high dependency on climate-sensitive agriculture. In Algeria, Iraq, Jordan, Lebanon, Libya, Mauritania, Morocco, Sudan, Syria, Tunisia, and Yemen, rain-fed agriculture is practiced on more than half of all arable land. In the Maghreb, Sudan, and Yemen, at least 80% of cereal production is rain-fed, and in the Mashreq, from one-half to two-thirds of cereal production is rain-fed (World Bank et al, 2009).

Over the last century, the Arab region has experienced an increase in mean temperatures of up to 0.5°C, with significant increases of 0.5° to 3°C in Morocco, Algeria, Tunisia and Saudi Arabia. In some countries like Sudan and parts of North Africa, precipitation has decreased by up to 10% in recent decades (UNDP, 2011).

Assessments by the UN Intergovernmental Panel on Climate Change (IPCC) show that most of the region is expected to become hotter and drier in the future due to climate change (IPCC, 2007). IPCC simulation models indicate that average yearly rainfall could decrease by 10% in the next 50 years. With higher temperatures (causing increased evaporation) and reduced precipitation, loss of surface water would be accelerated and droughts would become more frequent. IPCC simulation models estimate that an increasing number of people will be exposed to water stress in the future (an additional 80 million to 100 million people by 2025) putting more pressure on already depleted groundwater resources. With increasing temperatures and decreased water, crops would fail to reach maturity due to lack of enough moisture in the soil. A warmer climate would also increase crop losses caused by weeds and diseases.

As a result of these climate-change related developments, already low average yields of rain-fed crops would decline and be more variable. Agricultural output could decrease by 21% by 2080 and in countries like Morocco and Algeria the drop could even reach 40% (Cline, 2007). It is usually the most marginalized farmers and herders who depend most on rain-fed agriculture, particularly in the drier areas. These groups could be further marginalized and impoverished by the negative effects of climate change. At the same time, the high salt content in much of the available water, would further complicate irrigation efforts, limiting the potential for additional development of irrigated agriculture in the region.

Climate change could affect all aspects of food security. Aggregate food supplies could be adversely affected, as climate change would reduce availability of arable land and productivity as a result of a decline in rainfall, increased desertification, droughts and floods. For the affected regions, this could be the perpetrator for increasing food prices and market volatility and aggravating poverty especially of rural communities[31]. Climate change also creates concerns about food distribution and utilization of food as it exacerbates pre-existing social competition over scarce resources and induces new conflicts within society (UNDP, 2011). Finally, it could place additional strain on social welfare and food safety nets, limiting the ability of poor and vulnerable people to meet their food needs. Potentially, the numbers of food insecure could increase considerably.

In terms of other economic impacts, changes in temperature and precipitation patterns may result in damage to tourism and other strategic economic sectors with growth potential such as value-added agriculture. Climate change also poses many challenges to the region's cities which represent hubs for economic, social, cultural and political activities. Rising sea level could affect 43 port cities (24 in the Middle East and 19 in North Africa). In case of Alexandria, Egypt, a 0.5 meter rise would leave more than 2 million people displaced, with $35 billion in losses in land, property, and infrastructure, as well as incalculable losses of historic and cultural assets[32].

[31] As substantial net food importers, countries of the region could be doubly affected by climate change, both through world market price increases and reduction in their domestic food production potential (World Bank, 2013).

[32] World Bank, web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/MENAEXT/0,,contentMDK:21596757~pagePK:146736~piPK:146830~theSitePK:256299,00.html

IV GROWING FOOD IMPORT GAP AND IMPLICATIONS FOR ITS SUSTAINABILITY

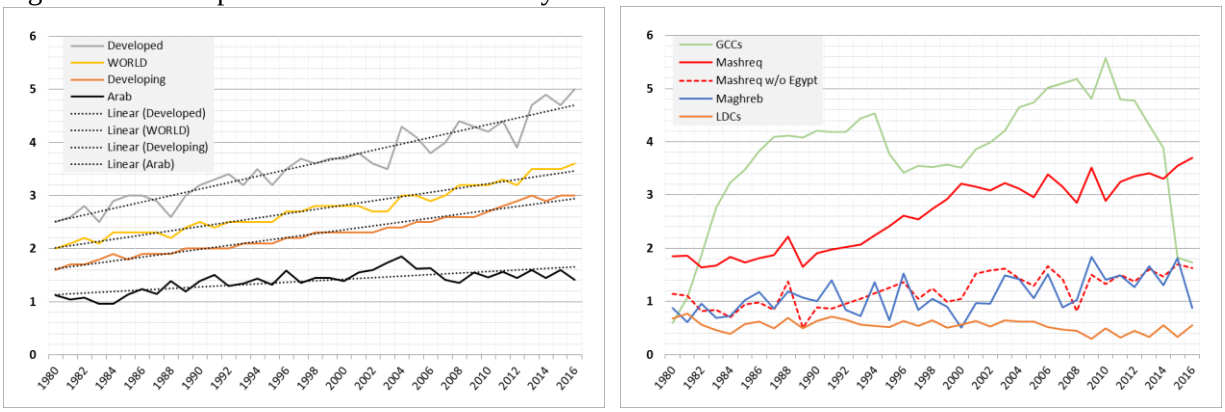
As a consequence of the high population growth rates, increasing urbanization and growth in incomes, demand for food in the region has expericenced high growth rates over the past decades, largely met by imports. For a region increasingly dependent on the world market to meet its basic food needs, two factors aggravating this situation stand clearly out: low productivity of basic food commodities and the high food losses and waste along the food supply chain.

4.1 Low and stagnating productivity in domestic food production in the region

Considering the continuing importance of agriculture in the economies of the region, a vibrant agricultural sector can contribute to food security in various ways: it can increase the purchasing power of the rural poor via higher incomes from increased farm output enabling them to buy food; it can increase domestic food supplies and hence reduce the need for imports; and it can produce agricultural exports of crops in which Arab countries have comparative advantage thus generating foreign exchange to finance remaining food deficits. Yet, for a variety of reasons, domestic food production (and agricultural production in general) has suffered from low levels of productivity.

The Arab region overall compares very unfavourably to other world regions in terms of productivity gains. Historically, the region had much lower yields than other parts of the world due to less favourable climatic conditions and limited resource endowments of land and water, however, what has been observed with the passing of time is that this productivity gap widens. Actual performance in cereal yields going back to the 1980s show that gains in the Arab region have been very modest compared to those of the world as a whole or those of other developing countries (Figure 4.1.1a).

Figure 4.1.1 Comparisons of trends in cereal yields



Source: FAO CCBS database.

Within the Arab region there are huge differences as regards productivity gains between the different sub-regions. Mashreq, which accounts for the bulk of the area devoted to cereal production in the region and harvests the lion's share of cereal output (close to 70%), has achieved yields consistently much higher (about double) than those of the other sub-regions. However, this performance is due to Egypt, as Mashreq w/o Egypt has much lower yields, similar to the other sub-regions (Figure 4.1.1b).

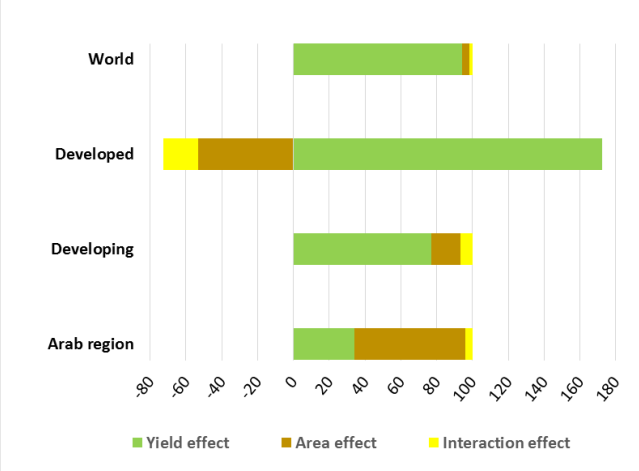
These differences in productivity are driven basically by irrigation. While Maghreb, Mashreq w/o Egypt and the LDCs of the region rely heavily on rainfed wheat production, the much higher yields of Egypt are due to irrigation. The apparently impressive performance of the GCCs is mainly due to the resource-

intensive and expensive production systems in Saudi Arabia[33] based on underground fossil water supplies. However, as underground water supplies were severely depleted, Saudi Arabia adopted in 2008 a major shift in policy to phase out all wheat production in eight years. Wheat production has plummeted since then and the country is relying exclusively on imports since 2016.

The most worrying case in the Arab region is that of the LDCs where yields are not only a fraction of what is achieved elsewhere but remain stagnated at desperately low levels and have been declining during the past decade.

Historically everywhere in the world, expansion of food production has come first from increasing the area under cultivation followed by inceasing productivity, as area suitable for cultivation became scarce. With few exceptions, this shift from extensive to intensive exploitation of the land has hardly taken place in the region. In fact, due to the very poor performance in productivity gains in the region, any increase in cereal output continues to come largely from area expansion (Figure 4.1.2)[34]. During the 20-year span from 1990-96 to 2010-16, the contribution of yields to the gains in cereal production of the Arab region was only 37% compared to 95% for the world overall, some 75% for the developing countries and a staggering 173% for developed countries. In contrast, the main increase in cereal production in the Arab region overall has come from area expansion (67% of the increase between 1990-96 and 2010-16), compared to 5% for the world as a whole and actually a substantial contraction in area under cereal production in the developed countries.

Figure 4.1.2. Area and Yield contribution to cereal production increases from 1990-96 to 2010-16 (%)



Source: Computed by the author based on FAO CCBS database.

[33] In the 1980s, Saudi Arabia began pumping fossil water from deep underground, allowing it to farm the desert. By subsidizing wheat production at several times the world price, Saudi Arabia became the second largest Arab wheat producer in the early 1990s. At its peak, Saudi Arabia harvested more than twice the wheat it consumed, realizing substantial exportable surpluses, albeit at the expense of scarce subterranean water resources.

[34] The increase in quantity produced between two time periods can be decomposed into effects attributed to yield increase, effects attributed to area increase and the combination of these two factors. The related formula is as follows:

$$Q2-Q1 = A2*Y2 - A1*Y1 = A1*(Y2-Y1) + Y1*(A2-A1) + (Y2-Y1)*(A2-A1)$$
$$= \text{Yield effect} + \text{Area effect} + \text{Interaction effect}$$

where :

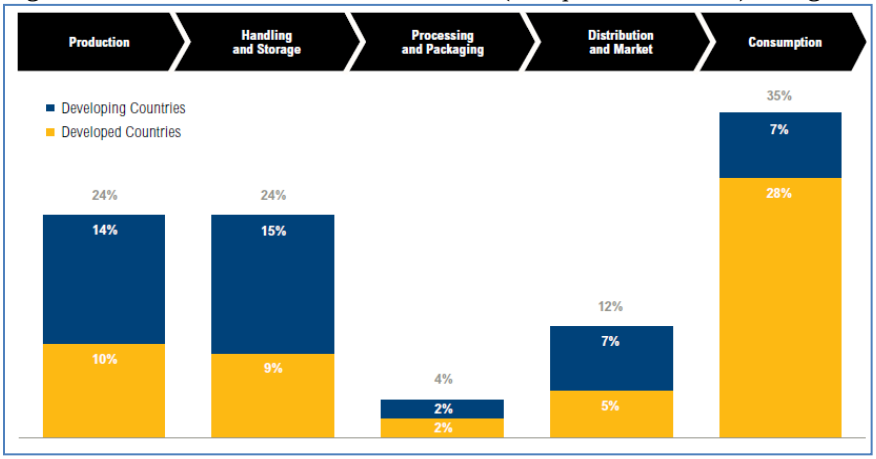
Q, Y and A are quantity produced, yield realized and area harvested, respectively, and subscripts 1 and 2 correspond to averages of periods 1990-96 and 2010-16, respectively. In cases of constant area harvested the area effect is zero and the yield effect is ±100%. In cases when yields are constant, the yield effect is zero and the area effect is ±100%. The reality is always somewhere in between, whereby both area and yield vary between the two periods (not necessarily increasing) which results in a positive interaction term (if changes in are and yield are of the same sign) or a negative one (if of the opposite sign).

4.2 Large food losses and waste

Food losses and waste are caused by a multitude of factors related to the type of commodity, the nature and length of the supply chain, the quality and quantity of infrastructure along the supply chain (storage type, product handling and preservation techniques, transport and distribution systems), as well as social and cultural consumption habits by the population.

It has been estimated that between 30-40% of edible food produced for human consumption annually is lost or wasted globally[35]. Food is wasted throughout the food supply chain, from the farm to the final consumer (Figure 4.2.1). Globally, the processing, distribution and consumption stages of the supply chain account for more than 50% of these losses, of which the bulk actually is food waste, as it occurs at the final stage of the supply chain (consumption stage).

Figure 4.2.1 Global food losses and waste (1.5 quadrillion kcal) along the supply chain



Source: WRI (2013) based on elaboration of data in FAO (2011a)

In the industrialized countries, more than 60% of the total food losses (in kcal terms) occur at retail and consumer levels, while in developing countries more than two-thirds of total food losses occur at post-harvest and processing levels, before retailing and consumption. In terms of commodities responsible for food losses and waste, it is estimated that cereals account for the largest part estimated at 53% globally (in kcal terms). Another important food item in terms of losses and waste are fruits and vegetables (13%), followed by other food commodities. Of the total production worldwide, between 25-30% of cereals produced is lost or wasted, for fruits and vegetables about 50%, for oilseeds between 20-25% and for meat over 20% (FAO, 2011a).

The countries of the Arab region are rather diverse in terms of the commodities subject to greater food loss and waste as well as the stage of the supply chain where such losses occur. One general characterization of the problem for different countries would suggest that in those countries which import most of the food products they consume, the bulk of the losses are at the final stage of the supply chain related to consumption. This is typically the case for the GCCs while, on the other hand, for those countries that produce most of the food they eat (e.g. the LDCs of the region), losses are concentrated more on the post-harvest stage.

[35] The main sources of the magnitude of food losses and waste are FAO (2011b) and WRI (2013), which elaborated further on the numbers contained in FAO study, as well as selected assessments of losses from the countries of the region.

The implications of this phenomenon of excessive food waste are many and very important for the countries of the Arab region. In the first place, there is the direct link to wasting very scarce natural resources that the countries hardly can afford. Not only wasted food squanders scarce natural resources for its production, it also presents a serious environmental problem for its disposal. For example, food waste accounts for an estimated 28% of all waste in Saudi Arabia[36]and waste management of discarded food has become a main concern of the relevant authorities. In addition to its large volume, waste management cannot be dealt with properly, as the food waste is not separated from other waste. Excess food is an untapped energy source that mostly ends up rotting in the landfills and releasing harmful greenhouse gasses into the atmosphere[37].

Another problem is the economic cost of the wasted food, especially seen in the context of the efforts being made by governments to subsidize consumption. The opportunity cost of such government expenditures going to waste is high. Both private and public money spent on wasted food could instead be spent on goods and services that make a positive contribution to human welfare. The generous subsidies on food are often identified as one of the main reasons of food waste, contributing also to the undesirable trends in recent years of overweight and obesity (discussed above). All in all, food losses and waste is one of the most important food and nutrition security issues in several countries of the region, both from an ethical, social and economic perspective.

While there have been greater awareness in recent years about the seriousness of the problem of food losses and waste from the perspective of global food security, precise data are lacking. What is reported above is based on estimates of the order of magnitude of the related losses, supplemented by a few available commodity and location-specific individual assessments. Also, because they are very difficult to measure and subjective, much less is known about qualitative losses such as deterioration of nutritional quality and consumer acceptability of spoiled products. Despite this lack of precise quantitative and qualitative information about food losses and waste, the broad characteristics of the situation in individual country situations are generally adequately understood for governments to take corrective action.

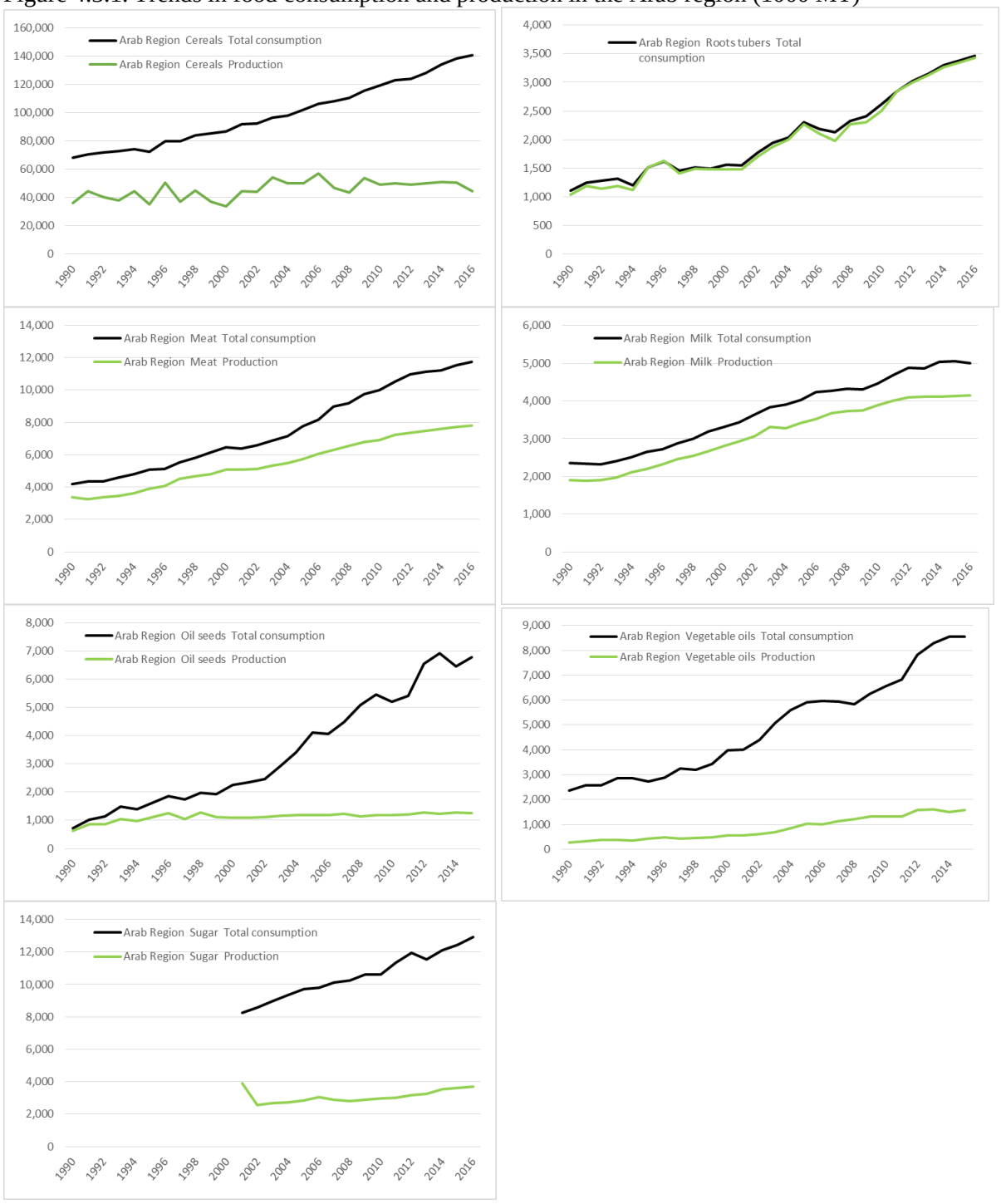
4.3 Increasing food import dependency

Largely due to very small productivity gains, food production has not matched the growth in food consumption in the Arab region, aside from starchy roots & tubers and vegetables, where there is near self sufficiency. Production of cereals has leveled off since the 1990s while consumption has kept its ever increasing trend and the gap between the two is widening (Figure 4.3.1). The same pattern is also evident in other basic food commodity groups such as pulses, sugar, oilcrops and vegetable oils. This is also the case but to a lesser degree, for meat and milk. Even though production of the latter has been increasing at impressive rates, it has yet to bridge the gap with consumption which has also registered high growth rates since the 1990s.

[36] According to a paper by Yousef Al-Saif, undersecretary of the Ministry for Municipal and Rural Affairs. Others have reported that 35% of the garbage is constituted by food material in the KSA. www.zawya.com/story/Saudi_Arabia_plans_foodsaving_panels_soon-ZAWYA20160123034056/

[37] Water Wastewater & Environmental Management, Nov 01 2012. “Food is the largest waste in Saudi Arabia”,. www.pollutionsolutions-online.com/news/waste-management/21/breaking_news/food_is_the_largest_waste_in_saudi_arabia/22804/#sthash.ZIOgO1Lx.dpuf

Figure 4.3.1. Trends in food consumption and production in the Arab region (1000 MT)



Source: FAOSTAT

At the aggregate regional level during the 10-year period from 2004-06 to 2014-16, the gains in per capita consumption in the Aab region have been modest and generally similar or below those realized by developing countries overall (Table 4.3.1). It follows that in general the factor that contributed most to the increase in the aggregate quantities consumed is not so much due to improvements in diets but to

feed the additional population in the Arab countries. It also follows that as population growth rates are well above domestic food production growth rates, the developing gap has to be met by increasing imports.

Among individual commodities, the highest dependence of the region on the world market is in **oilseeds** and **vegetable oils** where over 80% of all consumption was imported during 2014-16 (Table 4.3.1). The marginal improvement in the self-sufficiency ratio (SSR) of vegetable oils in this last period compared to 2004-06 may be due to an increasing share of imported oilseeds for domestic processing. Indeed, the SSR of the latter has declined from 34% in 2004-06 to just 18.7% in 2014-16, indicative of a pattern whereby the growth in production in one commodity may affect the importation of another commodity used as the input. While there appears to be a trend in the region towards the importation of the raw material and precessing oil locally, this is hardly hapenning in the LDCs of the region where a mere 4% of vegetable oils consumed are produced locally. This may be indicative of limitation in crushing and pressing plants in these countries.

From the food security perspective, the most important food commodity group for which the region continues to be heavily dependent on imports is **cereals**. In the aggregate, the region imported 65% of its consumption in cereals in 2014-16 up from just 50% ten years earlier. This increased dependence is due to several factors, coming both from the demand and the supply side. On the supply side, the under-performance in productivity gains, inter alia due to resource limitations, was discussed under 4.1. On the demand side, increased consumption as a result of food subsidies may have been partly responsible for these observed reductions in SSRs. Finally, a similar situation to that of the oilseeds sector is also evident, whereby the policy of increasing meat and milk production in many countries of the region depended largely on intensive production units, with cereals (coarsegrains) being the main feedstuff.

Table 4.3.1 Per caput consumption and self-sufficiency ratios in the Arab region

	Per capita consumption			Self-sufficiency ratio (SSR)		
	2004-06 (kg/year)	2014-16 (kg/year)	Annual gr rate (%)	2004-06 (%)	2014-16 (%)	Annual gr rate (%)
Cereals						
Mashreq	369.2	373.2	0.1	58.8	47.1	-2.2
Mashreq w/o Egypt	308.9	288.4	-0.7	49.5	40.4	-2.0
Maghreb	354.5	447.2	2.4	46.8	30.8	-4.1
GCCs	419.5	426.3	0.2	22.4	2.5	-19.7
LDCs	151.6	154.7	0.2	53.0	47.4	-1.1
Arab region	**321.6**	**345.5**	**0.7**	**50.2**	**35.2**	**-3.5**
Developing	237.4	274.7	1.5			
Developed	596.0	637.6	0.7			
World	311.1	343.8	1.0			
Roots & Tubers						
Mashreq	7.3	9.0	2.1	112.9	102.5	-1.0
Mashreq w/o Egypt	6.8	5.6	-1.9	113.4	96.2	-1.6
Maghreb	10.8	16.4	4.3	95.8	97.4	0.2
GCCs	4.3	2.5	-5.3	101.6	82.5	-2.1
LDCs	3.0	3.4	1.3	97.1	96.0	-0.1
Arab region	**6.9**	**8.5**	**2.1**	**103.2**	**98.8**	**-0.4**
Developing	26.9	29.9	1.1			
Developed	27.4	24.5	-1.1			
World	27.0	28.9	0.7			
Milk						
Mashreq	10.4	9.8	-0.6	89.8	87.5	-0.3
Mashreq w/o Egypt	10.1	8.6	-1.6	81.0	76.8	-0.5
Maghreb	10.2	13.2	2.6	71.9	76.7	0.6
GCCs	13.2	14.0	0.6	50.6	51.2	0.1
LDCs	19.7	16.0	-2.1	96.1	95.7	0.0
Arab region	**12.8**	**12.6**	**-0.2**	**84.0**	**82.1**	**-0.2**
Developing	8.0	10.0	2.3			
Developed	20.6	20.9	0.1			
World	10.6	12.0	1.2			
Meat						
Mashreq	19.5	24.8	2.4	84.4	71.7	-1.6
Mashreq w/o Egypt	16.7	24.1	3.7	81.1	55.2	-3.8
Maghreb	22.1	28.0	2.4	91.2	89.8	-0.2
GCCs	59.4	63.6	0.7	36.1	28.4	-2.4
LDCs	17.9	17.1	-0.5	94.1	99.5	0.6
Arab region	**24.3**	**28.8**	**1.7**	**74.7**	**67.1**	**-1.1**
Developing	16.5	20.0	1.9			
Developed	52.2	54.3	0.4			
World	23.8	26.6	1.1			
Oil seeds						
Mashreq	10.3	15.5	4.2	26.8	15.9	-5.1
Mashreq w/o Egypt	6.1	9.4	4.4	37.6	26.7	-3.4
Maghreb	12.1	20.5	5.4	25.6	14.5	-5.5
GCCs	16.3	32.5	7.1	0.5	0.2	-8.8
LDCs	8.3	6.8	-2.0	95.2	92.0	-0.3
Arab region	**11.0**	**16.9**	**4.4**	**34.0**	**18.7**	**-5.8**
Developing	38.1	49.9	2.7			
Developed	91.8	116.8	2.4			
World	49.1	62.7	2.5			
Vegetable Oils						
Mashreq	21.4	27.2	2.4	12.2	13.2	0.8
Mashreq w/o Egypt	25.9	32.4	2.3	7.2	8.5	1.7
Maghreb	18.5	22.4	1.9	18.0	23.0	2.5
GCCs	21.2	21.3	0.0	27.0	43.7	4.9
LDCs	7.3	9.9	3.1	6.4	4.1	-4.4
Arab region	**17.4**	**21.2**	**2.0**	**15.2**	**18.7**	**2.1**
Developing	14.8	21.6	3.9			
Developed	29.7	36.6	2.1			
World	17.8	24.5	3.2			
Sugar						
Mashreq	33.3	33.0	-0.1	43.7	44.8	0.2
Mashreq w/o Egypt	32.9	27.8	-1.7	8.7	5.1	-5.2
Maghreb	35.0	35.7	0.2	14.8	15.3	0.3
GCCs	26.1	24.7	-0.5	0.0	0.0	..
LDCs	22.0	28.0	2.4	42.4	25.4	-5.0
Arab region	**30.3**	**31.3**	**0.3**	**33.0**	**28.4**	**-1.5**
Developing	18.0	20.3	1.2			
Developed	34.2	34.1	0.0			
World	21.3	22.9	0.7			

Source: FAOSTAT

As regards **meat** and **milk**, a handful of countries that have been traditionally livestock producers maintain high levels of SSR close to 100%. Among them are the largely pastoral populations of the LDCs that include Sudan, Somalia and Mauritania. Some other countries have increased or maintained their SSRs. Among them, the Maghreb sub-region managed to more or less maintain its SSRs in both milk and meat despite a large increase in per capita consumption in both of these commodities of some 2.5% per annum from 2004-06 to 2014-16. The lowest SSRs for meat and meat are in the GCCs. For meat these countries cover only 28% of their consumption from domestic production, while their SSR for milk actually increased marginally to 51% largely on account of expansion of highly intensive milk production in Saudi Arabia.

Sugar is also an important food commodity in which the majority of the countries of the region are heavily in deficit. Overall, some 72% of sugar consumed in the region was imported in 2014-16, up from 67% ten years earlier. Aside from some countries in the region, notably Egypt in the Mashreq and Sudan in the LDCs which produce a sizeable part of their consumption, all the other countries meet their sugar needs from imports, several of them totally.

Overall, aggregate regional and sub-regional trends in the gap between consumption and domestic production of basic foodstuffs mask a wide variation among countries of the Arab region. It should also be noted that a high/low, increasing/decreasing levels of SSRs do not on their own signify an improvement or deterioration of the food security situation of a country. Clearly, the SSR level is an outcome and not a choice, and it can remain high/increase in a country which does not have the foreign exchange to import enough food to meet growing needs. Hence, SSRs are of limited usefulness in measuring food security. Attaining high SSRs is generally not positively correlated with a high level of food security (the LDCs of the region is a case in point with generally high SSR levels in most commodities but highly food insecure). Conversely, SSRs can remain low/decrease in a country which has no foreign exchange limitations and/or prioritizes food imports vis a vis other consumables.

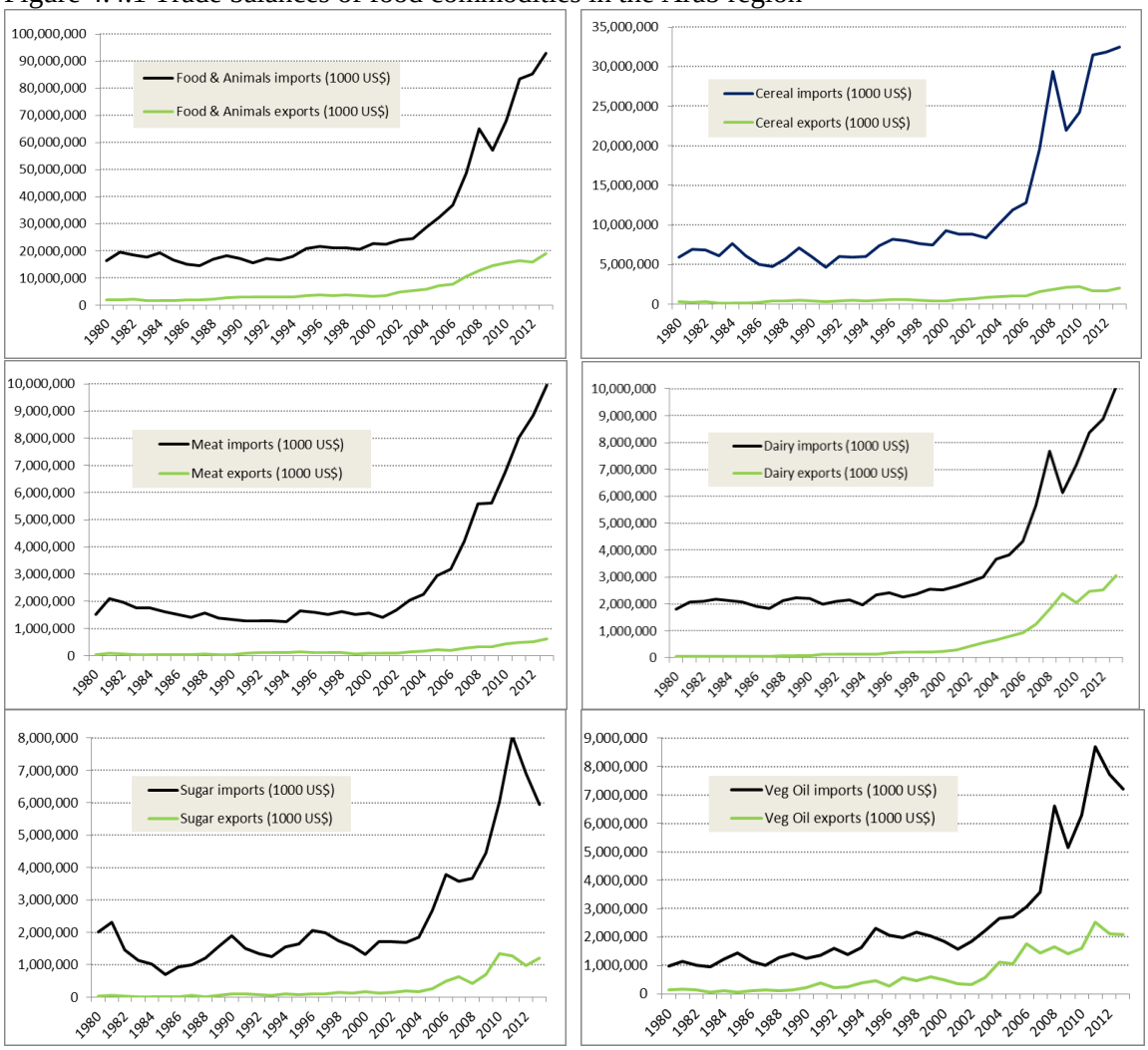
4.4 Burden on national budgets and sustainability of food import dependence

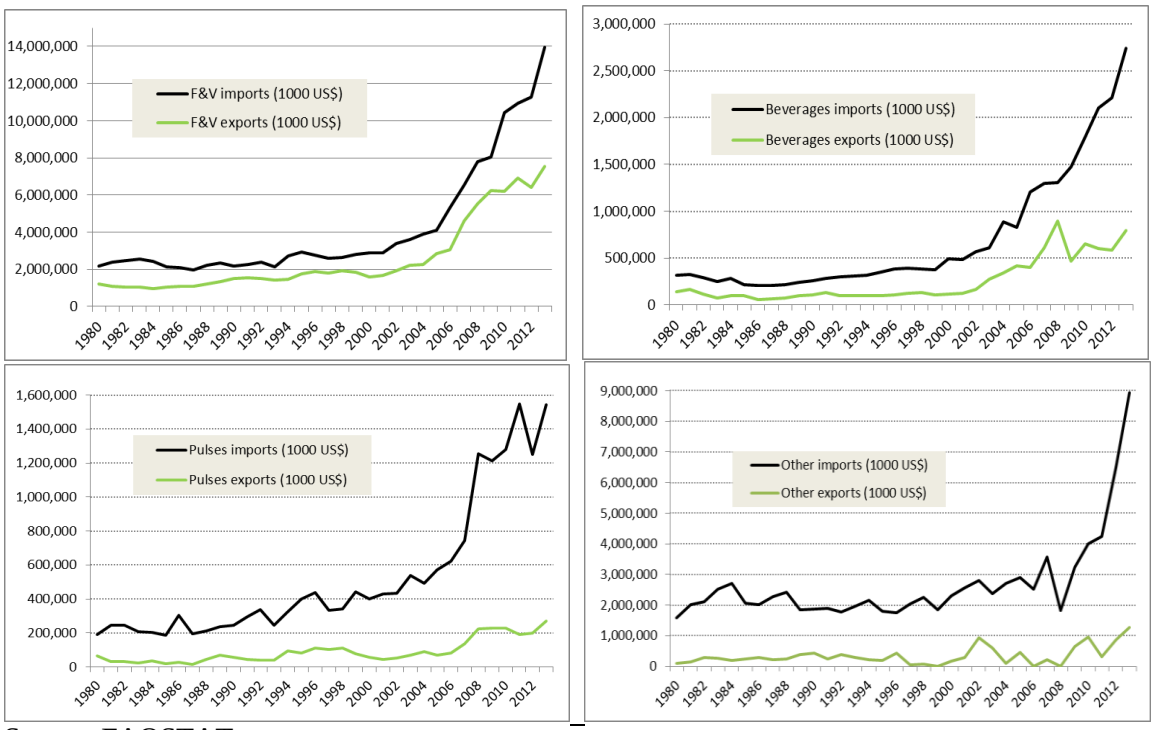
4.4.1 Accelerating food trade imbalances

In view of the growing absolute quantity of food imports by most countries of the Arab region, regional trade imbalances in all food commodity sectors are growing rapidly. The Arab region's imports of food and animal products have been growing exponentially since the 2000s to reach over $90 billion in 2013, the last year for which comprehensive trade value data are available at FAOSTAT (Figure 4.4.1). During the same period the region's food exports also increased but modestly, resulting in an overall trade deficit for food and animal products of some $75 billion.

Cereals are by far the leading item in the food import basket, with an over $30 billion trade deficit in recent years, followed by meat products with an imbalance of over $9 billion, dairy products (some $7 billion), sugar (some $6 billion), vegetable oils and fruits & vegetables (some $5 billion each), beverages (some $2 billion), pulses (some 1.2 billion) and all other products amounting to some $8 billion trade deficit.

Figure 4.4.1 Trade balances of food commodities in the Arab region





Source: FAOSTAT

With limited growth in domestic food production in most countries of the region, the rapid growth in food imports reflects the strong demographic changes experienced in the region as well as the growing capacity to import in several oil-rich countries with the view to improve their diet. This acceleration in food imports applied to nearly all food sectors (Table 4.4.1). During the 15-year period 1995-98 to 2010-13 annual growth rates of food & animals imports of the Arab region were nearly 15% compared to less than 2% during the previous 15-year period from 1980-83 to1995-98. The same double-digit annual growth rates have been experienced for all food commodity groups, with beverages and meat topping the list at 19% and 18% annual growth rates, respectively, during the 1995-98 to 2010-13 period.

The value of all merchandize imports, not only food, also accelerated during the 1995-98 to 2010-13 period compared to the earlier 1980-83 to 1995-98 period. However, the acceleration of imports of food commodities was higher. The annual growth rate of the latter during the second period was 9 times the rate of the first period, while for total merchandize imports the corresponding ratio was about 7 times.

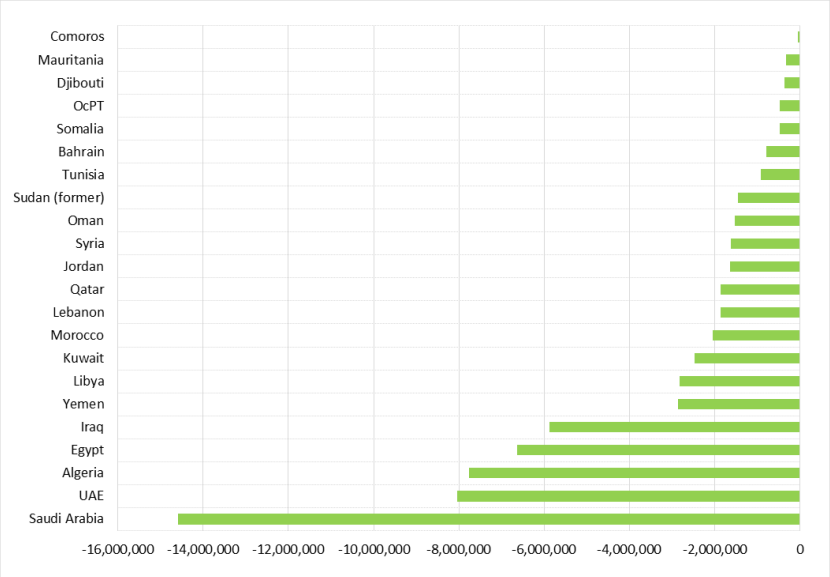
Table 4.4.1 Annual import growth rates in the Arab region

	Growth 1980-83 to 1995-98 (%)	Growth 1995-98 to 2010-13 (%)
Food & animals	1.6	14.5
Beverages	2.5	19.3
Meat	-1.4	18.1
F & V	1.3	15.6
Cereals	1.9	14.4
Pulses	5.5	14.0
Dairy	1.4	13.9
Sugar	0.7	13.7
Veg Oils	7.6	13.4
Other	-0.5	11.7

Source: FAOSTAT.

Turning to the aggregate trade balances of individual countries for all food commodities, without any exception, all Arab countries experienced a negative food trade balance in 2010-13 as has been also the case in earlier years (Figure 4.4.2). Among those countries with the highest food trade deficit are most of the oil-rich GCCs, Saudi Arabia's being at the top with a food trade deficit of close to $15 billion in 2010-13 (1/5th of region's overall food trade deficit). UAE and Algeria follow, at about $8 billion each, and Iraq close to $6 billion. Also among the countries with large food deficits in absolute terms are some large non-oil rich countries, among them Egypt but also Yemen, Morocco, Lebanon, Jordan and Syria. However, the extent to which these negative food trade balances constitute a problem for national food security would of course depend on the overall trade balance of each country which is examined next.

Figure 4.4.2 Trade deficits in Food & Animals of Arab region by country in 2010-13 ($1000)



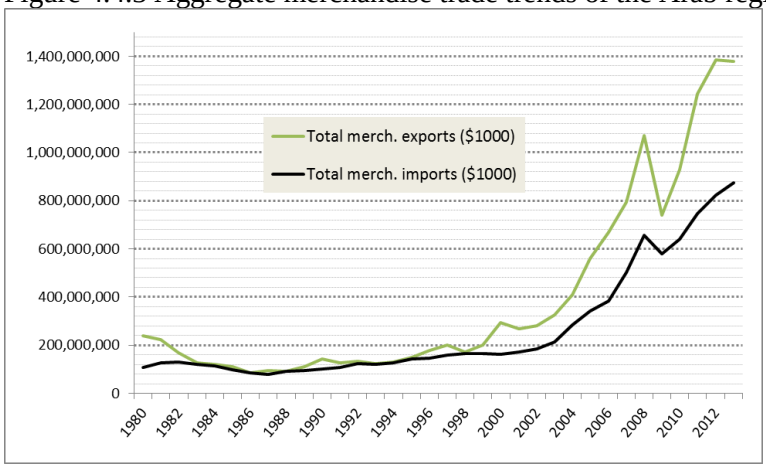
Source: FAOSTAT

4.4.2 The burden of food imports

For the region as a whole, the balance of total merchandise trade has been consistently positive over several decades and much more so after the late 1990s. The overall trade surplus of total merchandize trade of the region stood at some US$360 billion in 2013 from about US$30 billion ten years earlier and at roughly zero twenty years ago in the early 1990s (Figure 4.4.3)[38].

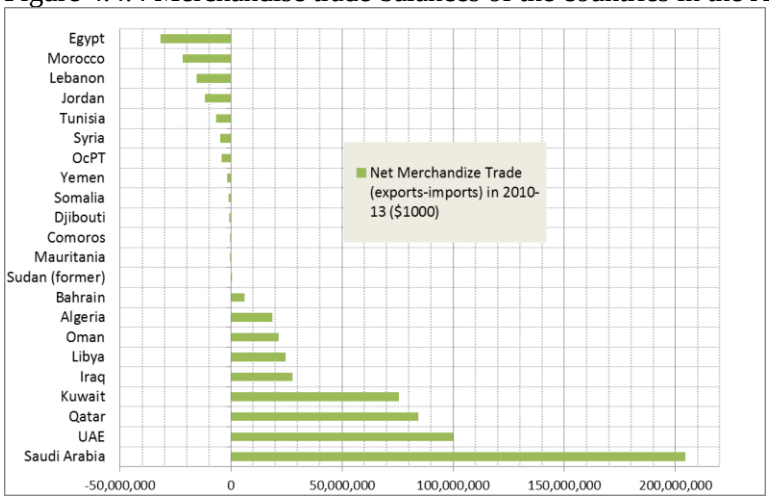
[38] The trade values discussed here and throughout the paper are nominal US dollars, unless otherwise indicated.

Figure 4.4.3 Aggregate merchandise trade trends of the Arab region



Source: FAOSTAT

Figure 4.4.4 Merchandise trade balances of the countries in the Arab region



Source: FAOSTAT

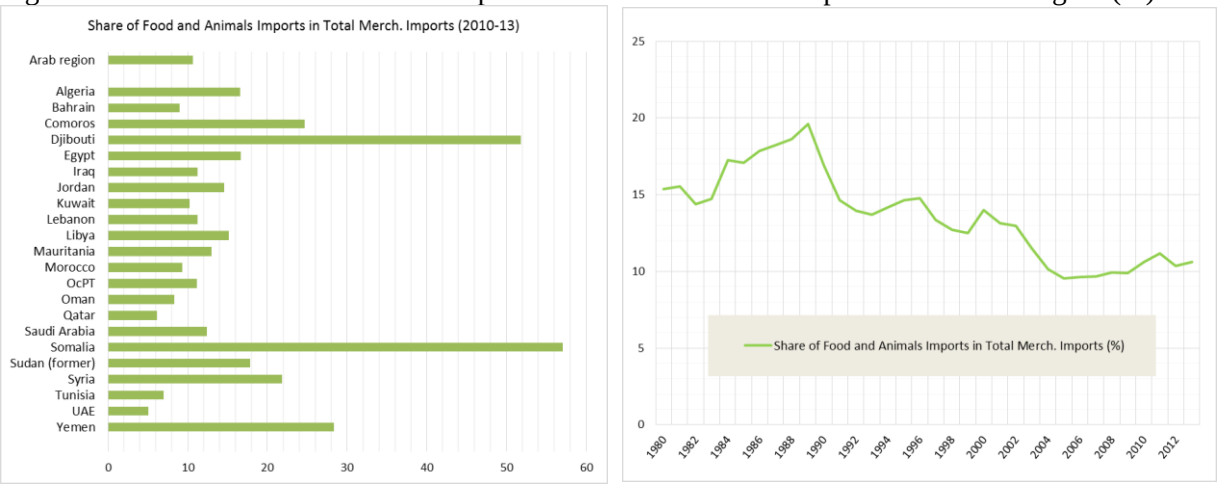
This overall positive evolution in the external trade balance of the aggregate Arab region, largely due to the large surpluses enjoyed by the petroleum endowed countries, hides huge differences among individual countries (Figure 4.4.4). In fact, a handful of countries weigh heavily on the overall trade surplus of the region with just four countries (Saudi Arabia, UAE, Qatar and Kuwait) accounting for 83% of the region's surplus in total merchandize trade in 2010-13. Looking at it from a different angle, the combined trade surplus of these four countries amounts to nearly five times the combined trade deficit of all the deficit countries of the region, with the surplus of Saudi Arabia alone amounting to more than twice the deficit of the latter. The overall trade deficit countries of the region (total merchandize trade) include Egypt, Morocco, Lebanon, Jordan, Tunisia, Syria and OcPT. A priori, because most of these countries have been identified above as experiencing also large food trade deficits, they would be in a precarious situation in terms of being able to sustain their food security.

A fundamental concern of a food deficit self-reliant country, importing food on a regular basis to meet its food needs, is its ability to pay for such imports now and in the future. There are a number of indicators that have often been used to assess this capacity to sustain food imports. One is to examine the share of food imports in the total merchandize imports of a country. A high share would imply that the imperative of importing food to meet current consumption crowds out other essential imports, including capital goods for long-term economic development. The average ratio for the region as a

whole has been declining over time and it has been hovering around 10% in recent years (10.7% during the 2010-13 period), from as much as close to 20% in the late 1980s (Figure 4.4.5). At its present level this ratio is more than double the world average (about 5%). Of course there is wide variation among individual countries. Half a dozen countries of the region have a ratio below 10% (the average of the region) and several of them have ratios 20-30% and a couple countries even above 50%.

The higher shares of expenditures on food imports than the world average (that may be considered as 'normal') is of some concern, however, even more serious is when this expenditure varies a lot from one year to the next. This appears to be the case for the aggregate share of the Arab region but it is even much more so for individual countries. This may be the outcome of either highly volatile food import bills (due to volatile world prices and/or high variability in domestic production) and/or highly volatile export earnings of the country in question. In either case, the implication is that in some years the country may not be able to afford other essential imports (or limit considerably the quantity imported) in order to be able import food. In reality, if the political imperative for importing food is not strong, food imports themselves may be curtailed in some years.

Figure 4.4.5 Share of food & animals Imports in total merchandize Imports in the Arab region (%)

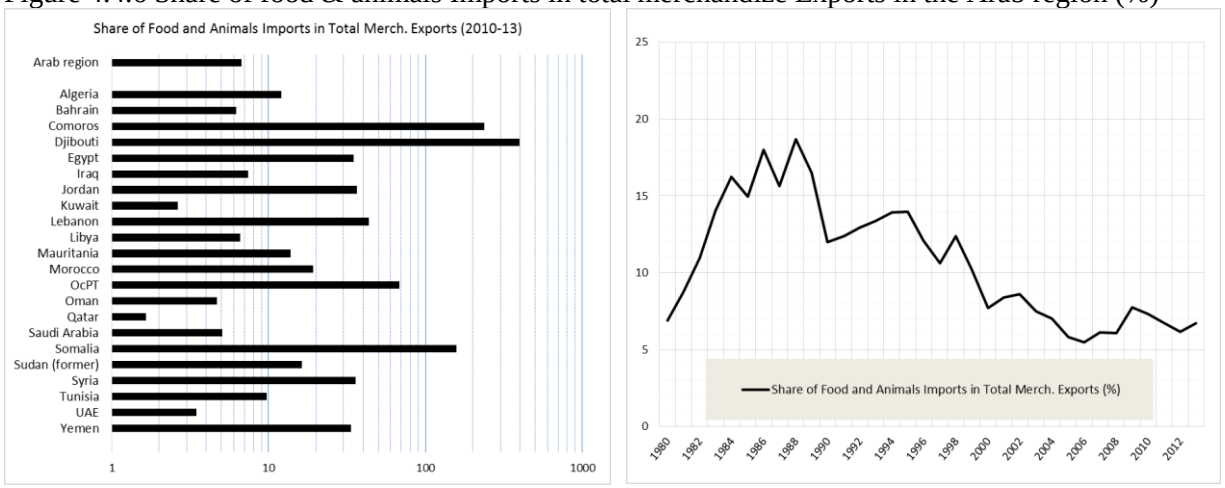


Source: FAOSTAT

A second indicator (and perhaps more relevant) for assessing sustained capacity of a deficit country to import food is the share of total merchandize export earnings[39] spent on food imports. This measure would signify a situation of self-reliance for a country when food imports account for a small and stable share of export earnings or, conversely, the non-affordability of importing food sustainably when the share is large and volatile. For the world as a whole this share is less than 5%. The Arab region average has hovered around 7% in recent years (6.7% during 2010-13) and has been at a downward trend from earlier years when it was as much as 18% in the late 1980s (Figures 4.4.6).

[39] Merchandize exports is a good indicator of the capacity to import as foreign exchange earnings for merchandize exports account for large share in the total current account balance. A more comprehensive variable would have been the Current Account Credits (which in addition to merchandize exports includes exports of services, income credits and transfers). While the latter are important components of Current Account Credits for some countries of the region, for the majority of them merchandize exports is the main component.

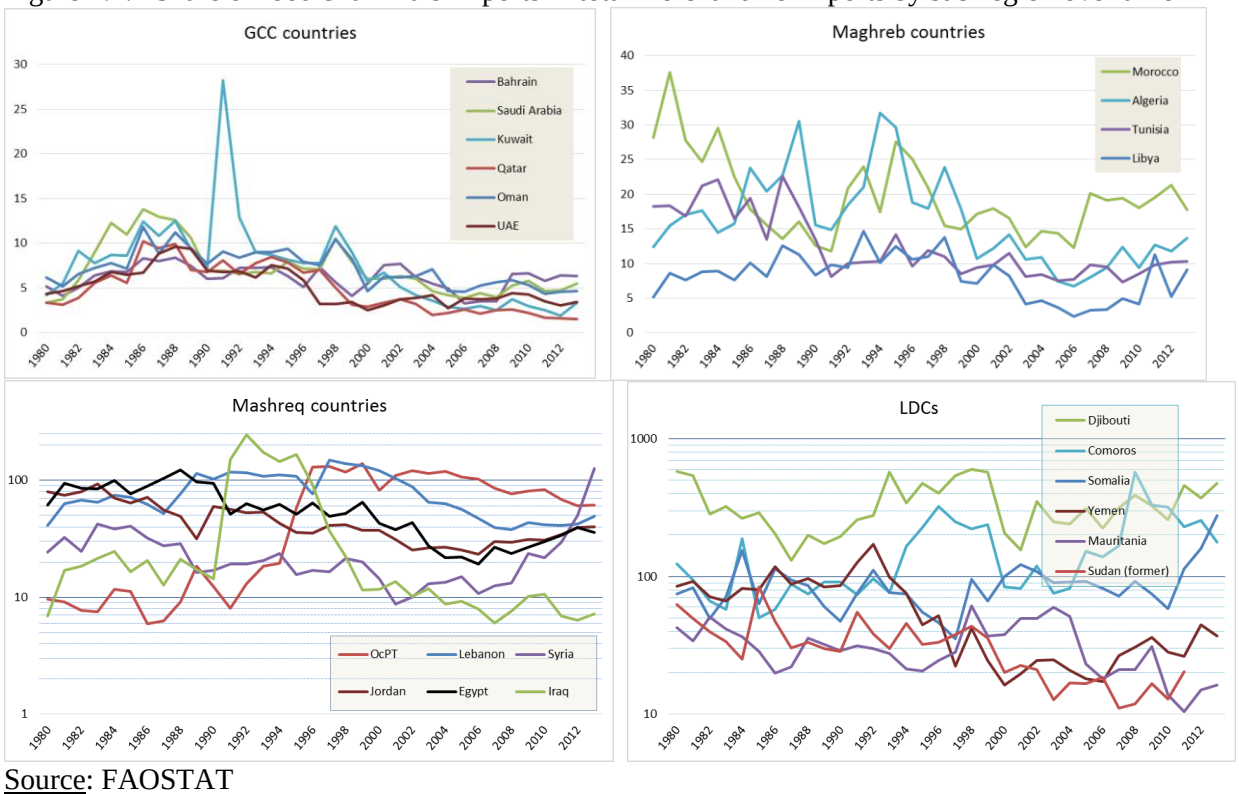
Figure 4.4.6 Share of food & animals Imports in total merchandize Exports in the Arab region (%)



Source: FAOSTAT

However, this regional average hides huge differences between sub-regions and individual countries. As it would be anticipated, the GCCs have low ratios converging around 5% and as a group have seen a steady decline in this ratio over the years Figure 4.4.7). Also, aside from Kuwait during the war years, the ratios has been relatively stable around their downward trends. The ratios of Maghreb as a group are about double those of the GCCs and they are also more volatile. Among the Maghreb countries Morocco stands out at a much higher and more variable ratio than the other three.

Figure 4.4.7 Share of food & animals Imports in total merchandize Exports by sub-region over time



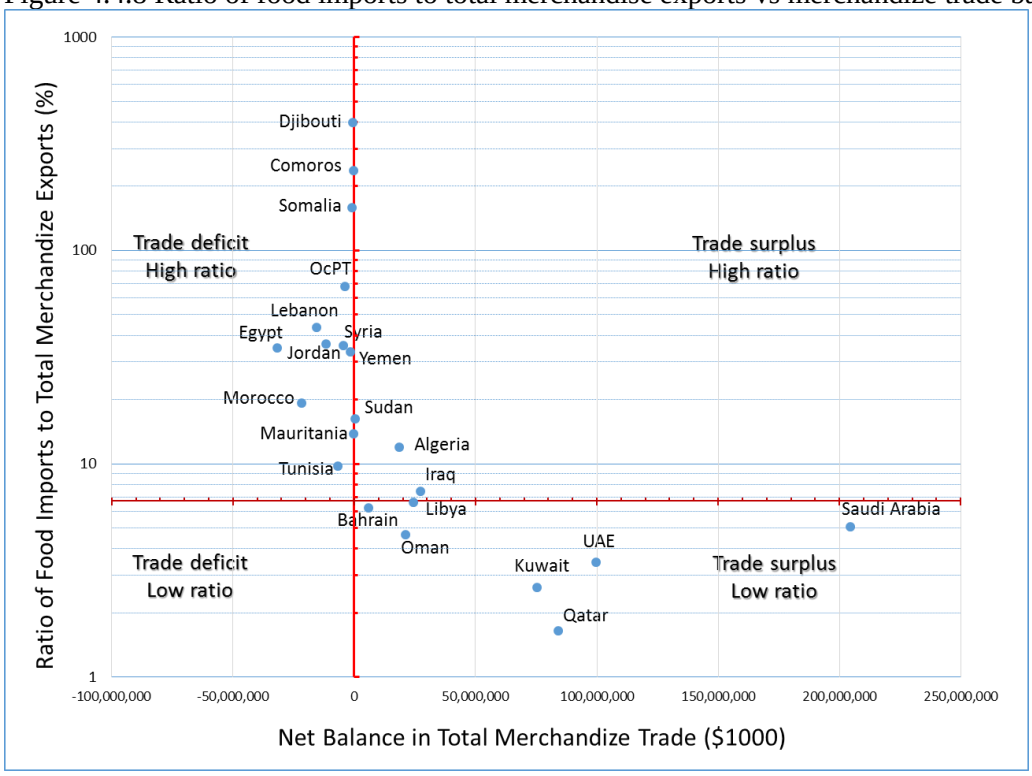
Source: FAOSTAT

Moving to the Mashreq sub-region, aside from higher overall ratios compared to the Maghreb, there is also considerable diversity among Mashreq countries with a ratio ranging between 10% and 100% in

earlier year and converging to around 30% in recent years, aside from Iraq with a ratio oscillating below 10%. Finally, the LDCs of the region provide even a more diverse picture than that of Mashreq. Three countries of this sub-region (Yemen, Mauritania and Sudan) have ratios in the range of 15-30% in recent years, while the other three countries (Comoros, Djibouti and Somalia) have ratios ranging in the area of 200-400%, implying that the latter countries spend year after year a multiple of their total earnings from merchandize exports on food imports (possibly financed by remittances, other sources of export earnings and food assistance flows). For all countries in the LDCs sub-region there is also much higher volatility in their ratios which implies that food imports pose even a much higher burden for some years, a situation hardly sustainable.

Another way of looking at the burden of food imports, especially with the view of assessing also the vulnerability of countries on their reliance on the world market, is to examine the relationship between the ratio of food imports in total merchandise exports (reflecting the existing burden of food imports) against their total merchandise trade balance (reflecting their capacity to continue to sustain such imports through export earnings). This is shown in Figure 4.4.8 where countries fall under four quadrats representing the four combinations of high/low ratio (6.7%, the average ratio of the Arab region in 2010-13 was taken as a borderline in defining high/low ratio) and a surplus/deficit overall trade balance.

Figure 4.4.8 Ratio of food imports to total merchandise exports vs merchandize trade balance (2010-13)



Source: based on FAOSTAT data

A priori, countries with a relatively low ratio and a positive overall trade balance (net exporters in total merchandize trade) would be expected to be in the most privileged position in terms of being able to sustain their food import needs. In that category are all the GCCs but also Libya). Other countries with a positive overall trade balance but somewhat higher ratios would also be expected to be in a position to sustain their food imports. These include Algeria and Iraq.

At the other end of the spectrum are countries with an already relatively high ratio and a negative overall trade balance in total merchandize exports. Nearly all the LDCs of the region are to be found in this vulnerable quadrant of Figure 4.4.8 as well as Lebanon, Jordan, Syria, Egypt, OcPT and Morocco. These countries would be the expected to experience difficulties in sustaining needed food imports, being in a position of overall trade deficit and already spending a sizeable amount of their export earnings on food imports. It may be noted that the near balance in total merchandize trade of the LDCs of the region does not necessarily reflect a desirable outcome if it is the result of an inability to procure enough food from the world market due to limited foreign exchange. It would appear that these countries are in that position, considering their precarious food security situation as analysed in Chapter II.

V EVOLUTION OF THE FOOD GAP OF THE ARAB REGION TO 2030[40]

5.1 Arab region to remain a major player in projected sluggish world food markets

Global food demand for virtually all commodities is expected to slow by 2030 compared to the previous decade. Growth in the last decade was led to a large extent by the People's Republic of China, where income and population growth drove consumption up through rising meat and fish demand and their associated feed use. Future drivers, however, are not anticipated to support markets in the same way over the projection period. Per capita food demand for cereals is anticipated to be largely flat, with growth only expected in least developed countries. Meat consumption prospects are seen as limited on the basis of recent trends in many countries, where dietary preferences, low incomes and supply-side constraints curb consumption growth.

Future growth in crop production to feed the growing population will be attained mostly by increasing yields, as increase in global cereal area will be marginal. Growth in meat and dairy production will be achieved from both larger herds and higher output per animal, with large differences in the intensity of production continuing to persist.

Based on these supply and demand conditions, real prices of most agricultural and fish commodities are anticipated to follow a slightly declining trend, keeping them below previous peaks over the next ten years. The growth in agriculture and fish trade is projected to slow to about half the previous decade's growth rate but will account for a broadly constant share of the sector's output over the coming decade. In contrast to widely dispersed imports, exports will remain concentrated in a few key suppliers, which may imply greater susceptibility of world markets to supply shocks stemming from natural and policy factors.

The Arab region is expected to remain a major food importer in the world market. On average, the region is expected to maintain a food consumption level well above the developing country average. Despite the challenging natural endowment of the region for production, continued efforts are expected to be made to expand output, using high yield varieties, better irrigation systems and intensification of the meat and dairy production, made possible in part by access to affordable (subsidized) energy for water desalinization and temperature-controlled growing environments. Nevertheless, resource constraints will put a limit on the extent to which domestic production can expand to accommodate the growing demand, and food imports will be increasingly important for ensuring food security in the region by 2030.

5.2 Food consumption trends in the Arab region to 2030

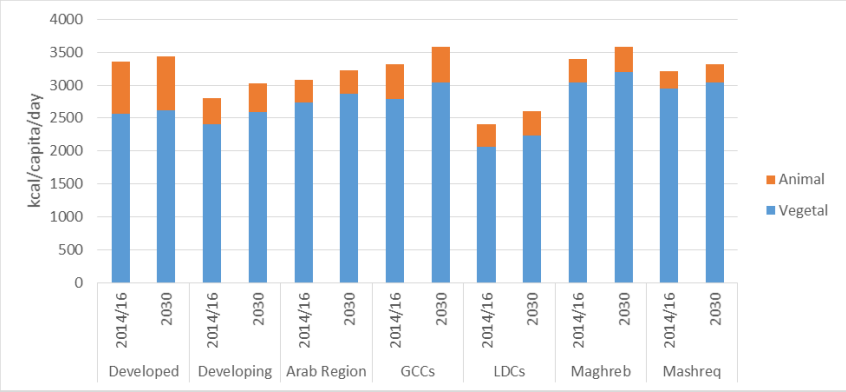
5.2.1 Important overall gains in per capita calories but uneven sub-regionally

[40] A first approximation of the possible evolution of food supply/demand balances in the Arab region has been obtained by the use of the OECD-FAO *Aglink-Cosimo* projections model. The OECD-FAO on-going medium-term agricultural projections 10 years ahead, are published annually in the *OECD-FAO Agricultural Outlook* publication. The same modelling framework was used to project supply and demand balances for the countries of the Arab region to 2030, by constructing and incorporating a number of individual country modules into the *Aglink-Cosimo* model and running the model under a baseline scenario representing the most likely outcome as well as under different scenarios reported elsewhere in this paper.

The baseline projections foresee considerable improvements in food availability in the region. The average daily calorie availability per person, which includes losses and waste, is currently estimated at about 3000 calories and is projected to reach about 3,100 calories by 2030.

However, this aggregate figure masks the twin challenge of addressing widespread undernourishment in the poor LDCs of region while at the same time there is a growing incidence of obesity in other countries of the region. These large differences between the sub-regions will remain. The Gulf region will continue to have the highest level of food availability, reaching as high as 3600 calories per capita/day in 2030. The LDCs sub-region, currently providing around 2,400 calories will make significant progress, increasing its daily calorie availability to 2,600 calories in 2030, but they will remain significantly below the other sub-regions. The levels in the Maghreb and Mashreq sub-regions are falling in between, their overall availability of food will increase slightly by 2030 (Figure 5.2.1). Calories from vegetal sources in the Arab region will continue to comprise most of the daily intake, well above the levels of both developed and developing country averages.

Figure 5.2.1 Projected calories from animal and vegetal sources in the Arab region to 2030



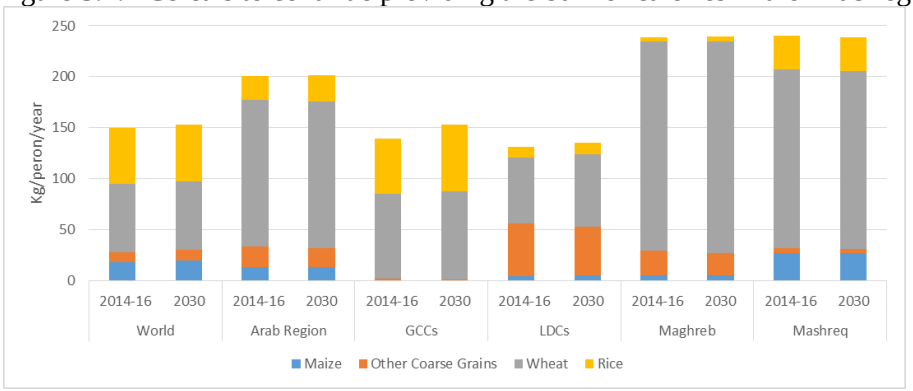
Source: AGLINK-COSIMO projections model

5.2.2 Cereal consumption will remain the main source of calories in the diet

Arab diets are characterized by a very high share of vegetal foods, ranging from 84% in the Gulf States to 91% in the Mashreq region and cereals are the main component of the diet. Per capita food availability of cereals is expected to continue to be above the global average, remaining almost fixed at around 200 kg/year/person up to 2030. Based on slower population growth and already high levels of intake, the average annual growth rate of total cereals consumption (1.7%) is expected to be slower than in the previous decade (3% p.a.). Consumption differs significantly by sub regions based on income levels and dietary preferences. In the LDCs, the level of cereal consumption stays the lowest within the Arab region, but the gap is expected to narrow further in the coming years (Figure 5.2.2).

Wheat will account for 71% of the total food consumption of cereals in the region throughout the projection period. In Arab LDCs, per capita food availability of wheat is expected to increase from 65 Kg/year to 71 Kg/year by 2030. Other coarse grains, mainly millets, the second most important staple item, which have declined in per capita consumption in Arab LDCs, will decrease further at around 4 kg/year, in favor of other cereals, mainly wheat, a trend observed in whole Arab region. Rice has traditionally played a minor role as a food in the region. However, per-capita consumption of rice in the Gulf region has been significant, and the level is expected to increase further from 54 kg to 65 Kg/year during the projection period reflecting the increasing number of migrants from South East Asian countries with high preferences for rice consumption. Maize food use is significant primarily in the Mashreq region where the current consumption level of 27 Kg/year is expected to remain largely unchanged through 2030.

Figure 5.2.2 Cereals to continue providing the bulk of calories in the Arab region



Source: AGLINK-COSIMO projections model

Per capita sugar consumption in the Arab region, at 31 Kg/year, already exceeds the global average of 24 Kg/day. Despite this already high level, per capita consumption is expected to expand at around 0.9% p.a., and by 2030, average availability for consumption will be 37 kg of sugar per year. The highest consumption levels are foreseen in Maghreb and Mashreq, the middle-income regions. Nevertheless, most of the increases in consumption are expected to come from the GCC and Arab LDC countries.

Population growth is foreseen as the main driver for additional vegetable oil demand in the region, notwithstanding average per capita consumption will also increase, from 20.5 to 22 Kg/year, reaching a level slightly below the global average. Considerable variations will be observed, however, in consumption levels across the sub-regions, as GCC region continues its fast growth, increasing per capita consumption by 1.6% p.a. to reach almost 20 Kg/ year by 2030, whereas per capita consumption in the LDCs sub-region will remain at 10 Kg/year/person in 2030, even after increasing the domestic availability by half a kilogram of vegetable oil per year, reflecting its low per capita income level. The Mashreq is the region with the highest level of vegetable oil per capita consumption, and it is expected to remain so by 2030 despite growing only at 0.3% p.a. similar development is expected to occur in the Maghreb, where per capita consumption increases slightly faster at 0.7% p.a. This is partly explained by a lower saturation level compared to the Mashreq. The varying levels of per capita consumption and its growth across regions is also explained to some extent by differing level of urbanization, under which out-of-home consumption becomes more common and access to processed foods containing oil is more readily available than in rural areas.

5.2.3 Small gains of calories from animal sources, but dairy consumption will increase

While calories from animal sources make up a relatively small share of total calorie intake in the Arab region (Figure 5.2.1), dairy products are becoming an increasingly important nutritional component in the region, and over the projection period, consumption will grow at 2.6% p.a., faster than the global average of 2.3% p.a. Per capita consumption of dairy products will increase over the projection period, at a faster rate than in the previous decade, with the exception of the GCC sub-region. The biggest increase in food demand will occur in the LDCs sub-region, where the level will reach 18.1 kg (dry equivalent), mainly as fresh dairy products, by 2030, the highest per capita consumption level in the region, also above the average consumption levels of developing countries and the world as a whole. Per capita availability will reach 15 kg in Maghreb, 10 kg in Mashreq and 14 kg in the Gulf countries. Despite a lower per capita consumption of total dairy products, the GCC region will consume much more processed dairy products; butter (14%), cheese (43%) and powders (44%). Milk powders will continue to make up a significant share of the dairy consumption in Maghreb, especially for manufacturing the

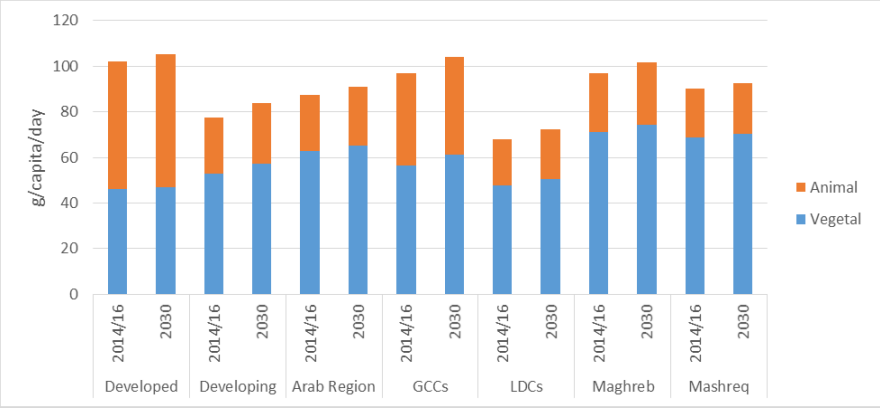
domestic fresh dairy products. Butter and cheese consumption is mainly relevant in the Mashreq sub-region.

The Arab region consumes about 28.8 Kg/person of meat per year, a figure which by 2030 will increase to close to 30 Kg/year. However, there are large differences in the levels and types of meat consumed across the sub-regions. The GCC region has a per capita food demand of 64 kg of meat per year, with poultry accounting for 73% of this demand, while people in the Arab LDC region consume only 17 Kg of meat per year with sheep accounting for almost 46% of the total demand and beef and veal accounting for 35%. These differences in the demand composition reflect the socioeconomic differences: the GCC region is characterized by urbanization and high per capita income, while in the LDCs, cattle are an important asset and a mean to store wealth. By 2030 the per capita meat demand in the GCC will increase by almost 7 Kg/year while in the LDCs the consumption will remain virtually remain unchanged. In the Maghreb and Mashreq sub-regions, increasing per capita income is expected to translate into increased consumption of poultry, while consumption of other types of meat will remain broadly unchanged.

5.2.4 Increased protein intake will improve the nutritional situation in the region

Protein intake is expected to increase, most notably in the GCC where higher demand for dairy and meat products are foreseen, driven by income gains. The lowest growth is expected in Mashreq because of small gains in the demand for animal products. The average daily protein availability in the Arab region is projected to reach 90 gr/person by 2030. However, strong differences will remain within the region, as the level will rise to almost 105 gr/person in GCC, but remain at 72 gr/person in the LDCs, keeping a considerable consumption gap within the region. (Figure 5.2.3).

Figure 5.2.3 Protein availability (vegetal and animal origin) in the Arab region



Source: AGLINK-COSIMO projections model

5.3 Food production trends in the Arab region to 2030 and continued reliance on imports

5.3.1 Resource constraints a limiting factor to expand domestic supplies

Natural resources scarcity, i.e. water and land, is the major production limitation in the Arab region forcing major changes in the last decade, such as GCC countries abandoning their cereal production due to the depletion of natural ground water reservoirs. These challenges will persist into the future, and production gains will have to be achieved primarily through efficiency gains rather than through an expansion of the area under cultivation. Governments are undertaking various policies to increase domestic food supply, yet, based on the projected strong growth in demand, the region's dependence on imports is expected to grow, if at a lower speed than in the previous decade.

The share of cereals in total agricultural land use is expected to remain above 95% over the projection period. Wheat production is expected to increase by 5.6 million MT to reach close to 30 million MT by 2030, driven by yield gains. The Mashreq region is expected to remain the largest producer, mainly due to Egypt, which will remain the single largest producer in the region.

Other Coarse Grains, mainly millet, make up a smaller share in terms of food consumption, but account for close to 60% of total cereal area harvested in the region. Average yields in the Arab region are projected to reach 0.8 MT/ha by 2030, but there will be considerable differences across the sub-regions. Maghreb and Mashreq yields are expected to increase to above 1 MT/ha, whereas millet yields in the food insecure LDCs sub-region are likely to remain below 0.6 MT/ha by 2030.

Maize production is tightly linked to the development of the feed industry in the region. Its share of the total cereal area is projected to remain constant around 5% over the projection period. Yields in the Arab region are currently 4.3 MT/ha on average, below the world average of 4.9 MT/ha. By 2030 yields in the Arab region could reach 5.6 MT/ha with most of those gains coming from the Mashreq sub-region where yields could reach 7.9 MT/ha, driven by high yield varieties in Egypt, made available to farmers by the Central Agency for Seed Production.

Despite these gains in production, limits to expansion exist, not just due to natural resource constraints but also because for several commodities the region is close to its technological frontier, especially wheat yields in Egypt being among the highest in the world. Therefore, the trade balance for cereals, which has been negative in the past, is expected to continue and even widen by 2030. Net imports of wheat into the Arab region would be twice the aggregate regional production and the region would account for one-third of total world wheat imports. Coarse Grains net imports are expected to account for around 22% of the total world imports in 2030, with the Gulf States taking the largest share, due to the growing livestock production in the sub-region. While the wheat trade deficit will be largely due to population growth, increasing imports of coarse grains would be primarily used to feed the growing livestock sector, with commercial poultry production absorbing the largest share of imported feedstuff.

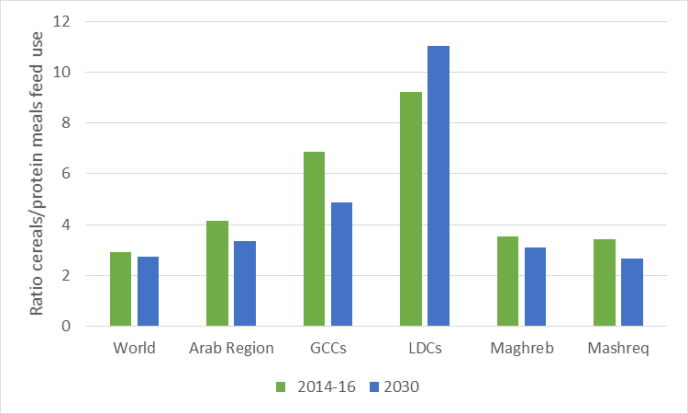
Rice production will remain marginal at around 2.5% of the total cereal area in the region. Most of the production is concentrated in Mashreq, where it could reach close to 5.5 million MT by 2030. The only sizeable production is taking place in Egypt, which aims to supply the domestic market. Rice imports are expected to be close to 8.5 million MT by 2030.

The expansion of sugar production is projected to be faster than that of cereals and oilseeds, growing at 3% p.a. and reaching close to 5.4 million MT by 2030. Egypt will remain the main producer of sugar with a total output of around 3.7 million MT. Nevertheless, sugar imports would increase to about three times the level of domestic production by 2030 and account for 20% of the projected global imports.

Oilseeds crush is projected to grow by around 1% p.a. over the projection period, a considerable slowdown compared with the previous decade of 6% p.a. Egypt would be the exception, where domestic crush demand is likely to be boosted by its expanding poultry and beef sectors. The growth of protein meal use is also projected to slow considerably, from 9.4% p.a. in the last decade to 2.6% p.a. over the projection period. Despite this decline, protein meals would expand faster than cereals for feed use, decreasing the ratio of cereals to protein meals in feed from 4:1 to close to 3:1. The ratio cereals/proteins is projected to decrease in the GCCs, Maghreb and Mashreq sub-regions, reflecting a shift towards higher share of protein in feed for livestock, particularly in poultry and dairy (Figure 5.3.1). Generally, the slowdown in feed demand is closely linked to the slower growth of the poultry industry. Specifically, the slowdown in the feed demand for cereals is explained by the substitution for protein meal. Overall, the projected growth in feed demand would still outpace growth in domestic production.

Only a very small share of the vegetable oil (not counting olive oil) consumed in the Arab region would be produced domestically. By 2030 more than 10 million MT out of the projected 11.5 million MT domestic demand are expected to be imported. The biggest importer would be the Mashreq sub-region, which would account for about half of the region's import. Oilseed imports in the Arab region is expected to expand at a rate of 1% p.a. and account for more than 80% of the domestic demand by 2030. However, imports into the region are expected to amount for only 3% of the world oilseed imports.

Figure 5.3.1 Cereals/Protein Meals feed ratios in the Arab region



Source: AGLINK-COSIMO projections model

5.3.2 Despite expansion, dairy and meat production will lag behind increasing demand

Total milk production in Arab region is projected to expand around 2.3% p.a., above the projected global rate (1.9%) but below the developing countries average (2.7%). Half of the additional milk production will come from the LDCs sub-region, while Maghreb and Mashreq would account for the other half (Figure 5.3.2). Most of the additional production would come from an expansion of the dairy herd, which would grow by 14% over the projection period. As is the case with the overall agricultural sector, however, access to resources and challenging weather conditions are likely to constrain future expansion of milk production in the region. Moreover, despite annual yield gains of 1.2%, production in the region is expected to remain "low inputs - low yields" and, without structural changes in the dairy sector, the yield level is expected to remain well below the global average.

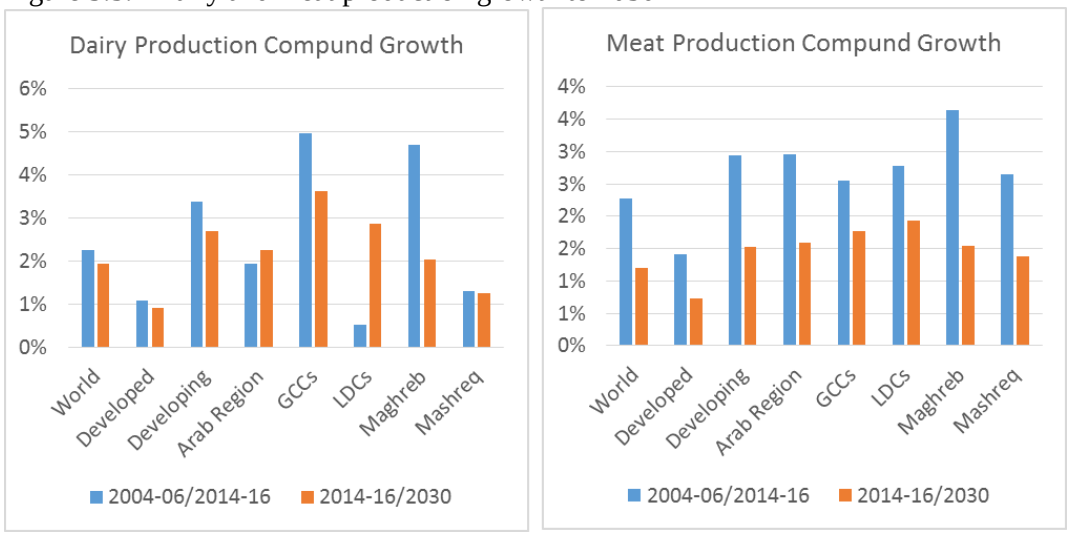
Aggregate dairy consumption in the region will thus outgrow production, and the gap between supply and demand would be bridged through trade, which is expected to grow by 2% p.a. By 2030, the region may account for up to 30% of global dairy product imports. The region would account for 19% of global cheese imports and 34% of total butter imports, and Egypt, in particular is expected to become the second largest butter importer, its import share rising from 6% to 11% of total trade. The country would emerge as a key player on the world market, increasing its share of world dairy imports from 3% to 5%. Generally, all Arab sub-regions would increase their dairy imports, especially imports of milk powder which is an essential input into domestic dairy supply chains.

Meat production in the Arab region is expected to expand by 1.6% p.a. Within the Arab region, the distribution of the meat supply across sub-regions is project to remain unchanged, with 36% of meat produced in Mashreq, 29% in Maghreb, 23% in LDCs and 12% in GCC. The Arab region produces about 4% of the global output of beef, poultry and sheep meat and this share is expected to remain unchanged by 2030. Despite production being constrained by scarcity of water and pasture land, output of sheep meat is expected to continue its rapid expansion, growing at 2.7% p.a. over the projection period, and by 2030 it would account for almost 15% of total world production. The LDCs sub-region,

mainly Sudan and Somalia would account for the increased sheep and goat production due to the well adapted pastoral practices which can cope even under poor weather conditions in the region. Poultry accounts for around 50% of the total meat production in the region and is expected to increase further. The Mashreq sub-region would be responsible for 40% of the expansion of the poultry sector. This rapid expansion would also be responsible for the increasing demand for feed grains, particularly maize.

Although meat production in the region is expected to expand at a rate above the global level, it would not be sufficient to cover the increase in domestic demand. As a result, meat imports, which currently amount to about 4.1 million MT, will increase to around 6 million MT. The region's share of global imports would also increase from about 17% to 19% over the projection period, mainly driven by the growing poultry consumption in the more developed sub-regions of GCC and Maghreb.

Figure 5.3.2 Dairy and meat production growth to 2030



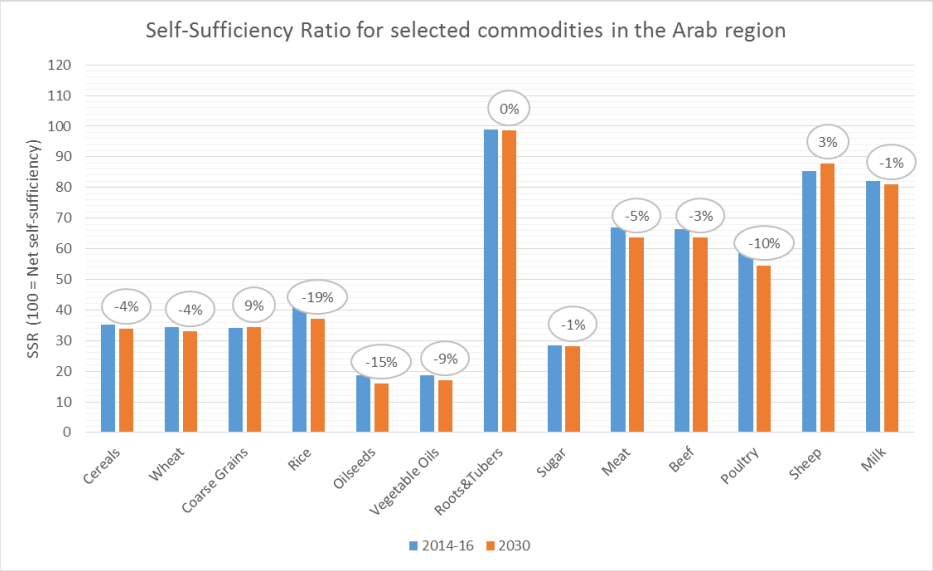
Source: AGLINK-COSIMO projections model

5.4 Self-sufficiency ratios to decrease across most commodities

Food self-sufficiency ratios in the Arab region which have been at a declining trend are projected to continue that path given a moderately increasing gap between supply and demand. Consequently, the Arab region as whole will increasingly rely on imports to meet its food needs. The highest dependency by 2030 will be in oilseeds and vegetable oils with self-sufficiency ratios staying below 20% (Figure 5.4.1). For cereals the rate remains around 34% and for sugar at 28%. Animal products with current self-sufficiency ratios of around 83% for dairy and 66% for meat, are also projected to decrease over the projection to 78% and 63% respectively, due to domestic production not being able to keep pace with the strong growth in demand.

The large differences in self-sufficiency ratios between animal and vegetal products reflect the support of several governments in the region to reduce import dependency on value-added livestock products through an import substitution policy. Thus, the increasing dependency on feedstuffs used in meat and dairy production. An additional rationale is that livestock and dairy products are harder to transport over long distances and they are an important source of income for many small farmers in the region.

Figure 5.4.1 Self-sufficiency ratios in the Arab region in 2014/16 and 2030



Source: AGLINK-COSIMO projections model

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Annex 1: Country coverage and data limitations

The study includes all 22 Arab countries of the Near East and North Africa region[41], which for analytical purposes are further subdivided into four sub-regions as follows:

- *Mashreq (6)*: Egypt, Iraq, Jordan, Lebanon, Occupied Palestinian Territories (OcPT) and Syria.
- *Maghreb (4)*: Algeria, Libya, Morocco and Tunisia.
- *Gulf Cooperation Council (GCC) (6)*: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates (UAE).
- *Least Developing Countries (LDCs) (6)*: Comoros, Djibouti, Mauritania, Somalia, Sudan and Yemen.

The analysis is largely based on FAOSTAT and other data databases maintained by FAO. The advantages of FAOSTAT are many, in particular being a comprehensive data system pertaining to all aspects of agriculture, including the resource base, production, domestic utilization, trade flows and overall commodity balances, nationally and globally. The drawback of FAOSTAT is that there is a certain lag in the availability of comprehensive data for some countries and commodities, due to the timing in the submission of such data by national statistical services. While certain data are available beyond 2013 (e.g. production data), comprehensive data on other essential statistics are not available for all commodities and countries, and this limitation is reflected in the analysis. However, as the scope of this study is largely on slowly changing longer term trends, this inevitable lag in data availability is not a serious concern as regards the validity of the analysis.

Another data limitation refers to lack of reliable statistics for some countries as assessed by FAO, including those that have been in chronic political instability with the consequence that the regular collection and quality control of information has been adversely affected. As a result, these countries are not covered in some aspects of the analysis and tabulations of related data.

[41] The list of countries under the acronym Arab region may vary in different country classifications and this need to be borne in mind when making comparisons between the aggregate statistics reported in this study and those reported elsewhere. Unless stated otherwise, the aggregate statistics reported in this study refer to these 22 countries.

Annex 2: Selected socio-economic indicators of the Arab region

	Population (2015)	Population gr. rate (2005-10)	Urban population (2015)	Urban population (2050)	Population <15 yrs	Life expectancy at birth Women	Life expectancy at birth Men	Mortality ratio Maternal per 100,000 live births	Mortality ratio < 5 years per 1000 live births	Fertility rate Adolecent births per 1000 15-19 year-olds	Fertility rate Total births per woman	Contraceptive prevalence Any	Contraceptive prevalence Modern	Improved drinking water coverage Urban	Improved drinking water coverage Rural	Improved sanitation Urban	Improved sanitation Rural	Primary Net enrolment Girls	Primary Net enrolment Boys	Tertiary education Gross enrolment Women	Tertiary education Gross enrolment Men
	(1000)	%	%	%	%	years	years					%	%	%	%	%	%	%	%	%	%
Egypt	91778	1.7	43.6	60.0	31.0	75.5	71.6	66.0	25.2	40.6	2.6	60.3	57.6	100.0	99.0	97.0	93.0	94.3	97.5	30.7	34.0
Iraq	35884	3.1	66.4	74.6	42.6	72.6	67.6	63.0	40.7	85.9	4.5	49.8	32.9	91.0	56.0	76.0	67.0	83.7	94.5	12.2	20.3
Jordan	6957	1.9	83.0	89.0	36.1	75.2	72.2	63.0	22.5	23.7	2.9	59.3	40.5	98.0	92.0	98.0	98.0	90.5	90.8	40.7	35.0
Lebanon	4426	0.7	87.4	91.2	23.7	75.1	70.7	25.0	23.8	15.4	1.8	58.0	34.0	100.0	100.0	100.0	87.0	91.2	92.2	58.8	49.4
OcPT	3198	2.8	74.6	82.9	41.4	74.8	71.5	64.0	22.5	48.3	4.3	50.2	38.9	86.0	81.0	92.0	92.0	85.6	87.4	57.6	43.1
Syria	24494	1.7	56.5	72.2	35.4	77.7	74.5	70.0	15.7	36.5	2.8	58.3	42.6	93.0	86.0	96.0	93.0	92.1	93.8	..	..
Algeria	38088	1.4	73.8	87.4	26.6	75.0	71.9	97.0	27.2	6.1	2.1	61.4	52.0	85.0	79.0	98.0	88.0	94.6	96.6	36.6	25.2
Morocco	34330	1.0	57.4	72.5	27.3	74.9	70.3	100.0	31.4	10.8	2.2	63.0	52.0	98.0	61.0	83.0	52.0	95.1	96.3	12.3	14.1
Tunisia	10884	1.0	66.5	77.2	23.1	77.1	72.6	56.0	22.5	4.4	1.9	60.2	51.5	99.0	84.0	96.0	64.0	97.8	99.1	41.4	27.5
Libya	7158	0.8	77.9	85.1	30.9	77.9	72.7	58.0	14.9	2.6	2.4	45.2	25.7	54.0	55.0	97.0	96.0	..	..	56.6	52.1
Kuwait	3378	2.4	98.3	98.7	26.6	75.9	74.0	14.0	9.9	14.4	2.3	52.0	39.3	99.0	99.0	100.0	100.0	93.5	90.8	31.2	14.2
Oman	5090	1.9	73.7	82.6	27.1	76.4	71.4	32.0	10.5	9.3	2.1	31.7	24.6	93.0	78.0	100.0	95.0	92.3	94.9	29.2	21.0
Saudi Arabia	28933	2.1	82.5	88.4	29.8	75.6	73.2	24.0	18.7	22.1	2.6	23.8	..	97.0	63.0	100.0		89.3	90.4	38.8	34.7
UAE	5193	2.2	84.7	90.6	16.8	78.0	76.0	12.0	7.9	23.4	1.7	27.5	23.6	100.0	100.0	98.0	95.0	90.1	86.8	38.8	12.3
Bahrain	882	2.1	88.7	92.8	20.5	76.1	74.7	20.0	8.6	14.8	2.4	61.8	30.6	100.0		100.0		98.0	97.7	27.9	15.7
Qatar	1630	2.9	98.9	99.8	14.4	78.2	78.7	7.0	10.4	15.5	2.2	43.2	32.3	100.0	100.0	100.0	100.0	92.3	91.6	26.1	4.9
Djibouti	953	1.9	77.1	84.2	35.1	60.0	57.0	200.0	104.3	19.5	3.6	17.8	17.1	99.0	54.0	63.0	10.0	42.1	46.8	3.9	5.9
Mauritania	3732	2.2	41.7	60.4	39.5	61.0	57.4	510.0	105.9	71.3	4.4	9.3	8.0	52.0	48.0	51.0	9.0	75.7	72.5	2.5	6.1
Sudan	47730	2.4	33.3	47.0	39.5	63.8	60.2	730.0	87.1	53.0	4.2	7.6	5.7	67.0	52.0	44.0	14.0	38.8	47.0	5.8	6.3
Yemen	27819	3.0	32.9	56.5	43.8	67.7	64.5	200.0	56.7	66.1	4.9	27.7	19.2	72.0	47.0	93.0	34.0	70.0	84.8	5.9	14.3
Comoros	767	2.5	28.1	40.1	42.6	63.2	60.3	280.0	85.5	51.1	4.7	25.7	19.3	91.0	97.0	50.0	30.0	74.8	80.7	6.7	9.1
Somalia	10731	2.6	38.2	59.8	44.9	53.4	50.1	1000.0	161.8	68.0	6.3	14.6	1.2	66.0	7.0	52.0	6.0	..	..	..	..
Mashreq	**166738**	**1.98**	**53.8**	**67.4**	**34.4**	**75.2**	**71.1**	**64.7**	**26.9**	**48.5**	**3.1**	**57.4**	**48.4**	**96.7**	**87.2**	**92.4**	**87.4**	**91.3**	**95.7**	**23.9**	**26.7**
Mashreq w/o Egyp	**74959**	**2.36**	**66.3**	**76.5**	**38.5**	**74.8**	**70.6**	**63.1**	**29.1**	**58.2**	**3.6**	**54.0**	**37.1**	**92.6**	**72.8**	**86.7**	**80.6**	**87.6**	**93.5**	**15.5**	**17.7**
Maghreb	**90461**	**1.13**	**67.0**	**80.3**	**26.8**	**75.4**	**71.4**	**90.1**	**27.3**	**7.4**	**2.2**	**60.6**	**49.9**	**89.2**	**70.9**	**92.0**	**72.1**	**87.7**	**89.2**	**29.6**	**23.4**
GCC	**45106**	**2.16**	**83.7**	**89.3**	**27.0**	**76.1**	**73.6**	**22.1**	**15.3**	**19.8**	**2.4**	**28.7**	**10.2**	**97.2**	**71.8**	**99.8**	**32.8**	**90.4**	**90.7**	**36.5**	**27.6**
LDCs	**91732**	**2.59**	**34.5**	**52.2**	**41.4**	**63.6**	**60.2**	**582.6**	**87.6**	**59.1**	**4.7**	**14.8**	**9.6**	**68.3**	**45.5**	**60.3**	**19.0**	**45.6**	**54.3**	**5.0**	**8.0**
Arab	**394036**	**1.95**	**55.8**	**69.3**	**33.4**	**72.6**	**68.9**	**186.2**	**39.8**	**38.3**	**3.2**	**45.0**	**35.3**	**88.4**	**72.0**	**85.7**	**61.7**	**79.7**	**84.0**	**22.2**	**21.7**
World	**7028829**	**1.10**	**54.0**	**66.4**	**26.4**	**72.3**	**68.1**	**148.2**	**44.0**	**45.9**	**2.4**	**61.6**	**54.4**	**95.0**	**82.0**	**72.5**	**53.4**	**74.4**	**74.3**	**26.3**	**22.6**

Source: UN DESA, Population Division

Annex 3: Correlation coefficients between different socio-economic indicators

	Population growth	Urbanization	Population <15 yrs	Life expectancy at birth	Maternal mortality ratio	Under 5 mortality rate	Total fertility rate	Contraceptive prevalence	Improved drinking water coverage	Improved sanitation coverage	Girls' share in primary enrolment	Women's share in tertiary enrolment
Correlations (Arab region)												
Population growth	1.00	-0.19	0.44	-0.26	0.29	0.28	0.65	-0.50	-0.21	-0.37	-0.31	-0.27
Urbanization		1.00	-0.71	0.69	-0.66	-0.66	-0.68	0.42	0.58	0.77	0.46	0.69
Population <15 yrs			1.00	-0.72	0.59	0.66	0.89	-0.45	-0.63	-0.70	-0.52	-0.68
Life expectancy at birth				1.00	-0.86	-0.98	-0.81	0.68	0.70	0.93	0.62	0.76
Maternal mortality ratio					1.00	0.90	0.75	-0.67	-0.79	-0.86	-0.69	-0.50
Under 5 mortality rate						1.00	0.80	-0.68	-0.70	-0.92	-0.66	-0.70
Total fertility rate							1.00	-0.62	-0.71	-0.81	-0.69	-0.71
Contraceptive prevalence								1.00	0.58	0.79	0.32	0.42
Improved drinking water coverage									1.00	0.70	0.65	0.60
Improved sanitation coverage										1.00	0.52	0.70
Girls' share of primary enrolment											1.00	0.44
Women's share of tertiary enrolment												1.00
Correlations (world total)												
Population growth	1.00	-0.26	0.79	-0.52	0.60	0.65	0.76	-0.63	-0.65	-0.64	-0.30	-0.57
Urbanization		1.00	-0.52	0.58	-0.52	-0.57	-0.51	0.49	0.49	0.54	0.18	0.40
Population <15 yrs			1.00	-0.77	0.73	0.79	0.93	-0.71	-0.74	-0.77	-0.31	-0.60
Life expectancy at birth				1.00	-0.84	-0.92	-0.78	0.70	0.73	0.78	0.32	0.67
Maternal mortality ratio					1.00	0.90	0.78	-0.71	-0.76	-0.78	-0.44	-0.68
Under 5 mortality rate						1.00	0.86	-0.77	-0.80	-0.79	-0.43	-0.76
Total fertility rate							1.00	-0.73	-0.76	-0.75	-0.35	-0.66
Contraceptive prevalence								1.00	0.66	0.65	0.32	0.58
Improved drinking water coverage									1.00	0.74	0.43	0.63
Improved sanitation coverage										1.00	0.30	0.68
Girls' share of primary enrolment											1.00	0.38
Women's share of tertiary enrolment												1.00

Source: Calculated by the author based on data from UN DESA, Population Division (see Annex 2 for the relevant data pertaining to the Arab region)