

# Food Security in the Middle East and North Africa

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**Abstract**—To date, one of the few comprehensive indicators for the measurement of food security is the Global Food Security Index (GFSI). This index is a dynamic quantitative and qualitative benchmarking model, constructed from 28 unique indicators, that measures drivers of food security across both developing and developed countries. Whereas the GFSI has been calculated across a set of 109 countries, in this paper we aim to present and compare, for the Middle East and North Africa (MENA), 1) the Food Security Index scores achieved and 2) the data available on affordability, availability, and quality of food. The data for this work was taken from the latest available report published by the creators of the GFSI, which in turn used information from national and international statistical sources. MENA countries rank from place 17/109 (Israel, although with recent political turmoil this is likely to have changed) to place 91/109 (Yemen) with household expenditure spent in food ranging from 15.5% (Israel) to 60% (Egypt). Lower spending on food as a share of household consumption in most countries and better food safety net programs in the MENA have contributed to a notable increase in food affordability. The region has also, however, experienced a decline in food availability, owing to more limited food supplies and higher volatility of agricultural production. In terms of food quality and safety the MENA has the top ranking country (Israel). The most frequent challenges faced by the countries of the MENA include public expenditure on agricultural research and development as well as volatility of agricultural production. Food security is a complex phenomenon that interacts with many other indicators of a country's wellbeing; in the MENA it is slowly but markedly improving.

**Keywords**—Diet, food insecurity, global food security index, nutrition, sustainability.

## I. INTRODUCTION

THE World Food Summit of 1996 defined food security as existing “when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life” [1]. Commonly, the concept of food security is defined as including both physical and economic access to food that meets people's dietary needs as well as their food preferences. Food security is a complex sustainable development issue, linked to health through malnutrition, but also to sustainable economic development, environment, and trade.

To date, one of the few comprehensive indicators for the measurement of food security is the Global Food Security Index (GFSI). This index is a dynamic quantitative and qualitative benchmarking model, constructed from 28 unique indicators, that measures drivers of food security across both developing and developed countries. Whereas the GFSI has

been calculated across a set of 109 countries, in this paper we aim to present and compare, for the Middle East and North Africa (MENA), 1) the Food Security Index scores achieved and 2) the data available on affordability, availability, and quality of food.

The regional analysis of food security is paramount because it highlights commonalities that are often present and provides points for comparison in order to understand the dynamics of food security. In regions that include countries with varying economic systems, policies, agricultural infrastructures and nutritional standards, as does the MENA region, the gap in food security between the best and worst ranking countries is wide and broadening.

## II. METHODS

The data for this work was taken from the latest (2014) report published by the creators of the GFSI, which in turn used information from national and international statistical sources made up of over 11, 000 data points that impact food security. For a detailed description of the methodology see the corresponding publication [2]. The twelve MENA countries comprised in this paper include Israel, Kuwait, United Arab Emirates (UAE), Saudi Arabia, Turkey, Tunisia, Jordan, Morocco, Egypt, Algeria, Syria and Yemen. The GFSI for the MENA countries has been calculated over three consecutive years with the exception of Kuwait and the United Arab Emirates which were only added to the 2014 calculations.

The affordability category explores the capacity of individuals within a country to pay for food and the relative costs they may encounter under normal conditions and during food-related shocks. The availability category assesses the factors that influence the supply of food and the ease of access within a country, including the internal capacity to produce and distribute food. Finally, the quality of food category looks at the nutritional quality of average diets and the food safety within each country. A detailed list of how these categories are defined according to the various indicators employed is presented in Table I.

## III. FINDINGS

According to the 2014 Global Food Security Index, MENA countries rank from place 17/109 (Israel) to place 91/109 (Yemen) with household expenditure spent in food ranging from 15.5% (Israel) to 60% (Egypt). Eight of the twelve countries in the MENA improved their scores from last year whereas a decline was observed for Egypt and Tunisia whose score fell by -2.9 points for each from 2013 to 2014. However, with recent political turmoil in some of these countries the ranking is likely to have changed. Economic performance in the MENA was held back by war, revolution and continuous

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weakness in Europe, a key market for exports from North Africa and Turkey.

TABLE I  
INDICATORS USED TO CALCULATE GFSI SCORES

<i>Affordability</i>
• Food consumption as a share of household expenditure
• Proportion of population under global poverty line
• Per capita GDP
• Agricultural import tariffs
• Presence of food safety net programs
• Access to financing for farmers
<i>Availability</i>
• Sufficiency of supply
• Public expenditure on agricultural research and development
• Agricultural infrastructure
• Volatility of agricultural production
• Political stability risk
• Corruption
• Urban absorption capacity
• Food loss
<i>Quality of food</i>
• Diet diversification
• Nutritional standards
• Micronutrient availability
• Protein quality
• Food safety

GFSI, global food security index; GDP, gross domestic product

TABLE II  
OVERALL AND REGIONAL GFSI RANKING AND SCORE BREAKDOWN OF  
MIDDLE EAST AND NORTH AFRICAN COUNTRIES

Country	Overall ranking	Overall score	Affordability	Availability	Quality of food*
Israel	17	80.6	22 (83.3)	17 (75.4)	1 (88.5)
Kuwait	28	72.2	23 (83.1)	41 (61.2)	29 (75.3)
UAE	30	70.9	15 (87.2)	51 (55.2)	32 (73.2)
Saudi Arabia	32	69.6	31 (76.1)	31 (65.7)	47 (64.4)
Turkey	39	63.8	43 (62.5)	36 (63.9)	41 (67.1)
Tunisia	54	55.7	54 (56.1)	53 (53.1)	50 (62.0)
Jordan	59	53.0	59 (53.8)	55 (52.8)	67 (51.3)
Morocco	63	50.1	65 (49.5)	66 (50.4)	68 (51.1)
Egypt	66	49.3	81 (35.7)	42 (59.6)	62 (55.1)
Algeria	70	47.5	67 (46.6)	71 (48.3)	72 (47.7)
Syria	79	40.9	75 (39.6)	94 (39.0)	79 (45.5)
Yemen	91	35.2	83 (35.5)	103 (35.7)	99 (32.7)

GFSI, global food security index; MENA, Middle East and North Africa; UAE, United Arab Emirates; \*, data given for category ranking and (score).

Within the MENA, Kuwait and the UAE rank second and third in overall GFSI score. Their high scores were driven by marked performances in affordability with both countries scoring above 80 points.

#### A. Affordability

Lower spending on food as a share of household consumption in most countries and better food safety net programs in the MENA have contributed to a notable increase in food affordability. Further, many countries have also benefited from a decline in wheat and rice prices (2 and 14% respectively) from 2013 to 2014. Certain MENA countries (i.e. Kuwait and the UAE) have the advantages of their oil endowments, helping them increase their affordability scores. Arab countries are the largest importers of cereal in the world. Most of the countries in the MENA region import at least 50%

of the food calories they consume whereas small Gulf countries (Bahrain, Qatar, UAE, Kuwait, and Oman) dependent almost completely on imports for staple foods [3]. The MENA region is encountering steep spikes on food prices. This increase in food prices is partially due to competition for the same food products (wheat, corn, soybeans, animal protein) from other areas of the world (i.e. Asia) where incomes are rising and the demand for more calories is setting off. Besides threatening the well-being of those already living on meager resources, the food price increases have amplified the number of poverty-stricken people by millions in less-affluent MENA nations.

To relief social pressures, all MENA governments, but in particular Egypt and Jordan, try to counterbalance rising food prices by having spent roughly 22 billion USD on food subsidies in 2011, according to estimates by the International Monetary Fund [4].

#### B. Availability

The region has also however experienced a decline in food availability, owing to limited food supplies and higher volatility of agricultural production. Throughout the MENA a poor performance in corruption and political instability hinder food security. Furthermore, the civil war in Syria is estimated to have already caused more than 3 million people to seek refuge across the borders [5]. Jordan, a country of 6.3 million inhabitants, is heavily overburdened with more than 600,000 Syrian refugees forcing an increase of its food imports [6].

Of those Syrians leaving the country and those being internally displaced many can be expected to have contributed to the agricultural sector prior to the conflict. Those farmers, traders and salesmen are now missing, disrupting various crucial pieces of the food supply chain. To what extent and for how long this can be compensated for is questionable, given that the World Food Program already had to cut back its food assistance operations in Syria [7] due to a lack of funding.

The heavy reliance of the MENA region on imported food is set to increase even further according to the International Food Policy Research Institute [8]. Its estimates show a slow rise in the production of cereals which cannot keep pace with the rapid rise in demand. These differences can arguably be blamed on population increase and higher per capita consumption.

#### C. Quality of food

In terms of food quality and safety the MENA region has the top ranking country (Israel). The rest of the region ranks moderately in all food quality indicators. This category explores the general quality of food supplies, based on the concept that food security requires access to nutritious foods that meet the required dietary needs of an individual. For this indicator the average diet was examined or variety, micronutrient availability and protein quality.

Diet variety (diversification) in the GFSI measured the proportion of non-starchy food out of the total dietary energy intake. It has been suggested that diets with lower percentages of starchy- foods (cereals, roots, tubers) tend to be more

nutritious due to higher amounts of vegetables, dairy and meat products being consumed. Originally, the peoples of the MENA relied heavily on a diet of dates, wheat, barley, rice and meat; with a heavy emphasis on yoghurt products, such as *leben*<sup>1</sup>. Middle Eastern cuisine today is the result of a combination of richly diverse cuisines, spanning from Iraq to Morocco and incorporating Lebanese, Egyptian, and Berber traditional foods. It has also been influenced to a degree by the cuisines of India and Turkey. Food consumption patterns and dietary habits in the Arab countries have changed markedly during the past four decades; this is particularly true in some Gulf countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates) where there has been a great shift from traditional foods to more westernized diets.

The micronutrient availability indicator comprised of vitamin A, heme iron and non-heme iron availability. These indicators were calculated by converting the amount of food available for human consumption, as estimated by the FAO, into iron equivalents. Availability, intake, status and deficiency of these micronutrients are not the same concept making this variable a difficult indicator to establish for comparison across countries. The final nutrition indicator, protein quality, measured the grams of quality protein consumed. Quality protein was defined based on the presence of the nine essential amino acids. Israel had the largest amount of quality protein in the average diet with 126g/day.

The most frequent challenges faced by the countries of the MENA include public expenditure on agricultural research and development as well as volatility of agricultural production. In its strategy paper on the Middle East and North Africa, the International Food Policy Research Institute states that budget allocations for poverty, nutrition and social protection; diet, health and food safety; science and technology, are generally considered very low, but rising [8].

#### IV. DISCUSSION

The countries that encompass the MENA region are extremely diverse in food supplies and food consumption. Whereas countries like Israel, Morocco and Turkey are major exporters of food and mostly self-sufficient in agricultural production, the Gulf countries depend heavily on food imports.

If, as predicted, moderate global warming may benefit crop yields in mid-to high- latitude regions but reduce yields in seasonally dry and low-altitude regions [9], then several countries in the MENA could be facing significant food shortages in the near future. It is already difficult to grow food crops in the Gulf region due to a scarcity of water supply and limited availability of arable land; to include an additional temperature strain may become disastrous as extreme temperatures are already being experienced here.

Whereas some countries in the region are taking initial steps to ensure their own food security, they are creating new food shortages in other parts of the world. For example, Saudi Arabia's growing food insecurity has led to the purchase or

lease of arable land in different countries, including the World's hungriest nations Ethiopia and Sudan. Saudis are planning to produce food for themselves with the land and water resources of other countries to meet the rising food demand of the rapidly growing Saudi population. Unfortunately, transferring agricultural land from subsistence farming to export crops has led to even more food shortages [10].

On the other hand there are also the initiatives that seem to be more promising. Currently in Jordan and Qatar the Sahara Forest Project is taking off. The aim of this project is to develop new environmental solutions to produce food, water and energy in desert areas by utilizing what is available (deserts, saltwater and CO<sub>2</sub>) to produce what is needed [11].

The 2014 version of the GFSI has two newly included indicators: food loss and the prevalence of obesity. High levels of food loss usually indicate problems in the supply chain that further intensify food insecurity. Loss or spoilage during transportation reduces the available supply of food to marketplaces and has the potential to drive up prices. Food loss data however should be considered with care as it is difficult to assess.

TABLE III  
THEMES WITH WEIGHTS AND DIRECTIONS OF LEVEL OF EFFORT IN THE MENA REGION [8]

Focus area	Research theme	Weight and direction of level of effort	
		MENA-FSHI	MENA-FSC
Efficient and fair functioning of global and national food and agriculture systems	-Outlooks, globalization, trade and markets	↑	↑
	-Natural resources policies	↑	↑
Effective strategies and governance at the global, national and regional levels	-Risks and emergencies	↑	↑
	-Governance and policy processes	↑	↑
	-Development strategies	↑	↑
Enhancing pro-poor food and agriculture system innovations	-Poverty, nutrition and social protection	↑	↑
	-Diet, health and food safety	↑	↑
	-Science and technology	↑	↑
Policy communications		↑	↑
Capacity strengthening		↑	↑

IFPR, International Food Policy Research Institute; MENA, Middle East and North Africa; FSHI, food secure and high income countries (Bahrain, Iran, Kuwait, Qatar, Saudi Arabia, United Arab Emirates); FSC, countries with food security challenges (Algeria, Djibouti, Egypt, Iraq, Jordan, Lebanon, Libya, Morocco, Sudan, Syria, Tunisia, West Bank and Gaza, Yemen).

Whereas food waste as part of the supply chain may hinder food security, food waste by the consumer may in turn be an indicator of a high level of food security. People who have access to sufficient quantities of affordable food may be more inclined to waste it when preparing or consuming meals.

An increase in obesity prevalence usually parallels industrial development, which in the Gulf region of the MENA is linked to significant growth in income. Urbanization and modernization, from a health perspective, are negatively

<sup>1</sup>Yoghurt without butterfat.

affecting the life quality in the MENA region [12]. While research has not yet linked obesity to food insecurity in a definitive manner it is very likely that some form of relationship exists. For the time being the obesity variable is considered in light of the growing prevalence of obesity.

#### V.CONCLUSIONS

Food security is a complex phenomenon that interacts with many other indicators of a country's wellbeing; in the MENA it is slowly but markedly improving. This conclusion may only be a mirage however, if one takes into consideration the growing threat of climate change that has a mostly negative impact on the region's water reservoirs. Iran, albeit not on the index, is a prime example, as demonstrations against water shortages appeared in numerous cities in 2014 [13]. As fellow MENA countries are similarly arid, this phenomenon is likely to spread with the impacts of climate change intensifying [14].

In addition, individual threats to countries, such as civil strife as in Syria, Libya, Yemen, Iraq and the Sinai Peninsula of Egypt; and disputes over dams, as between Ethiopia and Egypt or Turkey and Syria, are likely to pull down the performance of the MENA countries in terms of food security. Of the seven MENA countries not present in the GFSI, namely Iraq, Iran, Lebanon, Libya, Oman, Palestine and Qatar, three (Iraq, Libya and Palestine) are experiencing frequent bouts of conflict that negatively impact food security.

Given the risk of climate change, country-specific threats and violent conflicts, MENA countries are likely to experience a slide in the Global Food Security Index over the medium term. Even the long-term prospects appear dim, as in addition to climate change, numerous MENA countries, in particular the Gulf Corporation Council countries, will run out of low-priced hydrocarbon resources to sell which to date have been used as a means to buy themselves food security.

#### REFERENCES

- [1] World Health Organization, "Food Security," Available from <http://www.who.int/trade/glossary/story028/en/>. Accessed 17.09.2014.
- [2] The Economists Intelligence Unit, "Global Food Security Index 2014," Available from <http://foodsecurityindex.eiu.com/>. Accessed 17.09.2014.
- [3] The World Bank, The United Nations Food and Agriculture Organization and The International Fund for Agricultural Development (2009), "Improving food security in Arab countries," Available from: [http://reliefweb.int/sites/reliefweb.int/files/resources/1f52b98a6bbc8065492575a0000b87da-full\\_report.pdf](http://reliefweb.int/sites/reliefweb.int/files/resources/1f52b98a6bbc8065492575a0000b87da-full_report.pdf). Accessed 18.08.2014.
- [4] International Monetary Fund (2012), "Costly Mideast subsidies need better targeting," Available from: <http://www.imf.org/external/pubs/ft/survey/so/2012/car051412b.htm>. Accessed 28.09.2014.
- [5] Al Jazeera (2014) "UN says Syria refugees pass three million," Available from: <http://www.aljazeera.com/news/middleeast/2014/08/un-says-syria-refugees-top-three-million-mark-201482952430880804.html>. Accessed 28.09.2014.
- [6] United Nations High Commissioner for Refugees (2014), "Syria regional refugee response," Available from: <http://data.unhcr.org/syrianrefugees/regional.php>. Accessed 28.09.2014.
- [7] World Food Program (2014), "Funding shortfall forces WFP to announce cutbacks to Syrian food assistance operation," Available from: <https://www.wfp.org/news/news-release/funding-shortfall-forces-wfp-announce-cutbacks-syrian-food-assistance-operation>. Accessed 28.09.2014.
- [8] International Food Policy Research Institute (2010), "Middle East and North Africa strategy," Available from: <http://www.ifpri.org/sites/default/files/publications/ifpridp01196.pdf>. Accessed 28.09.2014.
- [9] McMichael AJ (2014), "Climate. Nutrition. The big picture, impact on water, crops and food. (commentary)," *World Nutrition*. 5, 7-8, 632-636.
- [10] Katkhuda N (2014), "Food security in the Middle East," *Ecomena*. Available from: <http://www.ecomena.org/tag/food-shortage-in-middle-east/>. Accessed 18.08.2014.
- [11] The Sahara Forest Project (2014), "Greening the desert," Available from: <http://saharaforestproject.com/concept.html>. Accessed 08.18.2014.
- [12] Garduño-Díaz SD and Garduño-Díaz PY (2014), "Components of an obesogenic environment in Kuwait," *Journal of Nutritional Therapeutics* 3, 35-46.
- [13] Al Monitor (2014), "Drought triggers protests in Iran," Available from: <http://www.al-monitor.com/pulse/originals/2014/09/esfahan-zayandeh-rood-protest-water-crisis.html>. Accessed 28.09.2014.
- [14] Food and Agriculture Organization (2007), "Climate change adaptation in the in the water sector in the Middle East and North Africa: a review of main issues," Available from: [http://www.fao.org/fileadmin/user\\_upload/rome2007/docs/climate\\_change\\_adaptation\\_water\\_sector\\_nena.pdf](http://www.fao.org/fileadmin/user_upload/rome2007/docs/climate_change_adaptation_water_sector_nena.pdf). Accessed 28.09.2014.

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