STRENGTHINING THE UNDERSTANDING OF SOCIAL VULNERABILITY IN THE ARAB REGION

FINAL REPORT

STRENGTHINING THE UNDERSTANDING OF SOCIAL VULNERABILITY IN THE ARAB REGION

A REGIONAL REVIEW

المجلس العربي للمياه
Arab Water Council
2017

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Acknowledgements

The overall strategic direction for the report was provided by H.E. Dr. Mahmoud Abu-Zeid, President of the Arab Water Council (AWC) and H.E. Dr. Hussein El-Atfy, AWC Secretary General. The task team leaders for the report were Eng. Heba Al Hariry, Regional Project Coordinator/ Hydrogeologist, AWC, Mr. Oscar Ekdahl, Regional Program Officer at United Nations World Food Programme (WFP); and Prof. Wadid Erian, LAS Climate Risk Nexus Initiative "LAS CRNI" Programme Coordinator.

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Special Acknowledgement is extended to the United Nations World Food Programme (WFP) and the League of Arab States (LAS) for their partnership and contributions throughout the production of the report.

The report benefited from the outcome of the 3-day Regional Workshop on "Strengthening the Understanding of Social Vulnerability (SV) in the Arab Region" organized in Cairo, Egypt, in September 25 – 27, 2016, in joint cooperation between AWC and WFP. The Workshop was held within the framework of the LAS Climate Risk Nexus Initiative addressing Food Security, Water Scarcity and Social Vulnerability (LAS/CRN) launched in November 2015. Almost 75 representatives of different countries from the Arab region and international organizations attended the workshop, aiming at contributing to the understanding and evaluation of social vulnerability as affected by major sources of risks, particularly poverty, climate change, water scarcity, food security, and conflicts.

The team would also like to thank Prof. Dr. Safwat Abdel Dayem, AWC Advisor, as well as AWC Task Force: Ms. Mervat Hassan, AWC Managing Director, Ms. Yara El Nagdi, AWC Business Development Officer and Eng. Noura Hani, AWC Communication Systems & Networks Engineer, for their inputs and review. Mapping and creative production services were provided by Eng. Hossam Gebril, AWC Senior Designer. The Chief Editor of the report is Dr. Mary Halim, AWC Technical Consultant.

Finally and most importantly, the team gratefully acknowledges the ***financial support of the World Food Programme (WFP)****, without which this report would not have been possible.*

Abbreviations

ACSAD	Arab Center for Sustainable Agricultural Development
AOAD	Arab Organization for Agricultural Development
AWC	Arab Water Council
CAPMAS	Central Agency for Public Mobilization and Statistics (Egypt)
CAST	Conflict Assessment System Tool
CCA	Climate Change Adaptation
CRN	Climate Risk Nexus
DRM	Disaster Risk Management
FAO	Food and Agriculture Organization
FSI	Fragile States Index
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
Gini	Gini coefficient is a measure of statistical dispersion intended to represent the income distribution of a nation's residents.
ICARDA	International Center for Agricultural Research for Dry Areas
IDP	Internally Displaced Persons
IDS	Institute for Development Studies
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research institute
IMF	International Monetary Fund
IPCC	Inter-Governmental Panel Committee for Climate Change
LAS	League of Arab States
MDGs	Millennium Development Goals
NAF	National Aid Fund
NGO	Non-Governmental Organization
PPP	Purchasing Power Parity
SLM	Sustainable Land Management
SSR	Self-Sufficiency Ratio
SV	Social Vulnerability
SVI	Social Vulnerability Index
S-NAPA	Sudan National Program of Action
UKMET	UK Meteorological Office
UNDP	United Nations Development Program
WB	World Bank
WFP	World Food Programme
WDI	World Development Indicators

REPORT

This report aims at reviewing the concept of social vulnerability and its applicability in the Arab region. In particular, the report focuses on certain aspects of social vulnerability and its relationship to different types of risk, including poverty, climate change, water scarcity, and food insecurity, with reference to conflict. These risks warrant focused attention as they are increasingly influencing development pathways and will have a strong impact on the achievement of the Sustainable Development Goals in a number of countries in the region. While a number of other relevant factors and sectors are important to the understanding of social vulnerability, including for example health and education, this report only considers these indirectly and would welcome further complementary research in this regard.

In this context, the report provides a broad-based review of existing literature, first hand sources of information from workshops and panel discussions to better understand social vulnerability in the Arab Region. The report targets a broad range of stakeholders involved in decision-making and policy design at regional and national levels. It also provides insights and acts as a resource for civil society, practitioners and community leaders.

Social Vulnerability Concept. There is no unanimously agreed upon definition on the term «social vulnerability» to-date. Traditionally, most stressors and shocks -including their impact- have been understood primarily from a physical point of view, such as infrastructure, while the socio-economic and environmental aspects have been less understood and researched. In this regard, the report highlights different aspects of social vulnerability, and also presents one of the most agreed upon definitions among stakeholders in the Arab Region:

«Social vulnerability is the inability of people, organizations and societies to withstand adverse impacts from multiple stressors to which they are exposed.»

Social vulnerability in this report is therefore looked at as a forward-looking concept referring to the potential of an individual/ group/ community/ state to be adversely affected by an event or a change and the ability to cope with or recover from its impacts.

Photo by: Ebtisam Elmanzlawy

Main Drivers Affecting Social Vulnerability in the Arab Region

The political and economic situation in the Arab Region is still quite challenging with violence continuing in Iraq, Libya, Syria, Somalia and Yemen. Egypt, Iraq, Jordan, Lebanon, Tunisia, and Sudan are hosting millions of forcibly displaced people from conflict areas. Most of the other Arab countries are consolidating their political environments and/or are undertaking major governance and economic reforms. Economic growth in the Arab Region was 2.9 percent in 2016, with lower-than-average growth (2.2 percent) in the GCC countries, while in Lebanon, Morocco and Tunisia it was down to 1.8 percent, and higher-than-average growth in the region's developing countries (4.4 percent). Growth in 2017 is projected to rise to 4.2 percent. Less than 3 percent of the population live in extreme poverty, yet vulnerability is high because 53 percent of the population live on $4.00 a day or less (IMF, 2016).

The Arab region suffers from water scarcity and is a net-food importer, hence expected to be facing a considerable challenge over the next four decades with projected population of 780 million people by 2050 (400 million more than today's population). Twenty five percent of the region's population is estimated as poor; while 34 % of the rural populations are poor; compared to 18 % of the urban population. As per water scarcity, most of the region already suffers water scarcity, with less than 800 m3 of water per person per year. Eighty percent of the agricultural land is rain-fed. With respect to food and malnutrition, countries of the region depend on imports to meet much of their food needs. ***Meanwhile, agricultural production in the Arab region has not kept pace with population growth,*** where it meets only half of the food requirements while the other half is imported from the international market. At the same time, more than half of all people living in the Arab region depend on agriculture for part of their livelihood, rendering many of them vulnerable to climate shocks. The consequences of these

Photo by: Eman Eltokhy

pressures and the risk of potential increases in global food prices adversely affect food security and the broader development objectives of human wellbeing. ***For non-producers, food security is more closely linked to developments in global markets, the national economy, and how well governments and food systems respond to shocks such as global food price volatility.*** Meanwhile, surging conflicts and protracted crisis with resulting humanitarian needs has also become an increasingly important factor to consider as populations are displaced and governments' capacities to offer basic service provision is diminished.

The adverse effects of climate change are already affecting many sectors, including agriculture and food security, biodiversity and ecosystems, water resources, human health, human settlements and migration patterns, energy, transport and industry. The region at-large is exposed to long-term climate change effects which will be particularly challenging in the already water scarce areas which have limited capacity to cope with additional shocks and stressors. ***Countries in the Arab region, with the exception of the GCC countries, are considered exceedingly vulnerable to impacts of climate change due to relatively high rates of poverty.*** For food and nutrition security, climate

extremes and climate change will act as a risk multiplier in the region, exacerbating the already existing social and economic vulnerabilities. Even small changes in precipitation or temperatures can lead to large changes in evaporation, runoff and recharge in arid areas.

Severe inequalities exist within and between the majority of countries in the region, as well as between urban and rural areas. ***Inequalities relate to most aspects of human development such as equal access to education, sanitation and clean drinking water, infrastructure and natural resources, income opportunities, justice and political protection.*** The most vulnerable groups in the Arab region include smallholder farmers, tenants, landless and wage earners, women-headed rural households, rural households living in remote areas, fishermen in the high seas, and poor urban consumers. In a male-dominated society, the Arab women in particular face inequality and challenges with reflections on their social vulnerability to poverty, water and food insecurity, and climate change.

Social Vulnerability in Selected Arab Countries

Risks derived by conflict, political instability, human displacement and economic migration are elements presented in all countries, yet to different degrees. Egypt, Jordan, Sudan and Yemen were thoroughly analyzed in this report. Main findings highlight how all four countries suffer severe shortage of water which limits their capacity of food production driving them to rely heavily on food imports, thus exposed and vulnerable to global food price hikes. Targeting the proper vulnerable groups is important as poverty is normally higher in the rural areas. More than 50% of rural people are poor in Sudan and Mauritania; 40% in Yemen and 35% in Iraq. The severe social vulnerability in these Arab countries and others signaled the governments to take action to build capacities for risk management.

The Republic of **Yemen** faces recurrent floods, and landslides in addition to the on-going war devastating the country's resources, infrastructure and its population wellbeing. **Jordan** has developed perennial drought conditions. Facing water scarcity challenges, Jordan is to reallocate its scarce water resources to higher value uses as the Kingdom›s only viable option. Other alternatives to meet growing demand are the significantly more expensive sources including desalination, treated wastewater and groundwater inter-basin transfer.

In **Egypt**, the country already experiences chronic water scarcity and the situation is forecasted to worsen as a consequence of climate change and the construction of large dams in the upstream Nile riparian countries. The agricultural sector uses 86 percent of abstracted water, followed by households (8 percent) and industry (6 percent).

In **Sudan,** the interaction of multiple stresses endemic poverty, ecosystem degradation, complex disasters and conflicts, as well as limited access to capital, markets, infrastructure and technology - have all weakened people's ability to adapt to changes in climate. Climate-related shocks will further exacerbate existing social vulnerabilities and expose weakness in systems and services in all those countries.

Egypt's fast growing population exerts significant pressure on resources and public services. The recent liberalization program of the exchange rate is expected to improve the functioning of the foreign exchange market, increase competitiveness and attract foreign investment. However, strengthening the Social Safety Net to protect the vulnerable during the process of adjustment is a cornerstone of the program.

In Jordan, the most recent drive for reforms has focused on the need to achieve economic stability based on enhanced productivity, increased competitiveness, gradual removal of subsidies, and financial sustainability.

The Way Forward

Sustainable economic growth is a key for addressing social vulnerability in the Arab Countries. Smart macro- and sector policies will have to play a key role, especially for incentivizing growth in labor-intensive sectors. However, and except may be the GCC countries, all other ***countries in the region need to develop proper poverty-reduction strategies to address social vulnerability issues, and contribute to all dimensions of growth.*** Pro-poor growth which focuses on creating an enabling environment for employment and income opportunities for poor and vulnerable people is likely to be more successful in reducing social vulnerability for the largest number of people.

Many countries in the region are implementing various economic reform programs. A typical program would include better-functioning foreign exchange markets lower-budget deficit and reduced public debt levels. Several countries in the region are already moving from non-targeted food and fuel subsidies to more targeted support for the most vulnerable and needy groups. For this to succeed and achieve high growth rates, governments should improve the business environment, deepen labor markets, simplify regulations and promote competition. ***Meanwhile, strengthening the social protection policies and safety net to protect the vulnerable during the process of adjustment should be a cornerstone of the reform programs.***

Social protection policies and measures should include: economic measures (to reduce poverty, promote economic growth, etc.), ***social measures*** (to reduce inequality, promote social inclusion, etc.), and ***political measures*** (to enhance participation, reduce civil unrest, promote state legitimacy and institutionalize democratic values). ***Additionally, the semi-formal and informal social protection systems that include member-based organizations are very significant across the region.*** Organizations to be encouraged could include: savings clubs, faith-based mechanisms such as zakat, and community-based support such as remittances within extended families. Actually, improving the structure and the targeting of social protection and social safety net programs represent a unique opportunity in the Arab

region to support pro-poor and promote inclusive growth. Costs and benefits of targeting, as well as various types of government interventions, need to be carefully analyzed to determine effective options in a country's context as each country has different social structures, food insecurity, national priorities and fiscal capacities to achieve them.

With insufficient water for agriculture and food production, innovative policies and strategies are needed to enhance food security or even to maintain current production levels. ***In the upcoming few years, policy-makers will be challenged by decision-making regarding the increased trade-offs between water requirements for food production, energy production, the environment, and urbanization. However, three main priorities are highlighted for helping countries to*** become more water-smart and reduce the impacts of such trade-offs: (1) optimizing water use (adopting a demand-management approach); (2) expanding water supply and availability whenever possible; and (3) reducing the impact of weather extremes, variability and uncertainty in the water supply. ***Arab States have a lot to gain by considering the water, energy and food security nexus policies as they strive to achieve progress on the Sustainable Development Goals (SDGs) and also to broaden the scale of regional security and peace.*** Direct cash payments and other softening tools need to be implemented to mitigate the effects of the phasing-out of the massive subsidies and other distortions within the water-energy-food nexus that would otherwise lead the region to resource, economic and political disasters.

Integrated and holistic solutions at food systems level are required to address issues of food insecurity and nutrition in the Arab region. Ensuring increased and more efficient agricultural production is critical to support economic development for poor rural populations. However, as a result of large quantities of food being internationally imported, domestic agricultural production alone will not be enough to safeguard food security. Instead, investments are needed throughout the food chain and must focus on macro-economic

management and reform of food subsidy systems, and reducing risks in food processing, storage, distribution, retail and consumption.

High prioritization of food security-related policies and programs in conflict prone countries has been seen as critical to reduce tension. ***Sound policies and programs have the potential to build resilience to conflict not only by helping countries and people cope with and recover from conflict, but also by contributing to preventing the happening of such conflicts.*** They also support economic development more broadly by helping countries and people become even more self-sufficient. Moreover, greater focus on empowering women in development will unlock potential for economic and social growth, hence deserve special attention of decision-makers. ***Women's economic empowerment can be achieved through a selection of measures including improved access to finance, extending education and health services, and training opportunities at all levels.*** These measures will provide them with much needed resources, skills and know-how necessary to be actively involved in various economic and social activities. ***A stronger focus on monitoring social vulnerability indicators, data availability, access and holistic analysis are necessary to advance integrated responses required to tackle social vulnerability.*** Ensuring that the public and decision-makers at all levels have access to such analysis – in the right format, reliable content, and at the time required – will be fundamental to support risk-informed development decisions and effective policy change.

1. INTRODUCTION

1.1 Background

The Arab region continues to be in transition. Violence continues in Iraq, Libya, the Syrian Arab Republic, and Yemen; and Iraq, Jordan, and Lebanon are home to millions of forcibly displaced people. The Arab Republic of Egypt and Tunisia are consolidating their political environments; Jordan and Morocco are also undertaking governance and economic reforms. The Gulf Cooperation Council (GCC) countries, while stable, are also challenged by low oil prices and are initiating reforms to diversify their economies. The situation in the West Bank and Gaza remains largely unchanged, with occasional outbreaks of violence.

Economic growth in the region was 2.9 percent in 2016, with lower-than-average growth in the GCC countries (2.2 percent) countries and in Lebanon, Morocco, and Tunisia (1.8 percent), and higher-than-average growth in the region's developing countries (4.4 percent). Growth in 2017 was projected to rise to 4.2 percent, assuming in large part that oil production increases in Libya and Iraq. Less than 3 percent of the population live in extreme poverty. Vulnerability is high because 53 percent of the population live on $4.00 a day or less (IMF, 2016).

A rapidly changing climate, greater exposure to disaster risks, and trends of land degradation, food and water insecurity present an unprecedented challenge for development in the Arab region. Social vulnerability and instability, poverty and inequality, migration and population growth, and urbanization are increasingly complex to manage, due to natural constraints such as limited arable land and freshwater. Climate change adds complexity to a number of these trends, making natural shocks and stresses like drought more frequent, intense and in some cases, creating new risk hotspots that demand urgent and concerted action.

The situation is particularly severe for vulnerable communities in the region that are already struggling with food and water insecurity. Unless assisted, these communities will likely not be able to cope in a scenario where growing and accessing food, and ensuring sufficient water for production and consumption, is ever more difficult.

National development policies for countries in the region need to be rethought, with investments in risk and resilience inherited. Achieving this requires a deep understanding of climate and disaster trends, dry land expansion, food and water challenges, as well as increasing levels of social vulnerability and conflict. Meanwhile, agricultural production in the Arab region has not kept pace with population growth; it meets only half of the food requirements while the other half is imported from the international market. At the same time, more than half of all people living in the Arab region depend on agriculture for part of their livelihood, rendering many of them vulnerable to climate shocks. The consequences of these pressures and potential increases in global food prices risk adversely affect food security and the broader development objectives of human wellbeing.

In this context, and as a positive response to the above challenges, the League of Arab States (LAS) has launched the Climate Risk Nexus (CRN) Initiative to strengthen capacities of LAS and Member States to enact decisions and policies that can better manage the growing complexity of risks and support the resilience of people and countries. [1]The CRN Initiative will help addressing existing gaps to achieve a more risk-informed development by improving the use of science and capacities of networks in the region, towards building a strong Arab profile that helps understand the nature of converging risks and the implications for development goals in the region. Under CRN Initiative, AWC and the WFP conducted a workshop on 25-27 September 2016, on "Strengthening the Understanding of Social Vulnerability in the Arab region" in Cairo. The main objective of this workshop was to improve the understanding and evaluation of social vulnerability in the Arab Region as affected by major sources of risks.

The workshop addressed social vulnerability gaps in science and data, shared experiences that are common to all countries, discussed types of vulnerabilities unique to specific contexts and identified data sources and potential ways to measure social vulnerability. The workshop deliberated different approaches to build resilience and ways of supporting transformational change in policy development within the Arab Region.

Outcomes of the workshop reiterated how social vulnerability should be considered as a cross-

[1]The initiative is supported by the United Nations Development Programme (UNDP), World food Programme (WFP), United Nations office for Disaster Risk Reduction (UNISDR) and the Arab Water Council (AWC) as lead agencies.

cutting issue in Arab Strategies. It also affirmed how the implementation of SDGs may allow for a more integrated approach while dealing with risks and vulnerabilities, across the social, economic and environmental pillars. The workshop concluded that the League of Arab States, has a particularly important role to play by developing regional strategies where addressing social vulnerabilities is presented as a priority. Enhancing partnerships and cooperation with regional and international organizations in applying capacity-building programs and exchanging good practices and knowledge was also considered a key pillar of advancing these efforts.

1.2 Rationale and Objective of the Report

The report aims at reviewing literature pertaining to the concept of social vulnerability and how it may be applicable to the Arab region. One of its key objectives is to improve the understanding of social vulnerability, and how it may be affected by different sources of risk, particularly poverty, climate change risks, water scarcity, food insecurity, and conflict.

In this context, with the broad objective of this report focusing on understanding social vulnerability and its application on the Arab region, the specific objectives include:

- Understanding basic terms relevant to social vulnerability and the main factors affecting them;
- Presenting a general framework of social vulnerability;
- Explaining why considering social vulnerability is necessary in order to reduce risk;
- Highlighting linkages with other major disciplinary teams and understanding how they relate;
- Understanding and analyzing the drivers of social vulnerability in the Arab region and their applicability to Arab countries;
- Reviewing and assessing adaptation approaches and mechanisms available to address different risks;

1.3 Methodology

The challenge of understanding social vulnerability can be defined in two points: lack of studies concerning social vulnerability in general and with respect to the Arab region in particular, and; limitation of information and data available concerning social vulnerability indicators taking into consideration the complexity of the social vulnerability concept.

The present review is based on secondary data and studies, theoretical or empirical, related to social vulnerability. This means that resources related to poverty, climate change, water scarcity, food security and malnutrition have been compiled from journal articles, books, documents and seminar/ conference proceedings. The concept of social vulnerability is discussed and applied to the Arab region in the light of the 17 Sustainable Development Goals (SDGs). The review has been further strengthened by consultations and validation workshops with regional stakeholders. This has allowed the main concept to be refined, for key social vulnerability indicators to be discussed, and for specific unique properties of social vulnerability relevant to the region to be addressed in more detail.

1.4 Target Audience

The recommendations provided by this review target a broad range of stakeholders involved in decision-making and policy design at regional and national levels. They also aim at providing insights and act as a resource for civil society, practitioners and community leaders with respect to awareness and ways in which social development and solidarity can be advanced.

2. THE CONCEPT OF SOCIAL VULNERABILITY

The concept of social vulnerability to natural hazards is one that has been documented widely in emergency and disaster literature for more than 30 years. The application of indicators that 'measure' social vulnerability to a natural hazard has also been attempted since the 1990s.

However, most research has largely focused on qualitative assessment methodologies rather than quantitative risk modeling. This section builds on previous research and applications and discusses the definition of social vulnerability and how it may be applicable to the Arab region. It also presents plausible indicators that could assist in measuring and monitoring progress in addressing social vulnerabilities.

2.1 Definition

For most of the twentieth century, disaster management typically focused on the physical world, emphasizing infrastructure and technology. Recently however, partly as a result of the emerging concept of social vulnerability, the discourse of natural hazards and disasters has come to also involve socio-economic factors as critical to community resilience (Juntunen, 2005).

Vulnerability could be classified as physical or social. Physical vulnerability refers to exposure to stress and crises resulting from physical hazards, while social vulnerability refers to the inability of individuals and communities to respond to physical impacts. Vulnerability may also be considered at many levels, including the individual, household, national or regional levels. When it comes to definition, to date, no one definition has been agreed upon. Thus, in many cases social vulnerability is lacking consensus on a conclusive definition, yet the core revolves around the same basic idea, namely:

«The inability of society to anticipate, cope with, resist and recover from the impact of natural, social, economic, environmental, or political hazards».

Social vulnerability does not have a unanimously agreed upon ***definition;*** however, most definitions have in common certain elements which can help summarize social vulnerability as "the inability of people, organizations, and societies to withstand adverse impacts from multiple stressors to which they are exposed».

Social vulnerability at any level (individual/group/community/state) is determined by a large number of drivers including poverty, water scarcity, food and malnutrition, social inequalities, policy risks, political instability and conflict.

Developing a ***Social Vulnerability Index*** can be useful to quantify social vulnerability taking into account a range of physical, social and economic indicators (depending on relevance and availability of data) which would allow for simplified monitoring and a better understanding of where specific actions and programs in relative terms are most needed.

Through consultations with regional stakeholders undertaken as part of this review, efforts were made to define what social vulnerability might mean for the Arab region[2] .

[2]Arab Water Council (AWC) and World Food Programme (WFP) Workshop on 'Strengthening the Understanding of Social Vulnerability in the Arab region' held in Cairo, Egypt, 25-27 September 2016.

One of the most agreed upon definitions among stakeholders was as follows: ***«Social vulnerability is the inability of people, organizations, and societies to withstand adverse impacts from multiple stressors to which they are exposed».*** This involves a combination of factors that determine the degree to which someone›s life and livelihood is at risk by a discrete and identifiable event in nature or society.

Social vulnerability is therefore a forward-looking concept referring to the potential of an individual/group/community/state to be adversely affected by an event or a change and the ability to cope with or recover from its impacts (Orindi and Zakieldeen, 2006).

2.2 The Importance of Understanding Social Vulnerability

It is of special importance for policy-makers to understand social vulnerabilities, their underlying factors, and affected populations in order to craft effective policies and targeted response strategies. Understanding social vulnerability allows policy makers to identify the adverse effects of risks at different levels over time and identify interventions that reduce or prevent the build-up of new risks. These efforts may relate to supporting effective adaptation priorities, but also better policies relating to structural challenges of poverty, food security and water scarcity.

One major gap is the lack of a well understood 'risk profile' for the Arab region that helps understand the nature of converging risks and the implications for development goals in the region and beyond. In the region, by applying the concept of social vulnerability as a lens to view these risks, an increased understanding of how risks emerge and manifest themselves is likely to be offered. Doing this effectively requires an increase in the ability of scientific networks and an improved coordination of capacities where each stakeholder can add value and identify entry points across the range of aspects integral to social vulnerabilities.

Addressing the issue of understanding social vulnerability in the Arab region is also expressed as a key element of the LAS/CRN Initiative and the need for high-level reports and reviews to come to grasp with the state of multi-dimensional

risk trends in the region and the evolving and unique profile that is progressively emerging. By presenting and discussing the social vulnerability approach and the results of this study with local experts and policy-makers, the strengthening of local capacity and leadership skills of decision-makers is also improved which provides a better outlook for the future of the region.

2.3 Framework for Social Vulnerability

States are assumed to improve the social welfare and wellbeing of their societies. As Figure (1) shows, this goal could be broken down into two sets of broad objectives: the first is related to efficiency (the allocation of resources to effect maximal national output); the second is non-efficiency objectives (Equity/Social Goals) (see Fig.1/p. including income distribution (the allocation of the benefits of national output to preferred groups or regions), and food security (the short-term stability of food prices at levels affordable to consumers, reflecting the adequacy of food supplies, and the long-term guarantee of adequate human nutrition), poverty alleviation, reduction of unemployment, alleviation of gender-inequality and other forms of discrimination, sustainability of development, and social stability. Policy actions that can support all these objectives are likely to be taken. Typically, however, the promotion of the efficiency objective conflicts with one or more of the non-efficiency objectives. These trade-offs largely arise because of constraints in the economic system. In such situation, policy-makers must trade off gains in one area with losses in the others. For example, small losses in efficiency might be tolerated if the action was believed to result in significant reduction in poverty or food insecurity. Policy-makers have to make these trade-offs explicitly or implicitly by forming value judgments about the worth of different objectives.

Connecting this background to social vulnerability, three important points can be concluded:

a) ***Further social wellbeing (welfare) necessarily reflects in reduced social vulnerability.*** Indeed, addressing social vulnerability is and should be recognized as an integral part of sustainable, long-term social welfare of a society. Sustainable social welfare is dependent not only on what and how much society currently consumes in terms of goods and services, the level of security and stability enjoyed, but also on expected future levels of consumption, security and stability.

b) ***Drivers of social vulnerability are more related to the non-efficiency objectives.*** Therefore, the policy-making context and environment in which weighing and value judgments are formed determine the trend and attitude towards social vulnerability. One important element of this is the skill level and existing capacities available for design and implementation of socio-economic development policies and programs.

c) ***The policy-makers are mostly concerned with the «current» situation more than the «future» situation.*** This is particularly true in such circumstances where economic resources are highly limited where the policy-makers are more involved in dealing with the short-term and immediate challenges rather than long-term situations. Under these circumstances, the society is less able to tolerate short-term losses for maintaining sustainability and long-run stability. Thus, short-term socio-economic pressures affect concerns about longer-term vulnerability.

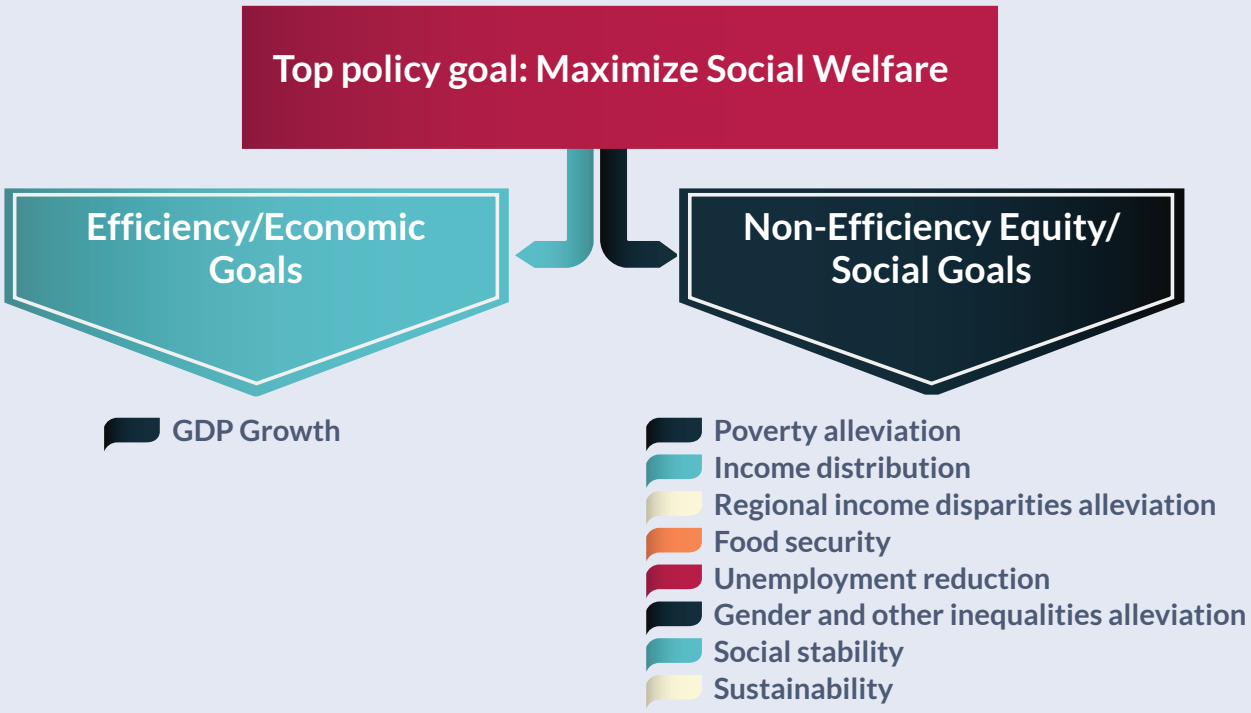

Figure 1: Policy Orientation of Social Vulnerability

2.4 Indicators of Social Vulnerability and Index

Vulnerability assessments strive to incorporate social, economic and political aspects as central to determining vulnerability levels in specific locations and moments in time. Vulnerability is commonly assessed using indicators that highlight a person's or system's sensitivity and exposure to certain risks or phenomena. Census or other data pertaining to population segments of a society, community or region are typical sources used for these assessments.

The set of indicators linked to social vulnerability depends on the types of risk that need to be addressed. Therefore, indicators of social vulnerability to poverty may differ from those of social vulnerability to climate change or food insecurity risks. However, there are certain indicators that are common to all risks, particularly those of poverty. Factors affecting social vulnerability may include: lack of access to resources (monetary, information, knowledge or technology); limited access to political power and representation; social capital (including social networks); customs and beliefs; building stock and age, frail and physically limited individuals; and type and density of infrastructure and lifeline (Lundgren et al., 2012).

The Fragile States Index: Social Vulnerability Index could be viewed as part of the Fragile States Index (FSI), which is an annual ranking of 178 nations, based on their levels of stability and the pressures they face. The comparison between the two indices is useful in policy-making processes while dealing with various risks. The Index is based on "The Fund for Peace proprietary Conflict Assessment System Tool" (CAST) analytical platform which performs content analysis on compiled information through sophisticated search parameters and algorithms, separating the relevant data from the irrelevant, guided by 12 primary social, economic and political indicators (each split into an average of 14 sub-indicators). This analysis is later converted into a score representing the significance of each of the various pressures for a given country using a certain algorithm. The lower the Fragile States Index, the better, thus a reduced score indicates an improvement, just as a higher score indicates greater instability. It is also important to mention that by using the above indices, the country's score (and indeed, its indicator scores) is a far more important and accurate indicator of a country's performance.

2.4.1 Social and Economic Indicators

Social and economic indicators can be divided into six sets of components or indicators: uneven economic development; poverty and economic decline; demographic pressures; public services; group grievance; and refugees and IDPs. The following outlines these components and their proxy variables:

1) ***Uneven Economic Development***[3] : Proxy variables are: Gini coefficient; income share of highest 10%; income share of lowest 10%; rural and urban distribution of services; improved service access, and slum population.
2) ***Poverty and Economic Decline***[4] : Proxy variables are: economic deficit; government debt; unemployment; youth employment; purchasing power; GDP per capita; GDP growth; inflation.
3) ***Demographic Pressures***[5] **:** Proxy variables are: natural disasters; disease; environmental pollution; food scarcity; malnutrition; water scarcity; population growth; youth bulge, and mortality.
4) ***Public Services***[6] **:** Proxy variables are: policing; criminality; education provision; literacy; water and sanitation; infrastructure; quality healthcare; telephony; internet access, and energy reliability roads.
5) ***Group Grievance***[7] **:** Proxy variables are: discrimination; powerlessness; ethnic violence; communal violence; sectarian and religious violence.
6) ***Refugees and Internally Displaced Persons (IDPs)***[8] **:** Proxy variables are: displacement; refugee camps; IDP camps; disease related to displacement; refugees per capita; IDPs per capita, and capacity to absorb.

3 When there are ethnic, religious, or regional disparities, governments tend to be uneven in their commitment to the social contract.

4 Poverty and economic decline strain the ability of the state to provide for its citizens if they cannot provide for themselves and can create friction between "haves" and "have not's".

5 Pressures on the population such as disease and natural disasters make it difficult for the government to protect its citizens or demonstrate a lack of capacity or will.

6 The provision of health, education, and sanitation services, among others, are key roles of the State

7 When tension and violence exist between groups, the state's ability to provide security is undermined and fear and further violence may ensue

8 Pressures associated with population displacement. This strains public services and has the potential to pose a security threat.

2.4.2 Political and Stability Indicators

Political indicators typically include six sets of indicators: state legitimacy, human rights and rule of law, human flight and brain drain, security apparatus, factionalized elites, and external intervention.

1) State Legitimacy: Corruption and lack of representativeness in the government directly undermine the social contract. This component includes pressures and measures related to: corruption; government effectiveness; political participation; electoral process; level of democracy; illicit economy; drug trade; protests and demonstrations, and power struggles.
2) Human Rights and Rule of Law: When human rights are violated or unevenly protected, the state is failing in its ultimate responsibility. This component includes pressures and measures related to: press freedom; civil liberties; political freedom; human trafficking; political prisoners; incarceration; religious persecution; torture and executions.
3) Human Flight and Brain Drain: When there is little opportunity, people migrate, leaving a vacuum of human capital. Those with resources and skills in demand also often leave before, or just as, for example, conflict erupts. This component includes pressures and measures related to: migration per capita; human capital, and emigration of educated citizens.
4) Security Apparatus: The security apparatus (linked to a sovereign state) should have a monopoly on use of legitimate force. The social contract is weakened where force is exercised by non-state groups. This component includes pressures and measures related to: internal conflict; small arms proliferation; riots and protests; fatalities from conflict; military coups; rebel activity; militancy; bombings, and political prisoners.

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5) Factionalized Elites: When local and national leaders engage in deadlock and brinksmanship for political gain, this undermines the social contract. This component includes pressures and measures related to: power struggles; defectors; flawed elections, and political competition.

6) External Intervention: When the State fails to meet its international or domestic obligations, external factors may intervene to provide services or to manipulate internal affairs. This component includes pressures and measures related to: foreign assistance; presence of peacekeepers; presence of UN Missions, foreign military intervention; sanctions, and credit rating.

2.5 Measurement of Social Vulnerability

In an attempt to quantify social vulnerability to a certain risk, an index approach is useful where each component and indicator is weighted and quantified (Iglesias et al, 2007). The scores of the vulnerability index range on a scale of 0 to 100, 0 being the least vulnerable and 100 the most vulnerable. The index is generated as the average of all components, which can be valued either equally or given different weights based on certain assumptions. The final value of the index depends on the valuation of each component. The sequential steps taken for quantification of a vulnerability index are:

(a) Select proxy variables for factors that contribute to the vulnerability;

(b) Normalize the proxy variables with respect to some common baseline;

(c) Combine the sub-component proxy variables within each vulnerability category by weighted averages; and

(d) Quantify vulnerability as the weighted average of the components. Here two examples are provided under two valuation scenarios, highlighting links to specific risks of climate change and food insecurity.

Measurement of Climate Change Vulnerability and Household Food Insecurity

Climate Change: Resource-dependent communities are particularly vulnerable to climate change; influence of which on the natural systems is already being felt. Projections point to large, potentially dramatic changes that are likely to occur in this century. Components of socio-economic vulnerability to climate change and an example of representative variables that can be used to characterize the vulnerable groups are as follows:

- ***Natural Component*** --- water resources and availability; per capital share; rain-fed areas; irrigated lands; forest areas.
- ***Economic Capacities*** --- GDP; agriculture production share in total GDP; poverty percent; etc. ***Human and Civic Resources*** --- population density and age groups; life expectancy; adults literacy; public health expenditures; access to water and sanitation;
- ***Agriculture Innovations*** --- fertilizers consumption; agriculture machinery

Household Food Insecurity: Vulnerability to food insecurity is a forward-looking concept based on the notion that the food security outcome of households is the result of a stochastic process, conditioned by a number of risk factors at different levels. Vulnerability is also further affected by strategies adopted by households, communities or public institutions (Scaramozzino, 2006). The categories of variables that should be present in the data set should include the following household- or individual-specific variables:

- Demographic characteristics: structure of the household; age; gender…
- Health Variables: morbidity; anthropometrical indicators…
- Labor Market Variables: education; employment status; agricultural and non-agricultural labor income..
- Production variables: crop production; harvesting..
- Other Economic Variables: assets; land; saving; investment; credit…
- Expenditure Variables: food consumption; non-food consumption; durables…
- Food Variables: breakdown of food consumption; dietary habits and preferences; intra-household food distribution…

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3. MAIN DRIVERS AFFECTING SOCIAL VULNERABILITY

IN THE ARAB REGION

The Arab region is facing a considerable challenge over the next four decades with projected population of 780 million people by 2050. Growing resource scarcity, particularly of water, will increasingly constrain food production growth, and climatic stresses will likely limit Arab farmers' abilities to produce grains. Meanwhile, growing demand for high-value foods will put further pressure on the natural resource base. The impacts of societal development are driving environmental changes that are potentially more extreme than at any other time in recorded history. Moreover, the complex interplays of social and economic factors are increasing the vulnerability of both people and environment.

Social vulnerability at any level is dependent on a large number of factors and risks that interact with each other with considerable complexity. This section addresses the applicability of social vulnerability with its major drivers relevant to the Arab region and how these may also be considered and linked to the Sustainable Development Goals. Specifically, the focus of this section will be on social vulnerabilities related to poverty, climate change risks, water scarcity, and food insecurity, and conflict-related risk and political instability, and links to policies (see Figure 2). Many of these drivers impact each other resulting in a multiplied effect on social vulnerability.

In the Arab region, 25% of the region's population is estimated to be poor, 34 % of the rural population is poor, compared to 18% of the urban population.

In terms of climate change, the Arab region is the driest place in the world with expectations of higher temperature, precipitation changes, and sea level rise by 2030. This is particularly worrying as 80 % of the agricultural land is currently rain-fed, coupled with changes in water runoff which is expected to decrease by 10% by 2050. Water demand is also projected to increase by 60%, by 2045 which will increase competition among different sectors. With respect to food security, countries in the region depend on imports to meet much of their food needs which exposes them to global food price shocks.

The most vulnerable groups in the Arab region include smallholder farmers, tenants, landless and wage earners, women-headed rural households, rural households living in remote areas, fishermen in the high seas, and poor urban consumers. Arab women in particular face inequality and challenges with reflections on their social vulnerability to poverty, food insecurity, and climate change.

3.1 Drivers of Social Vulnerability and their Interrelationships

To understand how social vulnerability plays out in the Arab region, a contextual understanding is required. For example, out of a total area of about 13.4 million sq. km, more than 87% is desert with extreme aridity and poor vegetation cover. Population and economic factors are also critical to consider; for example, the Arab population is increasingly becoming urbanized, and in 2015, out of a total Arab population of 392 million, 52% are urban. The aggregate GDP for all Arab countries was USD 2.8 trillion in 2014 of which USD 155 billion (5.5%) is generated in the agriculture sector (AOAD, 2015), yet there are high variations in terms of GDP per capita with Qatar at an estimated 73,600 USD and Yemen at around 1400 USD per capita.

On average, 37 % (or 47.6 million people) out of an economically active population of 126 million, were engaged in agriculture in 2006, down from 47.8% per cent in the 1990s. However, large differences exist between countries in the region, and the percentage remains quite high in some countries, for example, 50% of the economically active population in Yemen is engaged in agriculture.. On individual country basis, agriculture's contribution to gross domestic product is also quite low, ranging between 0.3% in Kuwait and Qatar to 34% in the Sudan. The regional average was 12.5% in 2005. Demographic growth (2.6%), economic growth, urbanization, industrialization and the expansion of irrigated agricultural lands have all contributed to a dramatic and unsustainable increase in water consumption over the past few decades.

Water scarcity is indeed a critical factor contributing to social vulnerability in the region, with direct implications on many other factors, including food security, peace and stability. The region qualifies as the most water scarce region in the world, with around 800 m3 per person per year compared to a global average of around 7000 m3 per person per year. In marginal drylands, a characteristic feature common to the Arab region is that over 90% of rainwater is lost to evaporation. The link between rural shocks, loss of livelihoods and income, and urbanization are also critical, particularly when taking into account that 80% of the rural population in the region depend on pastoralism and rainfed agriculture sensitive to drought shocks.

Like policy risks and political instability, climate risk can be considered a key factor that directly or indirectly exacerbates almost all other risk drivers including water scarcity, food insecurity and poverty. For example, affordability to food and poverty are affected by price policies, and conflict may be caused by political instability. Poverty, hunger and water stress are intrinsically linked. Regions with rain-fed agriculture often face challenges associated with water scarcity, fragile environments, drought and land degradation, high population pressure and low efficiency with regard to rainwater and investment in water infrastructure. Consequently, exposure to risk and risk-related vulnerability implies that people take precautions and that the responses to these risks have welfare consequences and implications for practice and policy (Oestigaard, 2012).

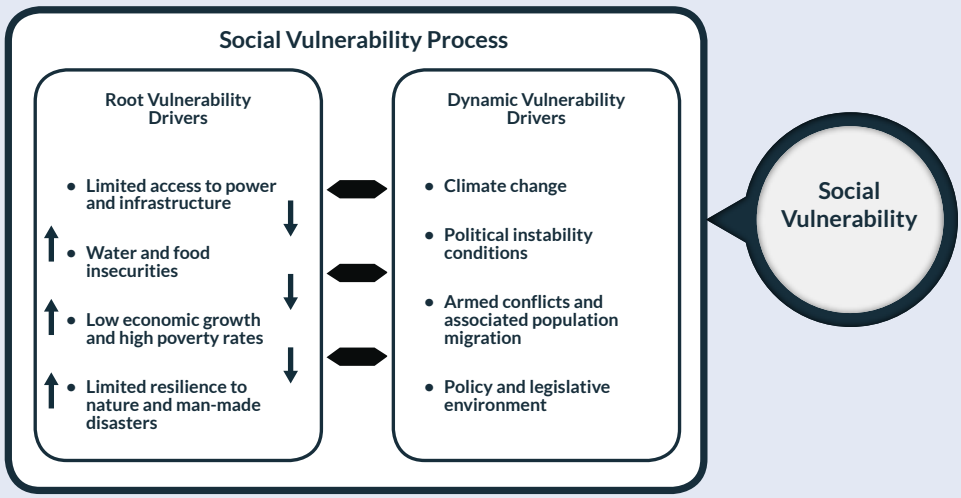

Figure 2: Drivers of Social Vulnerability

3.2 Social Vulnerability and the Sustainable Development Goals

There is a clear and often direct relation between most of the Sustainable Development Goals (SDGs), social vulnerability and major drivers of risks (see Figure 3). SDG 1 (No poverty) and SDG 2 (Zero hunger) address poverty and food security. SDG 8 and SDG 10 address issues of inclusive growth and reduced inequalities, which in turn relate to issues of uneven development and social inequalities being the major causes of poverty. SDG 3 focuses on ensuring good health, which relates to household food insecurity and malnutrition. Water scarcity and climate change risks are linked with SDG 6 and SDG 13 respectively. Also, SDG 14 and SDG 15 encounter the environmental risks. Gender inequality matches SDG 4. In conclusion, SDGs call for and require a more integrated approach to manage interconnected risks between social, economic and environmental pillars.

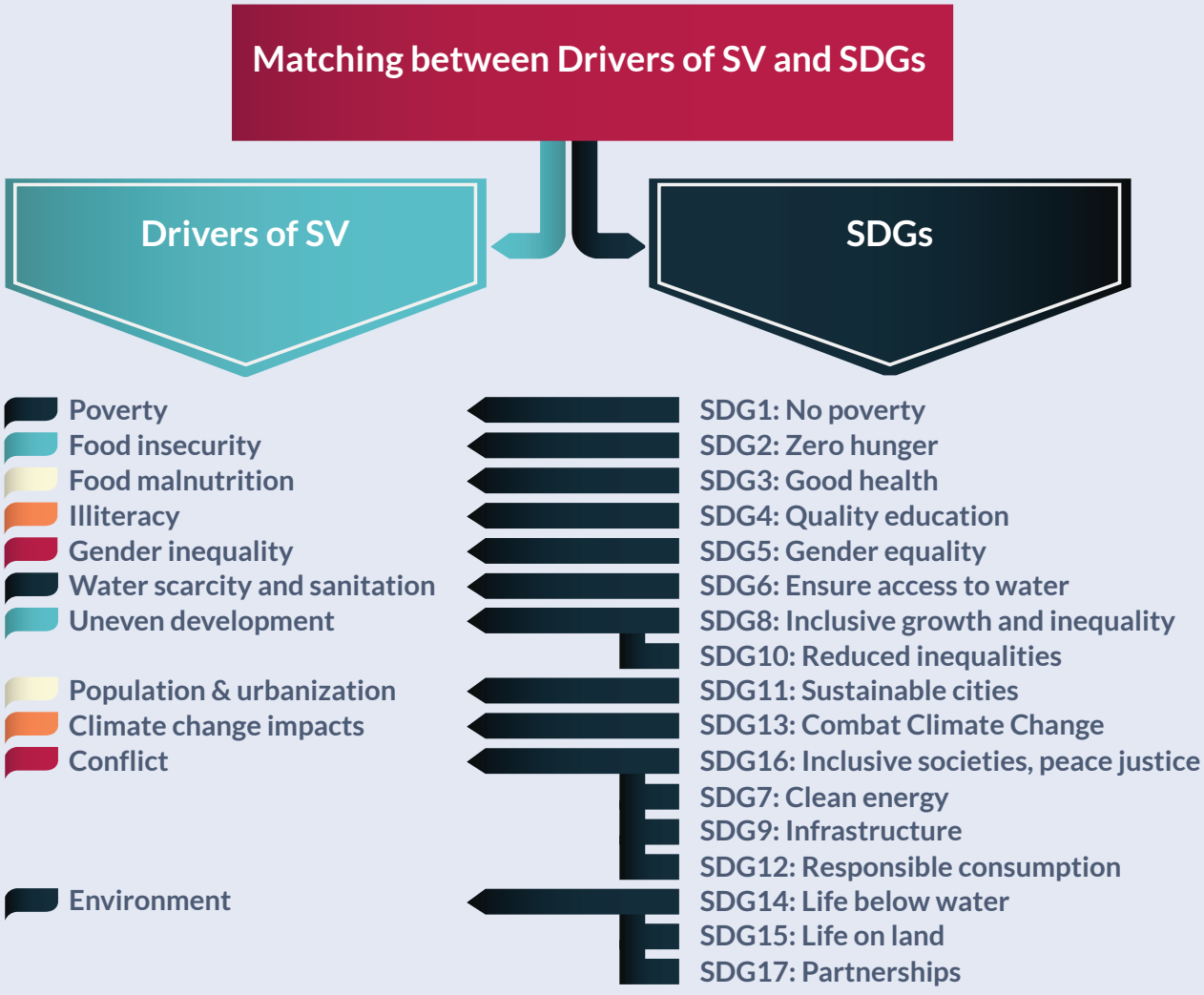

Figure 3: Matching between Drivers of Social Vulnerability and the Sustainable Development Goals

3. 3 Drivers of Social Vulnerability

3.3.1 Poverty

SDG 1: No poverty; End poverty in all its forms everywhere
SDG 2: Zero hunger; End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Poverty is generally associated with deprivation of health, education, food, knowledge, influence over one's environment and the many other things that make the difference between truly living and merely surviving, while the term vulnerability generally refers to exposure to contingencies and stress, and difficulty in coping with them (Philip and Rayhan, 2004).

Poverty has many links to other drivers of social vulnerability and is considered the main determinant of hunger. And like hunger, poverty is also multifaceted; it is not simply defined by a lack of income or consumption, but as highlighted, includes deprivation in areas of health, education, nutrition, security, empowerment and dignity. Vulnerability is a dimension of poverty. Without effective coping mechanisms, excessive exposure to shocks – such as droughts or sudden price swings – will lead to risk of future poverty. All of these dimensions interact with and reinforce one another.

Among a number of poverty indicators is the poverty gap against the national poverty line, which indicates the gap to be filled in order to bring all of the poor to the poverty line. Poor households generally spend large shares of their incomes on food, and many of them, even among farmers, are net food buyers. The inability of poor families to consume enough food to meet dietary requirements can have long-lasting impacts on cognitive capacities and hamper human development, with reduced economic productivity and hence affecting the national GDP.
Poverty in the Arab region is mainly a phenomenon affecting the 180 million people living in rural areas. However, this is not to say that urban environments are home to poor

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people. 25% of the region's overall population is estimated to be poor, of which about 58% live in rural areas. Furthermore, about 34% of the total rural population in the region is estimated to be poor, compared to 18% of the urban population. The distribution of the poor within countries is uneven, with some regions experiencing a higher incidence of poverty than others (e.g. Upper Egypt compared to the Delta region). In some countries, pockets of high poverty are found within areas of low-poverty incidence (Morocco, Tunisia), while other countries, such as Sudan, Yemen, Djibouti, and Somalia experience widespread rural poverty.

Table 1: Poverty and Inequality Indicators for the Arab countries[9]

Country	Population (m person)	Poverty Headcount Ratio at national poverty line	Population under Poverty Line in selected Countries (m)	Multi-dimensional Poverty Index (MPI) headcount	GINI Index	Illiteracy Ratio (%)	Human Development Index (HDI)
Year	2015		2015			2014	2014
Algeria	39.9	N/A		N/A	N/A	12.3	0.736
Bahrain	1.3	N/A		N/A	N/A	4.3	0.824
Comoros		44.8% (2004)		36.0(2012)	55.93 (2004)	N/A	0.503
Djibouti	0.9	N/A		29.3 (2006)	45.13 (2012)	N/A	0.470
Egypt	91.5	27.8% (2015)	25.4	3.6 (2014)	30.75 (2012)	23.7	0.690
Iraq	35.8	28.0% (2015)	10.0	11.6 (2011)	29.54 (2012)	20.3	0.654
Jordan	7.7	14.4% (2010)	1.1	1.7 (2012)	33.66 (2010)	6.4	0.748
Kuwait	3.6	N/A		N/A	N/A	3.9	0.816
Lebanon	5.1	28.6% (2004)	1.5	N/A	N/A	8.0	0.769
Libya	6.3	N/A		1.5 (2007)	N/A	N/A	0.724
Mauritania	3.5	42.0% (2008)	1.5	52.2 (2011)	37.48(2008)	47.9	0.506
Morocco	34.0	8.9% (2007)	3.0	15.4 (2011)	40.72 (2007)	28.0	0.628
Oman	4.2	N/A		N/A	N/A	6.1	0.793
Palestine	4.7	25.8% (2011)	2.2	1.5 (2010)	34.46(2009)	3.3	0.677
Qatar	2.4	N/A		N/A	N/A	2.3	0.850
Saudi Arabia	29.9	N/A		N/A	N/A	5.2	0.837
Somalia	10.8	N/A		81.2 (2006)	N/A	N/A	N/A
Sudan	40.2	46.5% (2009)	18.7	57.8 (2010)	N/A	24.0	0.469
Syria	18.5	80% (2015)	14.8	4.4 (2009)	35.77 (2004)	13.6	0.594
Tunisia	11.3	16.7% (2012)	1.9	1.2 (2012)	35.81 (2010)	19.0	0.721
UAE	9.5	N/A		N/A		7.0	0.835
Yemen	26.8	54.5% (2012)	14.6	N/A	35.89 (2005)	30.0	0.498
Total	387.9	24.4	94.7				

Notes:

Egypt: poverty rate increased from 25.2 % (2010) to 27.8% (2015)

Iraq: poverty rate increased from 18.9% (2012) to 28 % (2015)

Syria: poverty rate increased from 35.2% (2007) to 80% (2015)

Tunisia: poverty rate increased from 15.5% (2011) to 16.7% (2012)

Yemen: poverty rate increased from 34.8% (2005) to 42% (2009) and then 54.5% (2012)

9 Sources: 1) Arab Development Portal, 2) the Author's computations with respect to the number of poor population.

3.3.2 Food Insecurity

SDG2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture
SDG 3: Good health and well-being; ensure healthy lives and promote well-being for all.
SDG12: Responsible consumption, production; ensure sustainable consumption and production patterns.

All Arab countries depend heavily on imports to meet much of their food needs, a fact that exposes them to global food price shocks. The value of the Arab food gap is expected to reach about 80 billion USD by the year 2030. Table 2 presents a summary of indicators related to food security dimensions in the Arab countries.

3.3.2.1 Availability

A key determinant of food security lies in the availability of food and its constituents. Information on the amount of food available for consumption is mainly obtained at an aggregate level through food balance sheets, which provide data on the amount of energy and protein available per person per day at the country level. However, this information reports only on the amount of energy or nutrients available for consumption at the national level, not the actual amount of food consumed by individuals. Even if dietary energy supply is a good indicator of food availability, other indicators, such as food adequacy, are needed to provide information on the gap between food supply and average energy requirements. For example, dietary energy may be available but not diversified enough to provide the macro and micronutrients essential for a healthy life.

Environmental conditions in the Arab region limit the potential to grow food, and, with population growth, and shifting consumption demand countries are importing more of their food needs and becoming less dependent upon domestic agriculture for most types of food (FAO, 2015). This dependence on international markets means all countries are exposed to fluctuations in

international prices. This exposure is not risky in itself, but can be so, if countries are not wealthy enough to protect their citizens from food price inflation that results from high international food prices.

One of the factors of increasing food demands, namely the high rate of population growth with an annual average of about 2.3% during the last decade, is one of the highest rates compared with other regions in the world. Dependency in the Arab region on imported food is already substantial and likely to grow in the future. The Arab countries import about half of their food needs, and are considered the major importers of grain in the world. Three countries (Egypt, Algeria and Morocco) are among the top ten importers of wheat in the world.

The region meets its needs through imports of about half of its wheat and barley consumption requirements, 40% of its rice consumption, nearly 70% of its maize consumption, about 72% of sugar, 68% of vegetable oil, 31% of dairy products, and 14% of meat needs. The net value of food imports increased from USD 10.2 billion in 1980 to USD 28 billion in 2009, and out of the USD $16.3 billion . of grain imports, more than half was wheat (Lanchovichina et al., 2012). It is expected that the value of this gap will reach USD 80 billion by the year 2030.

3.3.2.2 Access

As long as food is available but is not adequately distributed among the population, hunger will remain an issue. It is therefore necessary to ensure that people have physical and economic access to food. Access to food is primarily determined by incomes, food prices and the ability of households and individuals to access social support. Over the entire period from 2000 to 2010, the relative food price index in the Arab Region had been high.

Beyond economic affordability, physical access to food is facilitated by adequate infrastructure, including roads and markets. These facilitate access and functioning of markets, help reduce price monopolies and the delivery of food and non-food products across regions and between production areas and urban centers. High poverty rates in the developing parts of the region suggest that a large number of households are also highly vulnerable to food price shocks.

3.3.2.3 Utilization

Many Arab countries have some of the highest rates of obesity in the world, while others have the highest incidence of stunting among children. With respect to under-nourishment, available data indicate that the proportion of under-nourished in Egypt, Tunisia, Algeria and Morocco is less than 5% (FAO, 2015), but increasing to 23% in Iraq (8 million Iraqis), and to 26% in Yemen (6 million Yemenis).

Malnutrition, especially among children and pregnant women, has high economic costs in the long-term due to the reduced productivity of malnourished children later in life. The nutrition indicators and others pose serious challenges to sustainable development, including food security and nutrition across the Arab Region. As concluded by an IFPRI study (IFPRI, 2015), food insecurity is not only a consequence of civil conflict, but can also trigger social unrest.

The main reasons behind the increased rates of these indicators are varied, but include high dependency on food imports to meet consumption needs; resource scarcity, particularly water; vulnerability to climate change; poverty; and high levels of social instability in many countries. The 2008 global food price crisis and social unrest as well as the uneven distribution of growth in several Arab countries have contributed to slow progress in reducing hunger and malnutrition. At the same time, wide-scale food subsidy systems such as

those in Egypt and Iraq appear to be ineffective in meeting the food needs of vulnerable people and addressing child malnutrition (IFPRI, 2015).

3.3.2.4 Stability

A food systems approach could be used for analyzing food insecurity as an organizing framework. This analysis provides good indicators for the performance of the food markets in the Arab countries, particularly with respect to determining the right prices for the different actors, which is related to issue of competitiveness. In the Arab region context, small-scale producers dominate the food production side with limited capacity of production. In the absence of market regulations and lack of information and weak producer institutions, big traders usually exploit them. There is lot of bottlenecks in the supply chains of most of food commodities, particularly with the lack of marketing services and post-harvest processing / transport / warehousing / distribution infrastructure, food labeling, food fortification. Furthermore, the role of governments is weak concerning the food safety and hygiene. These circumstances result in market failure with high transaction costs, low quality and less diversified goods available, high consumer prices, lack of access and nutritional quality. However, big supermarkets and retail stores are now wide spreading in the urban centers and big cities. They provide high quality diversified food but for high-income consumers.

Photo by: Hossam Gebril

Table 2: Food Security Indicators in the Arab Region

	Cultivated area	Food Production Index	Cereal yield	Domestic food price level index	Prevalence of under-nourishment	Depth of the food deficit per capita	Prevalence of stunting, height for age (% of children under 5)	Prevalence of wasting, weight for height (% of children under 5)	Food imports (% of merchandise imports)
Unit of measurement	Thousand hectare	Index	Kilogram per hectare	Index	percent	kilocalorie/day	percent	percent	percent
Source	FAO	WDI	WDI	FAOSTAT FAO	FAOSTAT FAO	FAOSTAT FAO	WDI	WDI	WB
Year	2013	2013	2013	2014	2014	2014	2014	2012	2014
Algeria	8435.0	157.5	1813.6	5.1	<5	20.0	11.7 (2012)	4.1	19.3
Bahrain	4.6	206.8	N/A	2.2	N/A	N/A	N/A	N/A	11.8
Comoros	118.0	112.9	1443.1	N/A	N/A	N/A	32.1 (2012)	11.1	31.4 (2012
Djibouti	2.0	134.4	2000.0	N/A	15.9	118.0	33.5 (2012)	21.5	N.A
Egypt	3761.0	118.7	7252.5	7.5	<5	12.0	22.3	9.5 (2014)	19.4
Iraq	5230.0	126.1	2197.1	N/A	22.8	185.0	22.6 (2011)	7.4 (2011)	7.2(2013)
Jordan	314.6	136.7	1678.0	4.5	<5	13.0	7.8 (2012)	2.4	19.8
Kuwait	17.6	170.2	8500.0	2.6	<5	21.0	5.8	2.4 (2014)	16.2
Lebanon	258.0	96.1	3382.1	N/A	<5	29.0	N/A	N/A	17.8 (2013)
Libya	2055.0	110.2	833.4	N/A	N/A	N/A	N/A	N/A	N/A
Mauritania	461.0	119.9	1130.1	10.1	5.6	36.0	22 (2012)	11.6	12(2013)
Morocco	9401.0	133.6	1828.4	5.7	<5	31.0	14.9 (2011)	2.3 (2011)	11.2
Oman	68.5	123.7	11254.4	3.3	<5	33.0	9.8 (2009)	7.1 (2009)	12.4
Palestine	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	N/A
Qatar	17.6	136.7	5930.9	1.8	N/A	N/A	N/A	N/A	9.7
Saudi Arabia	3295.0	107.9	4119.9	N/A	<5	9.0	N/A	N/A	14 (2015)
Somalia	1125.0	117.2	964.0	N/A	N/A	N/A	25.3 (2009)	15 (2009)	N/A
Sudan	17365.0	115.4	589.5	N/A	N/A	N/A	38.2	16.3 (2014)	N/A
Syria	5733.0	82.4	1576.1	N/A	N/A	N/A	27.5 (2009)	11.5 (2009)	N/A
Tunisia	5129.0	118.8	1691.3	3.9	<5	3.0	10.1 (2012)	2.8	11.2
United Arab Emirates	77.3	68.2	72443.0	N/A	<5	18.0	N/A	N/A	7.6
Yemen	1546.0	138.4	1008.2	N/A	26.1	182.0	46.8 (2013)	16.2 (2013)	46.9
Total	64414.5								

Source: Arab Development Portal, the Author's computations, and https://data.worldbank.org/indicator/TM.VAL.FOOD.ZS.UN

3.3.3 Water Scarcity and Sanitation

SDG 6: Clean water and sanitation; Ensure access to water and sanitation to all.

Water is the most important - and the scarcest - natural resource in the Arab region, which has the lowest freshwater resource endowment in the world. Annual per capita water availability is less than 800 m3 for the region as a whole, and less than 200 m3 in some countries, quantities that are insufficient to meet basic needs. Almost all Arab countries suffer from water scarcity- defined as having less than 1,000 m3of water per person per year (El-Ashry et al., 2010). New fresh water supplies are limited by physical, economic and political constraints. There is little new water that is not already tapped and this is mostly of low quality (e.g. treated sewage water) or involves high processing cost (e.g. desalination). Increasingly, more water is being diverted from agriculture to meet the growing demand from priority sectors such as domestic and industrial. Unlike the rest of the world, where 80% of agricultural land is rain-fed (accounting for over 60% of world food production), there is little rain-fed agriculture in the Arab region due to low soil humidity. Therefore, crop production depends on irrigation using river water, groundwater and, increasingly, marginal water and treated wastewater. The agriculture sector is the prime water consumer at the regional level, with an annual average consumption level of 146 km3, or 83% of the total amount of water available (IFAD, 2009).

Renewable water resources in the Arab region are estimated at around 335 km3 /year, more than half of this amount originates from outside the region. Per capita renewable water resources in the Region are expected to drop from 800 m3/year currently to 547m3 /year, by 2050. Fifteen of the 20 countries in the world with the lowest internal renewable freshwater supply (below the water stress threshold of 1,000 m3) are Arab countries. Due to water scarcity, a total of approximately 30 km of unconventional water supplies (desalinated seawater) are being produced every year, mainly in the Gulf countries (IFAD, 2009).

At the same time, climate change is expected to make the water situation even worse. It is estimated that climate change will reduce water runoff by 10% by 2050. Currently, the region suffers a water deficit and with increasing populations and per capita water use, demand is projected to increase a further 60% by 2045. As a result, share of the agriculture water will likely drop from the current 80% to about 50% in 2050. This reduction will seriously threaten food security and the already fragile environment (World Bank, 2009, and Verner, Dorte, Ed. 2012).

3.3.3.1 Access to clean water and sanitation and under-nourishment

Access to clean water and sanitation facilities affects health conditions of individuals and households, and hence their ability to utilize food. The body's capacity to absorb nutrients requires a good health status, especially in young individuals. North Africa recorded the lowest percentage (approximately 12%) of population without reasonable access to improved water sources in 1992. In addition, this percentage dropped to even less than 10% in 2011.

Low levels of access to clean water are associated in several countries with high levels of under-nourishment and a high frequency of under-weight children. This is the case, for instance in Sudan. While this association does not make it possible for establishing causality, it does warrant further investigation. As in the case of access to improved water sources, the percentage of population without access to reasonable improved sanitation facilities was low in the Arab Region (25 % in 1992), which declined significantly to only 10% in 2011. As indicated by the available data, the situation of access to improved sanitation facilities remains crucial and very alarming in the region.

Table 3: Water Scarcity Indicators in the Arab Region

Unit of measurement	Long-term average precipitation in depth millimeter / year	Renewable water resources, total BCM /year	Renewable water resources, per m3/year	Access to improved water source, percentage of population percent	Access to improved sanitation facilities, percentage of population percent	Treated municipal wastewater BCM / year
Source	(1)	(1)	(1)	(2)	(2)	(1)
Year	2014	2014	2014	2015	2015	2012
Algeria	89.0	11.7	294.0	83.6	87.6	0.3
Bahrain	83.0	0.1	84.2	100.0	99.2	0.1
Comoros	900.0	1.2	1522.0	91.1	35.8	N/A
Djibouti	220.0	0.3	337.0	90.1	47.4	N/A
Egypt	51.0	58.3	637.1	99.4	94.7	4.0
Iraq	216.0	89.9	2467.0	86.6	85.6	0.1
Jordan	111.0	0.9	123.4	96.9	98.6	0.1 (2012)
Kuwait	121.0	0.0	5.1	99.0	100	0.2
Lebanon	661.0	4.5	769.6	99.0	80.7	N/A
Libya	56.0	0.7	111.5	N/A	96.6	N/A
Mauritania	92.0	11.4	2802.0	57.9	40	N/A
Morocco	346.0	29.0	843.6	85.4	76.7	0.2 (2012)
Oman	125.0	0.8	311.7	93.4	96.7	0.0 (2012)
Palestine	402.0	1.4	179.3	58.4	92.3	N/A
Qatar	74.0	0.1	26.0	100.0	98.0	0.1
Saudi A.	59.0	2.4	76.1	97.0	100.0	1.1(2010)
Somalia	282.0	14.7	1363.0	N/A	N/A	N/A
Sudan	250.0	37.8	939.5	N/A	N/A	N/A
Syria	252.0	16.8	908.0	90.1	95.7	0.6
Tunisia	207.0	4.6	410.1	97.7	91.6	0,2(2010)
United A.E	78.0	0.2	16.4	99.6	97.6	N/A
Yemen	167.0	2.1	78.3	N/A	N/A	N/A
Total		288.9	742.7			6.4

(1) AQUASTAT/ FAO Food and Agriculture Organization

(2) World Development Indicators, The World Bank Source: Agricultural Development Portal – Water and Food Security Statistical Snapshot, 2016

3.3.4 Climate Change

SDG13: Climate action; Take urgent action to combat climate change and its impacts.

Social vulnerability to climate change reflects the stratified conditions in which people compete for the scarce and limited resources to militate against, respond to, and recover from disasters. Vulnerability to climate change can be examined through three dimensions; exposure, sensitivity and adaptive capacity (IPCC, 2012). Exposure is the "nature and degree to which a system is exposed to significant climatic variations». Sensitivity means the "degree to which a system is affected, either adversely or beneficially, by climate-related stimuli". Adaptive capacity is the "ability of a system or individual to adjust to climate change, to moderate potential damages, to take advantage of opportunities, and/ or to cope with the consequences".

The Arab region is highly vulnerable to climate change. By 2030, the region will be affected by long-term climate change trends: higher temperatures, precipitation changes, and sea level rise. More frequent, longer and intense heat extremes and drought affected by climate change are happening now in the Arab countries. The Arab region already experiences the effects of climate change; higher temperatures and extreme events such as drought and floods have become the new norm and extreme climate events are widely reported (WFP and ODI, 2015).

Climate change will adversely impact all economic sectors in the Arab countries. However, agricultural production will most likely be affected more than any other sector. Projections suggest that the rate of increase in agricultural production will slow down over the next few decades, and it may start to decline after 2050. Most of the Mediterranean region is projected to have less rainfall and higher temperature. This will increase water use and likely limit the productivity of some crops. Other areas, such as the Nile Delta in Egypt, will have to contend with saline intrusion from the sea. Farmers will face additional problems from higher temperatures such as reduction in crop yields, and soil fertility is likely to decline. The climate change effect is exacerbated because almost half of the Arab region's population are

Photo by: Hossam Gebril

engaged in agricultural and rural areas, with 40% of employment derived from agriculture. Compounding this vulnerability is troubling poverty rates: 34% of the rural population is poor, and unemployment is high, especially for women and youth (Verner, 2012).

Urban populations will also be affected by climate change either directly or indirectly. Impact of climate change in the agricultural and rural areas will reflect on the urban population in a number of ways; one through the rate of rural-to urban migration which will increase and will result in greater pressure on cities. Another is the adverse impact on the household food security of urban population because of potential increase in food prices. Droughts have been shown to increase rural-to-urban migration and establishment of informal settlements around the major cities in the region. With an expected 5-10 times increase in the number of heat waves in cities, i.e. the number of days in which extreme temperatures are experienced, productivity in labor intensive work, such as construction, will be adversely affected.

Flash flooding is also increasing in cities across the region as a result of more intense rainfall events, concrete surfaces that do not absorb water, inadequate and blocked drainage systems, and increased construction in low-lying areas and wadis. The number of people affected by flash floods has doubled over the last ten years to 500,000 people across the region. Climate change projections suggest that average temperatures in the Arab countries are likely to increase by up to 3°C by 2050. The Urban Heat effect is projected to increase night-time temperatures by an additional 3°C. In addition, providing water to urban areas is becoming increasingly difficult. Reasons for this include aging pipes, water loss from leakage of 40% or more in some major cities and no water infrastructure available for informal settlements (Verner, 2012).

3.3.4.1 Effect of climate change on poverty and food security

Climate extremes and climate change will act as a risk multiplier for both poverty and food insecurity in the Region. Climate-related shocks will not only exacerbate existing stresses faced by poor households but will also reinforce the underlying drivers of poverty. Repeated and long-term drought, for instance, will not only erode households monetary income, but it will also affect multi-dimensional indicators of poverty, including health, education and people's capability to participate in processes that are meaningful to them.

Climate change will not only affect food production (availability) but will also affect the other three dimensions of food security. The impact of climate change on food production is a serious issue, particularly for poor and small-scale food producers. The potential impacts of climate change on food prices, non-agricultural livelihoods and income, and food safety are also critical. Indeed, it is those impacts - not impacts on food production – that will most directly affect the majority of citizens by 2030, particularly the poorest and most vulnerable inhabitants in urban areas. At the farm household level, lower agricultural and food production means lower household incomes. At the same time, lower availability (production) at the national level could lead to higher food prices. Both lower incomes and higher food prices, in return, will affect the economic access of people, particularly poor people, to food. Furthermore lower cash income coupled with higher prices means lower real income, which in turn enforces the poor households to divert to lower quality cheaper food. Increased drought risk will also affect the stability and prices of food supplies. Evidence shows that safety nets and social protection systems in the Arab Region are challenged by food price shocks (WFP and ODI, 2015).

Characteristics of the poor that make them highly vulnerable to climate change

Many studies have concluded that the poor are the most vulnerable to climate change. The characteristics of the poor that make them highly vulnerable to climate change risk are:

- Dependence on natural resources that are exposed to climate;
- Lack of assets, which hinders effective adaptation;
- Settlements in at-risk areas, which are less productive and are vulnerable to floods, droughts, or other extreme events;
- Low levels of education, which prevent the poor from developing more climate-resilient skills or livelihood strategies;
- Migrant status, which can prevent them from accessing certain social services; and
- Minority status, which deters policy-makers from making them the focus of adaptation policies.

Based on the characteristics, the highly vulnerable individuals to climate change are as follows:

a) Small-holder marginal farmers and poor households dependent on agricultural daily wage labor will become vulnerable to both economic and social shocks and stresses such as indebtedness due to economic, social or life-cycle events, food insecurity, health problems, productivity loss, lack of access to inputs, information and markets, gender discrimination in ownership of assets and discrimination in the labor market (Holmes and Jones, 2009).

b) Small-scale pastoralists will also be highly vulnerable to the impacts of drought, and will have low capacity to adapt to climate change. Pastoralists constitute around 9% of MENA's agricultural population and exist in inland areas of Morocco, Algeria, Libya, Egypt and Syria. A further 14% are engaged in mixed dry land farming, combining livestock with barley, rain-fed wheat, and fodder, in North Africa, Jordan, Lebanon and Syria (Dixon et al., 2001).

c) Farmers in remote highland systems will become highly vulnerable to climate impacts because of extensive poverty, remoteness and marginal resources. Highland communities in Yemen, northern Iraq, Morocco, and Algeria make up around 30% of MENA's agricultural population. This includes both rain-fed farming of cereals, legumes, and trees on terraces, and sheep husbandry on communally managed lands.

d) Poor people, living in areas remote from public services and markets, and dependent on marginal natural resource bases, will be most vulnerable. Lacking the assets or opportunities to invest in agricultural adaptation or shift to entirely new economic strategies (such as migration). They are the most likely to be caught in poverty traps (Sabates -Wheeler et

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al, 2008). The people in MENA, most sensitive and vulnerable to climate change, may therefore be poor people living in drought-exposed, remote marginal areas with endemic poverty - especially highland systems, but also dry-land and pastoral systems.

e) Poor urban consumers affected by food price spikes as a result of climate extremes and harvest failures at global level affecting international food prices. Heat extremes may also impact productivity and livelihoods in urban areas, particularly those in labor-intensive employments such as construction sector, which could see drops in productivity by up to 20% in some countries as a result of increase in heat waves in urban areas.

Table 4: Projected annual temperature range over parts of the Arab region °C

Years	Best scenario	Worst scenario
2030	0.5-1.0	1-1.5
2070	1.0 -1.5	2.0-2.5
2100	2.5-3.0	3.0-4.0

Adapted from the IPCC, 2007
Source: Elasha, B.O. (2010). Mapping of Climate Change Threats and Human Development Impacts in the Arab Region. UNDP, Regional Bureau for Arab Studies.

3.3.5 Gender-inequality

SDG 5: Gender equality; Achieve gender equality and empower all women and girls.

To-date, there are gender-specific challenges facing women in the Arab region reflected in their social vulnerability to climate change, poverty and food insecurity. In the majority of cases, rural women tend to be more vulnerable than are men, largely due to their respective roles and positions in society. Women tend to have less education; they face travel difficulties because of cultural norms, pregnancy and child care and often lack the cultural and legal authority to assert their rights. For example, access to and control of water is usually ceded to landowners – which rarely is a woman. In rural areas, women face unequal involvement in agricultural activities including lack of access to credit, inputs, information and training; time poverty due to domestic and care activities; lack of ownership and access to productive assets; discrimination in the labor market (World Bank, 2008b).

Climate change will further affect rural livelihoods, and more men will feel obligated to move to cities to seek paid employment, which is mostly unskilled and temporary, with little security, low wages, crowded living conditions, and poor health support. As a result, on top of their already heavy domestic workload and local natural resource management, rural women are assumed to take over the departed male's community role, but with additional challenges that they may face due to the multiple inequalities related to women and girls, which hinder their ability to manage and recover from shocks and stresses and make them the most vulnerable to climate change. For instance, women tend to have lower incomes, fewer productive assets, greater responsibility for dependents and poorer access to education and climate-resilient livelihoods. With adverse climate impacts, the well-being of women and their dependents is under severe threat (Mearns et al., 2010).

Furthermore, women face social, economic and political barriers that limit their coping capacity. Women and men in rural areas in the Arab region are especially vulnerable when they are highly dependent on local natural resources for their livelihood. Those charged with the responsibility to secure water, food and fuel for cooking and heating face the greatest challenges. Secondly, women have an unequal access to resources and to decision-making processes, and organizations and support systems are often thwarted.

Women's representation in Arab governments is only 9% - half of the global average, which places them in a position where they are disproportionately affected by climate change and other risks. However, social protection policy and programming have not adequately recognized the gendered experiences of poverty and vulnerability (Holmes and Jones, 2009), (WFP and ODI, 2015).

To maximize the linkages between social protection and agricultural growth, and to improve the effectiveness of both for reducing poverty and improving food security, it is imperative that gender-sensitive measures at multiple levels (community, household and intra-household) are integrated into policy and program design and implementation (Holmes and Jones, 2009 and Verner, 2012).

Table 5: Gender Inequality Indicators in the Arab Region

	Gender Parity Index, Primary education	Gender Parity Index, Tertiary education	Un-employment rate, male	Un-employment rate, female	Proportion of seats held by women national parliaments	Proportion of women in ministerial level positions
Unit of measurement	Index	Index	%	%	%	%
Source	UNESCO, UIS	UNESCO, UIS	KILM-ILO	KILM-ILO	WDI	WDI
Year	2013	2013	2015	2015	2015	2015
Arab Region	0.9	1.0	8.96	19.96	18.7	10.5

ILO = International Labor Organization

WDI= World Development Indicators , The World Bank

* The Gender Statistical Snapshot has been last updated on April 13, 2016 and is based on the most recent data available

4. SOCIAL VULNERABILITY IN SELECTED ARAB COUNTRIES

The natural disaster risk in the Arab Region is high. An increase in the frequency of disasters in less-hazard-prone countries has helped bring the disaster risk management agenda to the forefront of development in the Arab Region. For example, since 2009, Saudi Arabia has suffered flash floods resulting in heavy economic and human loss; in 2007, Oman was impacted by cyclone Gonu; Bahrain has become one of the most vulnerable countries in terms of climate change and frequent sand and dust storms; and Jordan has developed perennial drought conditions (World Bank, 2014). The following tables focus on four country case studies; Egypt, Jordan, Sudan and Yemen discussing the drivers of social vulnerability in such countries. (see Annex 2 for more details)[10]

Countries referenced in this review all consistently suffer from severe shortage of water which limit their capacity of food production driving them to rely heavily on food imports, thus exposed and vulnerable to global price shocks. Climate change risk is expected to act as a multiplier to these risks, particularly with increasing pressure of population on the already depleting physical resources. Risks derived by conflict and economic and political instability exacerbate social vulnerability in the four countries, yet with different degrees

The 2011 drought in Djibouti led the government to undertake a Post-Disaster Needs Assessment to understand the impact of the drought and to develop a recovery framework to build long-term resilience. This framework included creating an emergency fund to respond effectively to the drought while establishing cooperation with neighboring drought-affected countries such as Ethiopia, Kenya and Somalia.

10 Source: Compiled from: Tables from 1-4 of the present Study; Climate Change Knowledge Portal; Arab Development Portal; and the Author's computations.

Table 6: Drivers of Social Vulnerability in Four Arab Countries

Driver	Indicator	Egypt	Jordan	Sudan	Yemen
Poverty	Population	104 million (2017)	7.7 million (2015)	40.2 million (2015)	26.8 million (2015)
	Human Development Index (HDI):	0.690 (2014)	0.748 (2014)	0.498 (2014)	0.498 (2014)
	Poverty headcount ratio at national poverty line	27.8 % of total population (2015)	14.4 % of total population (2010)	46.5 % of total population (2009)	54.5% of total population (2012)
	Number of poor (living under national poverty line)	25.4 million persons (2015)	1.1 million (2015)	18.7 million (2015)	14.6 million (2015)
	Multi-dimensional Poverty Index (MPI) value	0.014 (2014)	N/A	N/A	N/A
	Multi-dimensional Poverty Index (MPI) headcount	3.6 % (2014)	1.7 % (2012)	57.8 % (2010)	N/A
	Gini Index:	30.75 (2008)	33.66 (2010)	N/A	35.89 (2005)
	Illiteracy ratio of whole population	23.7%	N/A	24.0%	N/A
Food security	Cultivated area:	3.76 million hectares (2013)	0.31 million hectare (2013)	17.4 million hectares (2013)	1.55 million hectares (2013)
	Food Production Index	118.7 (2013)	136.7 (2013)	115.4 (2013)	138.4 (2013)
	Cereal yield	7253 kg per hectare (2013)	1678.0 kg per hectare (2013	587.5 kg per hectare (2013)	1008.2 kg per hectare(2013)
	Domestic Food Price Index:	7.5 (2014)	4.5 (2014)	N/A	N/A
	Prevalence of under-nourishment	<5 % (2014)	<5 % (2014)	N/A	26.1% (2014)
	Depth of the food deficit per capita	12 kilocalorie/day (2014)	13 kilocalorie/day(2014)	N/A	182.0 kilocalorie/day
	Prevalence of stunting, height for age (% of children under 5)	22.3% (2014)	7.8 % (2012)	38.2 % (2014)	46.8% (2013)
	Prevalence of wasting, weight for height (% of children under 5)	9.5% (2014)	2.4% (2012)	16.3 % (2012)	16.2 % (2013)
Water scarcity	Long-term average precipitation in depth	51 mm/year (2014)	111.0 mm/year (2014	mm/year: 250 (2014)	167.0 mm/year (2014)
	Renewable resources, total	58.3 billion m3/year	0.9 billion m3/year (2014)	37.8 billion m3/year (2014)	2.1 billion m3/year (2014)
	Renewable resources, per capita	637.1 m3/year (2014)	123.4 m3/year (2014)	939.5 m3/year (2014)	78.3 m3/year (2014)
	Population having access to improved water source as a percent of whole population	99.4% (2015)	96.9% (2015)	N/A	N/A
	Population having access to improved sanitation facilities as percent of whole population	94.7% (2015)	98.6% (2015)	N/A	N/A
	Treated municipal wastewater	4 billion m3/year (2012)	0.1 billion m3/year (2010)	N/A	N/A

Table 7. Climate Change and Implications for Disaster Risk Management

Egypt	Jordan	Sudan	Yemen
• Projections of future rainfall indicate a 7% reduction in rainfall near the coast by 2050, while a 9% reduction is projected for the central parts of the country with the greatest reductions projected during June, July and August at 22%, followed by September, October and November by 11%. However, model projections diverge for the central regions. The highest reductions are projected for June, July and August by 27% and September, October and November by 1%. • Runoff is projected to decrease by 14% near the coast and by 13% in the center of the country. • Key precipitation trends: Although there is high annual variability in rainfall records, the linear trend for seasonal average and decadal variability indicates a reduction since 1960. • Key temperature trends: Records at the Helwan station for seasonal average temperatures and inter-annual and decadal variability show a warming of about 0.03°C per century since the 1900s. • Temperature: Mean annual temperature projected to increase by 2°C to 3°C by 2050. • Rainfall: Mean annual precipitation projected to decrease by 7% to 9% by 2050. • Extreme: Warming projected to increase more rapidly in the interior region.	• Jordan is likely to face an enormous freshwater problem. • Average rainfall in Jordan is expected to decrease by a third, and multiple drought-type occurrences are expected to triple in frequency, from about 8 inches 30 years to about 25 inches 30 years. • Simulation models showed an increase in temperature of about 2°C by the year 2050. • It is predicted that Jordan will get 51% to 75% less Yarmouk water compared to the historical flow rate. Once irrigated farming recovers in Syria to pre-conflict terms, the water flow over the Syria-Jordan border through the Yarmouk would be half that. • The change in precipitation and temperature will highly affect the amounts of monthly surface runoff for the main surface water basins in Jordan.	• For future projections till 2050 the minimum change will be during February by an increase of 1°C, while the maximum change will occur in November by an increase in of 3°C. The mean annual change in temperature will increase by 2.7°C. • The expected temperature increase and decrease of precipitation will result in decreasing productivity of the land specially smallholder rainfed subsistence farming that dominates in the upper states, and is characterized by low yields. • The (semi) arid parts of Sudan in the North rely almost exclusively on irrigated agriculture, but it is characterized by low productivity on the large smallholder schemes in Sudan. The expected increase in temperature by 2.5°C in most of the Northern states will put extra load on available Nile water consumption.	• Rainfall tends to fall in short heavy bursts that are at time intense and result in flooding. If rainfall intensity increases as is projected with climate change, particularly for the months of September, October and November, flooding could become an even more severe issue. • Yemen's water crisis ranks among the worst in the world. High aridity, fast-depleting groundwater reserves, and projected increases in temperature indicate that stress on agricultural production will increase. Greater rainfall variability could result in prolonged drought periods. Some areas will lose their economic viability as well as drinking water supplies, causing displacement and resettlement. • Water stress is observed to be increasing, with groundwater reserves likely to be mostly depleted in two to three decades regardless of climate change, reducing agricultural output by up to 40 %.
Implications for disaster risk management	**Implications for disaster risk management:**	**Implications for disaster risk management:**	**Implications for disaster risk management:**
Saline sea water will penetrate far into the northern delta, turning the current lakes into shallow saline lagoons and bays. Inundation along coastal areas due to sea level rise leading to destruction of property and disruption of the proper functioning of infrastructure facilities directly exposed to the sea. Substantial reduction in agricultural productivity.	Rising temperatures could affect agricultural production. Increasing competing demands for water including drinking water and agricultural production. Increased heavy rainfall could increase threat of flooding. Increased variability in rainfall patterns might increase consecutive drought occurrences.	Reduced yield and livestock production will reduce overall income and access to food (own production) There is a greater risk to livestock via heat stress and reduction in water availability as a result of increased evaporation and possible reduced rainfall.	Many parts of Yemen are likely to become uninhabitable within a few decades unless prudent measures are urgently taken and enforced to manage water, prioritizing human and animal drinking needs, followed by other domestic needs. Rising sea levels will affect much of the fisheries and coastal infrastructure, as well the living conditions for three of the country's major cities. Considerable financial investment is needed for mitigation while many highlanders will be moving to these coastal areas and thus putting more pressure on resources there.

5. POLICY AREAS AND INTERVENTIONS CRITICAL TO ADDRESS SOCIAL VULNERABILITY IN THE ARAB REGION

Most Arab countries face increasingly problematic and inter-linked issues of water, food and energy that pose a threat to development of societies. Climate change and protracted crises will make these challenges even harder to address. Consumption and production patterns need to be brought to sustainable levels. The unequal distribution of environmental, economic and social resources must be recognized and re-considered. Cities and infrastructure must be made resilient to natural hazards and climate change. These combined trends create an increasing probability to fuel grievances related to ethnic, religious or economic. marginalization and are critical elements of what constitutes social vulnerability in the region.

Having taken stock of these trends and how they influence social vulnerability in previous sections, the following sections seek to identify priority areas which have the potential to tackle social vulnerability in a holistic manner.

Investing into reducing social vulnerability requires engagement from a range of stakeholders and from a multitude of sectors. These range from the agriculture sector, to authorities in charge of managing water, to financial, health and social welfare ministries. Strengthened, and more targeted, social protection mechanisms in particular may offer pro-poor support to marginalized populations in urban and rural areas. Moving from blanket subsidies to social assistance for the poorest segments of the population which can offer vocational trainings, employment, in-kind or cash assistance and similar, show particular promise.

Policy and intervention responses which embraces a 'nexus' approach can support the identification of a balanced way forward where optimal outcomes for one sector can be achieved, whilst ensuring the best scenarios of potential influence on others. Yet, to do this effectively, the question relating to data, data sharing, coordination and leadership will be crucial. Without these elements, resolving the fundamental barriers and factors which contribute to social vulnerability will not be possible.

5.1 Poverty Reduction and the Case for Social Protection and Safety Nets in the Arab Region

Governments introduce social protection policies with economic objectives (reducing poverty, promoting economic growth, etc.), social objectives (reducing inequality, promoting social inclusion), and political objectives (reducing civil unrest, promoting state legitimacy). Social protection mechanisms in the Arab region include price subsidies, school feeding, public works and nutrition programs. All countries also run social security funds that provide retirement pensions, compensation for injuries at work and other forms of social insurance.

Well-designed social protection systems offer ways to reduce both risk and vulnerability and support growth. With appropriate analysis and participatory planning processes, social protection and safety nets can build more resilience livelihoods and promote prudent risk-taking in perceived high-risk sectors such as agriculture, which may otherwise prevent the poor from venturing into new opportunities (Holmes and Jones, 2009).

Many countries in the Arab region do not yet have national social protection strategies, however the semi-formal and informal social protection systems including member-based organizations such as savings clubs, faith-based mechanisms such as "zakat", and community-based support such as remittances within extended families are very significant across the region. Consumer price subsidies have been historically favored by governments in the region as an instrument to reduce household food insecurity. There is a predominance of general food subsidies in this region, which are expensive and regressive rather than pro-poor, since the benefits are captured disproportionately by the non-poor (over 80% in Egypt). Governments in the Arab region spend more on subsidies, both absolutely and as a proportion of Gross Domestic Product (5.7% on average), than other developing countries (1.3% on average). Conversely, social assistance programs receive a much smaller fraction of governments' social protection budgets (Devereux, WFP & IDS, 2015).

Many governments in the region are involved in reform of their subsidy and social protection systems, geared towards better supporting the poorest segments of population and adjustment to more constrained fiscal environments (World Bank, 2011). While these steps offer promise and can support in addressing social vulnerability, an important aspect to consider is the lag between when any new policies are implemented and when their impact takes place. These lags are not always taken into account yet might warrant complementing strategies, or related actions, for reducing social vulnerability and managing risk (Scaramozzino, 2006).

5.2 The Water Scarcity Challenge: Adaptation and Development Needs

According to the World Bank (Gustafson, 2016), the Arab Region could see a decline in economic growth of up to 6% of GDP by 2050 due to water-related losses in agriculture, health, income, and property. With declining water for agriculture and food production, a critical solution to enhance food security or even to maintain current production levels is to sustainably and substantially increase the productivity of water. Therefore, water management policies will be key in providing guidance for increased productivity. Business practices, including inadequate regulation of common groundwater aquifers leading to overuse, further increase the negative effects of climate change, while policies that enable and better incentivize the efficient use of water (such as investments in physical infrastructure for water storage) can neutralize or even reverse those effects.

In the forth coming years, policy-makers will be faced by the necessity of making decisions about increasing trade-offs between water requirements for food production, energy production, the environment, and urbanization. Each country and sub-region faces unique risks and conditions and will thus need to determine which combination of policies makes most sense for its specific situation.

However, three main priorities are highlighted for helping countries become more water-smart and reduce the impacts of those trade-offs:

- Optimizing water use through better planning and incentives including water permits, water pricing and incentives to prevent water waste.
- Expanding water supply and availability whenever possible by increasing investments in infrastructure such as dams that store water until it is needed as well as wastewater recycling programs and desalination programs.
- Reducing the impact of weather extremes, variability and uncertainty in the water supply. This goal could be achieved through increasing storage capacities and water recycling systems as well as engaging in better urban planning and risk management programs. In rural areas, crop insurance programs play an important role in protecting farmers from weather shocks; investing in physical infrastructure like seawalls, levees and dams can protect coastal areas from storm surges and flooding.

5.3 Integrating Conflict Sensitivity to Address Resilience Deficits in Areas Experiencing Crisis and Prone to Conflict

Food insecurity at the national and household levels is not only a consequence of conflict but can also cause and drive conflicts (Breisinger et al., 2014). High prioritization of food security–related policies and programs in conflict prone countries have been seen as critical to reduce tension. These kinds of policies and programs have the potential to build resilience to conflict by not only helping countries and people to cope with and recover from conflict, but also contribute to preventing conflicts. They also support economic development more broadly—that is, helping countries and people become even more self-sufficient.

Based on this definition and a new conceptual framework, the report offers several insights from four case studies on Egypt, Somalia, Sudan, and Yemen, including:

- First, conflicts are often related to other shocks such as economic crises, price shocks, and natural disasters.
- Second, increasing subsidies is a favored policy measure in times of crisis; however, such measures do not qualify for building resilience and offer only temporary stability at a high fiscal cost.
- Third, ensuring risk-informed development and resilience building should be an integral part of conflict prevention because increased shocks are expected to significantly increase the likelihood of conflict in the future.
- Fourth, building price information systems, introducing and expanding credit and insurance markets, geographic targeting of social safety nets, and building functioning and effective institutions are key measures for building resilience, and in the Arab region can also help prevent conflict and social tensions (Breisinger et al., 2014).

6 CONCLUSION AND RECOMMENDATIONS FOR THE WAY FORWARD

Political and economic situation in the Arab Region is still quite challenging with violence continuing in Iraq, Libya, Syria, Somalia and Yemen. Egypt, Iraq, Jordan and Lebanon are hosting millions of forcibly displaced people from conflict areas. Most of the other Arab countries are consolidating their political environments and are undertaking major governance and economic reforms.

The Arab region will be facing a considerable challenge over the next four decades with projected population of 780 million people by 2050, 400 million more than today. Growing resource scarcity, particularly of water, will increasingly constrain food production growth, and climatic stresses will likely reduce the ability of Arab farmers' to produce grains. In countries affected by conflict, displacement of people and physical insecurity will pose significant long-term challenges and adversely influence social vulnerabilities.

Agricultural production in Arab region has not kept pace with population growth. It meets only half of the food requirements while the other half is imported from the international market. At the same time, more than half of all people living in the Arab region depend on agriculture for part of their livelihood, rendering many of them vulnerable to climate shocks. A growing demand for high-value food, due to increased urbanization, will put further pressure on the natural resource base and foreign currency reserves. The consequences of these pressures and potential increases in global food prices risk adversely affect food security and the broader development objectives of human wellbeing.

The region at-large is exposed to long-term climate change effects which will be particularly challenging in already water scarce areas which have limited capacity to cope with additional shocks and stressors. Countries in the Arab region, with the exception of the GCC countries, are also considered vulnerable to impacts of climate change due to relatively high rates of poverty and because even small changes in precipitation or temperatures can lead to large changes in evaporation, runoff and recharge in arid areas. For food and nutrition security, climate extremes and climate change will act as a risk multiplier in the region, exacerbating already existing vulnerabilities.

Severe inequalities exist within and between the majority of countries in the region, as well as between urban and rural areas. These challenges relate to most aspects of human development such as equal access to education, sanitation and clean water, infrastructure and natural resources, income opportunities, justice and political protection.

Taking stock of social vulnerability in the Arab region, this report suggests a number of recommendations and way forward. In part these recommendations are based on literature reviews, but also take into account consultations with stakeholders participating in workshops and discussions held with academia, government representatives, and international organizations engaged in various panel discussions and other fora. These recommendations include the following:

- Sustainable economic growth is key for addressing social vulnerability in the Arab Countries. Smart macro- and sector policies will have to play a key role, especially for incentivizing growth in labor-intensive sectors. However and except may be the GCC, ***countries the region need to develop proper poverty reduction strategies to address water and food insecurity , and contribute to all dimensions of growth.*** The strategies should also aim to accelerate progress toward reducing rural poverty; and reduce economic barriers to

access essential services (social, financial, etc.). Adopting a sustainable pro-poor growth policies is fundamental element of tackling risks and drivers of social vulnerability. Economic growth by itself may not result in improved poverty levels, reduced climate vulnerability and food insecurity. Pro-poor growth which focuses on creating an enabling environment for employment and incomes opportunities for poor and vulnerable people is likely to be more successful in reducing social vulnerability for the largest number of people.

- Many countries in the region are implementing various economic reform programs. A typical program would include better functioning foreign exchange markets; lower budget deficit and reduced public debt levels. For this to succeed and achieve high growth rates, government should improve the business environment, deepen labor markets, simplify regulations and promote competition. ***Meanwhile, strengthening the social safety net to protect the vulnerable during the process of adjustment should be a cornerstone of the reform programs.*** Actually, improving the structure and the targeting of social protection and social safety net programs represent a unique opportunity in the Arab region to support pro-poor and promote inclusive growth. Many countries in the region are already moving from non-targeted food and fuel subsidies to more targeted support for the most vulnerable and needy groups. Increasingly, social protection and safety net mechanisms also hold the possibility to provide a broad range of social assistance, including facilitating income opportunities and promotion of livelihoods through employment programs and public works. Costs and benefits of targeting and various types of government interventions need to be carefully analyzed to determine effective options in a country's context as each country has different social structures, food insecurity, national priorities and fiscal capacities to achieve them.
- Climate change is expected to see temperatures rise faster here than the global average, making parts of the region uninhabitable by mid-century. Unless actions are taken, social and economic impacts will be felt in loss of agricultural livelihoods, high unemployment, mass displacement, and resource conflicts. Climate change amplifies competition for resources in communities and transboundary disputes between countries. ***Countries and households in the region will need to diversify their production and income generation, integrate adaptation into all policy making and activities, and ensure a sustained national commitment to address the social, economic, and environmental consequences of climate change and variability.***
- Social vulnerability in the Arab region should be of serious concern and is amplified by natural and human risks. Addressing existing vulnerabilities and risks which contribute to social vulnerability will require a combination of social, economic and environmental initiatives that take a systems and nexus approach fit to tackle urban and rural dimensions simultaneously. ***Arab States have much to gain from considering the water, energy and food security nexus policy as they strive to achieve progress on the Sustainable Development Goals (SDGs) and also to broader regional security and peace.*** Direct cash payments and other softening tools need to be implemented to mitigate the effects of the phasing out of the massive subsidies and other distortions within the water-energy-food nexus that would otherwise lead the region to resource, economic, and political disasters.
- ***Integrated and holistic solutions at food systems level is required to address issues of food insecurity and nutrition in the Arab region.*** Ensuring increased and more efficient agricultural production is critical to support economic development for poor rural populations. However, as a result of large

quantities of food being internationally imported, domestic agricultural production alone will not be enough to safeguard food security. Instead, investments are needed throughout the food chain and must focus on macroeconomic management and reform of food subsidy systems, and reducing risks in food processing, storage, distribution, retail and consumption. Integrating specific nutrition objectives to tackle micronutrient deficiencies, alarming levels of stunting in some countries, alongside high levels of obesity, calls for stronger emphasis on healthy diets and awareness raising in support of sustainable consumption behaviors and increased resilience of local communities.

- A greater focus on empowering women in development will unlock potential for economic and social growth and deserve special attention of decision-makers. ***Women's economic empowerment can be achieved through a selection of measures including extending education and training opportunities to women and girls at all levels to provide*** them with much needed skills and know-how necessary to be actively involved in various economic and social activities. Developing women's business' opportunities could be achieved through training and incubation schemes in addition to backing business projects that observe equality of chances and fairness. Women's economic empowerment also entails equal access to essential public services like health and education benefits.
- ***A stronger focus on data availability, access and holistic analysis is necessary to advance integrated responses required to tackle social vulnerability.*** Stronger coordination between existing authorities, institutes, academia, private sector, international organizations and affected communities to support knowledge dissemination and utilization is required. These efforts should also include undertaking new and innovative applied research to tackle complex challenges. Ensuring that decision makers at all levels have access to such analysis – in the right format, reliably, and at the time required – will be fundamental to support risk-informed development and effective policy change.

Photo by: Hossam Gebril

ANNEX 1. SOCIAL INDICATORS FOR SELECTED ARAB COUNTRIES IN 2014

Table A1.1. Population and Land Resources and Human Development Index in the Arab Countries, 2014

Country	Total Population (Thousand)	Rural Population (Thousand)	Rural to Total (%)	Agricultural Labor (Thousand)	Cultivated Area (ha)	HDI	Per Capita Agric. Land (ha)
Non-oil							
Algeria	39,500	9,792	24.8	2,550.6	8,465	82	0.2
Djibouti	954	201	21.1	287	0.41	168	0.0
Egypt	85,783	49,719	58.0	6,935	3,744	106	0.04
Iraq	36,004	10,921	30.3	1,583	5,268	119	0.1
Jordan	6,675	1,161	17.4	191	300	75	0.0
Lebanon	5,304	617	11.6	26	245	69	0.0
Libya	6,703	1,361	20.3	54	2,644	93	0.4
Mauritania	3,970	2,299	57.9	863	322	153	0.1
Morocco	33,921	13,437	39.6	4,119	9186	125	0.3
Palestine	4,551	742	16.3	95	148		0.0
Somalia	13,590	7,204	53.0	2,794	1500		0.1
Sudan	37,461	24,724	66.0	3,371	21,756	163	0.58
Syria	27,590	9,400	34.1	1,352	5,730.	136	0.2
Tunisia	10,997	3,674	33.4	821	5,205	94	0.5
Yemen	26,184	16,463	62.9	2,215	1,609	159	0.1
Total	339,186	151,715	44.7%	27,257	66,126	-	0.2
Bahrain	1,362	149	10.9	9.5	4	47	0.0
Kuwait	4,519	59	1.3	321	16	46	0.0
Emirates	9,086	1,396	15.4	154	77	34	0.0
Oman	3,883	805	20.7	338	142	56	0.0
Qatar	2,235	77	3.4	23.12	14	33	0.0
Saudi Arabia	30,770	5,018	16.3	468	4,192	35	0.1
Total GCC	51,857	7,504	14,5%	1,3145	4,445	-	0.1
Total	391,042	159,219	40.7	28,571.	70,567	-	0.2

Source: http://www.aoad.org/statbook35.htm

http://ar.actualitix.com/country/wld/ar-human-development-index-by-country.php

Table A1.2. GDP, AGDP and Food Imports in the Arab Countries, 2014

Country	Gross Domestic Product ($ million)	Per capita GDP (000,$)	Agri. GDP ($ million)	AGDP to GDP (%)	FOOD EXPORTS ($ million)	FOOD IMPORTS ($ million)	Net Food Imports ($ million)
Non-oil							
Algeria	213,343	5.4	21,967	10.3	323	9,427	9,104
Djibouti	1,457	1.5	49	3.4	31	48	18
Egypt	265,576	3.1	38,466	14.5	4,658	12,298	7,639
Iraq	223,508	6.2	9,350	4.2	9	1,174	1,166
Jordan	35,928	5.4	1,194	3.3	1,792	3,234	1,442
Lebanon	45,700	8.6	1,900	4.2	825	3,817	2,992
Libya	64,439	9.6	885	1.4	7	1,829	1,822
Mauritania	4,166	1.0	586	14.1	64	84	20
Morocco	95,167	2.8	14,777	15.5	3,920	4,863	944
Palestine	12,765	2.8	433	3.4	48	95	47
Somalia	1,300	0.1	820	63.1	16	437	421
Sudan	79,676	2.1	25,136	31.5	987	203	-784
Syria	60,193	2.2	12,221	20.3	1,431	687	-743
Tunisia	47,111	4.3	3,792	8.0	1,296	2,221	924
Yemen	34,714	1.3	5,127	14.8	479	3,479	3,000
Total	1,185,044	3.5	136,702	11,5%	15,885	43,897	28,012
Bahrain	33,671	24.7	93	0.3	69	552	483
Emirates	399,451	44.0	2,709	0.7	3,302	6,296	2,994
Kuwait	140,111	31.0	627	0.4	89	1,330	1,242
Oman	81,143	20.9	578	0.7	608	1,225	617
Qatar	210,288	94.1	209	0.1	49	2,510	2,461
Saudi Arabia	746,248	24.3	14,325	1.9	3,071	24,936	21,865
GCC Total	1,610,913	31.0	18,542	1.15%	7,188	36,849	29,661
Total	2,795,956	7.2	155,244	5.6	23,073	80,746	57,673

Source: http://www.aoad.org/statbook35.htm

http://ar.actualitix.com/country/wld/ar-human-development-index-by-country.php

ANNEX 2. SOCIAL VULNERABILITY DRIVERS IN SELECTED ARAB COUNTRIES[11]

Egypt

Overview

Egypt has a total land area of 995,450 sq. km of which only 3.4% is arable. Egypt had an estimated population of 88.5 million in 2015 (104 million in 2017), with an average growth rate of about 2.6% annually during the last ten years. In 2014, per capita GDP was estimated at US$ 3100 and about 25% of the total population lived under the national poverty line. About 97% of the Egyptian population lives on 4% of Egypt's total land area in the Nile Valley and Delta. The average population density is 1,435 persons per square kilometer, which exerts tremendous strain on the River Nile's ecosystem. Most of the agriculture is concentrated near the banks of the River Nile; agriculture remains the biggest employer (over 27 % of the total labor force). Agriculture contributed 14% to GDP in 2014, and consumes about 80% of all freshwater resources. Egypt is a net-food importing country and lies among the top importers of wheat in the world. Egypt is a country of scarce agriculture land and water with per capita land of 0.05 hectare and per capita water of 620 cubic meters annually. Most of Egypt's population and infrastructure are concentrated in the Nile Delta and along the Mediterranean coast, which makes the country vulnerable to the impacts of sea level rise, particularly inundation and salt intrusion (World Bank, 2014a).

Since 2011, Egypt has experienced political upheaval due to societal unrest over the lack of economic opportunities and political inclusion. The subsequent political developments in the country have adversely affected the Egyptian economy and people›s livelihoods.

Poverty

Despite the economic development that took place between 2005 and 2008, when Egypt experienced high GDP growth with an overall drop in poverty from 40.5 % in 2004 to 35.7 % in 2008, poverty remains a major challenge in Egypt. At that time, it was estimated that about 19.6 % were living in absolute poverty, and 21 % were nearly poor. Nearly half the population is vulnerable to external shocks, especially rising food prices. Poverty rate increased over the years 2012/2013, reaching 26.3% compared with 25.2% in 2010/2011 and nearly 25% live just above the poverty line. Recently, CAPMAS (www.youm7.com/story/2016/7/26/) released the poverty rate for 2015 at 27.8% with nearly 25% of the Egyptians just above the poverty line. Poverty rate in Upper Egypt is 57% which is 3 times the poverty rate in Lower Egypt. At the Governorate level, poverty rates ranged between 6.7% in Port-Said to 66% in Assiut and Sohag. Some 11.9% of Egypt›s population is in extreme multi-dimensional poverty. In addition, many of the households along the poverty line are highly vulnerable and susceptible to falling back into poverty as a result of a host of factors. Data also shows that there has been an increase in inequality, with the Gini-coefficient rising from 28.7 to 31 between 2005

11 Source: Compiled from: Tables 1-4 of the present study; Climate Change Knowledge Portal; Arab Development Portal; and the Author's computations.

and 2010. While more recent data is not available, it is believed that inequality is still on the rise.

Most of the country›s rural poor people live in Governorates of Upper Egypt, where there are higher rates of illiteracy and infant mortality, poorer access to safe water and sanitation, and larger number of underweight children. According to the CAPMAS, around 51% of the population living in rural areas in Upper Egypt is poor. Although most people in Upper Egypt depend on agriculture for their livelihoods, smallholder farming in this region does not provide them with sufficient food security and income. Most smallholders have limited access to water, in terms of both quality and quantity. In addition, they have very small landholdings compared to those in Lower Egypt. They cultivate traditional crops with low market value and generate limited income, and they do not have adequate access to financing and credit. Alternative employment opportunities are lacking in Upper Egypt because of the limited development of micro enterprises or other non-farm economic activity. Local markets are underdeveloped, and marketing infrastructure – including transport and storage facilities – is poor, while producers› associations are not well organized.

Rural poor people in Egypt include tenant and small-scale farmers, landless laborers, unemployed youth and women – particularly those women who head about one in five Egyptian households.

Water Scarcity

Egypt has been suffering from severe water scarcity in recent years. Uneven water distribution, misuse of water resources and inefficient irrigation techniques are some of the major factors endangering water security in the country. Being more or less an arid country, Egypt is not heavily dependent on rain like in other countries to support its rapidly growing population and development. The River Nile is the lifeline of the country as it services the country's industrial and agricultural demand and is the primary source of drinking water for the population.

Rising populations and rapid economic development in the countries of the Nile Basin, pollution and environmental degradation are decreasing water availability for Egypt. Egypt is facing an annual water deficit of around 13 billion m3, the total fresh water resources is 59 billion m3 while the total consumption is 72 billion m3 annually.

The major factors affecting Egypt's water security include population, inefficient irrigation, pollution, and regional upheavals particularly the Ethiopian dams. The latest threat is a massive Renaissance Dam scheduled to be completed in 2017 on the headwaters of the Blue Nile, which supplies 59% of Egypt's water.

Population

Egypt's population will grow to 118 million by the year 2030 (already 98 million in 2017) and 160 million by the year 2050. The rapid population increase multiplies the stress on Egypt's water supply by more water requirements for domestic consumption and increased irrigation water use to meet higher food demands.

Inefficient Irrigation

Egypt receives less than 80 mm of rainfall a year, and only 6% of the country is arable and agricultural land, with the rest being desert. This leads to excessive watering and the use of wasteful irrigation techniques such as flood irrigation. Egypt's irrigation network is highly inefficient, losing as much as 3 billion m3 of Nile water per year through evaporation.

Pollution

Agricultural runoffs, industrial effluents and municipal sewage are being dumped into the Nile River, gradually making its water unfit for human consumption. Agricultural runoffs frequently contain pollutants from pesticides and herbicides. Industrial effluents are often highly toxic, containing heavy metals that can combine with the suspended solids in domestic wastewater to form muck. All of these factors combine together to render the Nile a polluted river, which may spell doom for the generations to come.

Regional Upheavals

With the Nile supplying 95% of Egypt's freshwater, losing some of the water supply could cause additional challenges to Egypt's water security.

A further decrease in water supply would lead to a decline in arable land available for agriculture, and with agriculture being the biggest employer of youth in Egypt, water scarcity could lead to increased unemployment levels and could endanger the country's stability and regional dominance.

It is imperative on the Egyptian government and the entire population to act swiftly and decisively to mitigate water scarcity, implement water conservation techniques, control water pollution, develop plans that would install more efficient irrigation techniques, and control water pollution in order to avoid a disaster (Dakkak, 2016).

Food Insecurity

Egypt is a net food-importing country, including importing 45–55% of its wheat demand, which makes it vulnerable to fluctuations in international food prices. Higher global food and fuel prices and lower foreign currency inflows from exports, tourism, foreign direct investment, and other sources that have only partly been offset by increased remittances from abroad, have resulted in a widening of the balance-of-payments deficit.

The challenging macro-economic backdrop has adversely affected households. Economic growth on a per capita basis fell dramatically from an annual average of 4.5% between 2005 and 2008, to 3.1% between 2009 and 2010, to almost zero in 2011 and 2012, and was coupled with growing unemployment.

Poverty has driven an increase in household food insecurity. Estimates of CAPMAS from the 2010–2011 Household Income, Expenditure, and Consumption Survey (Egypt, CAPMAS 2011) show that income poverty increased from 19.6% in 2004–2005, to 21.6% in 2008–2009, to 25.2% (21 million people) in 2010–2011. Between 2009 and 2011, 15.2% of the population (12.2 million people) fell into poverty, double the percentage of those who moved out of poverty (7.7%), and a further 12.6% of the population remained in chronic poverty.

Child malnutrition has also reached very high levels. Chronic malnutrition among children started to rise as early as 2003, and by 2008 about one-third of Egyptian children younger than five was stunted. Since then, child malnutrition has remained high, indicating not only a delink between nutrition and economic growth, but also limited capacity of the health system to adequately and regularly detect, treat, and monitor malnutrition, especially in children younger than five (Breisinger et al., 2011).

Despite the high level of food subsidies, food insecurity and poverty are on the rise, contributing to the double burden of malnutrition. Rising poverty has resulted in increasing dependence on cheaper, calorie dense food, including subsidized commodities, all of which have a correlation with obesity. Compounded by high food prices, changing lifestyles, and poor nutritional awareness, obesity in Egypt is on the rise, with an estimated 48 % of women older than 15 being obese. The coexistence of obesity and stunting has added to the phenomenon of the double burden of malnutrition in Egypt, now among the highest in the world.

Climate Change

Egypt is one of the most vulnerable countries to the potential impacts and risks of climate change. It is virtually rainless and depends entirely (80%) on the River Nile (whose source is outside of Egypt) to meet its water needs. Precipitation minimally impacts on the economy; therefore, climate impacts on water supply are indirect and may result from impacts on the principal sources of the River Nile.

Egyptian agriculture is vulnerable to potential climate change due to its dependence on irrigated crops. The climate is too dry to support crops and increasing water demands. The vast majority of Egypt's crops are irrigated from Nile water creating great vulnerability to reductions in Nile flow. Climate change also increases crop evapotranspiration needs and can reduce yields creating vulnerability. Furthermore agricultural lands in the Nile Delta face the threat of inundation from sea level rise (McCarl et al., 2015).

Inundation along coastal areas would also lead to destruction of property and disruption of the proper functioning of infrastructure facilities directly exposed to the sea. There might be significant reduction in the agricultural production of Egypt since it is estimated that about 30-40% of Egypt's Agricultural production is from the low-lying areas of the Delta and coast that are susceptible to sea level rise (McCarl et al., 2015).

In total, climate change would create substantial reduction in agricultural productivity. Egypt's Nile Delta and its coastal front on the Mediterranean are considered vulnerable to shoreline changes due to erosion and accretion, subsidence and sea level rise due to climate change. Coastal zones host a major proportion of industrial activities, distributed among a large number of highly populated economic centers, such as the cities of Alexandria, Rosetta, Damietta, Port-Said, Suez and Hurghada. Saline seawater will penetrate far into the Northern Delta, turning the current lakes into shallow saline lagoons and bays.

Climate change has effects on crop yields, livestock performance, non- agricultural water

use, water supply, irrigation water use, sea level rise and a growing population. Expected results indicate that climate change could damage the Egyptian agriculture sector and the damages would increase overtime (2030–2060). Prices for agricultural commodities increase and this has a negative effect on consumers but a positive effect on producers. Egypt may reduce these damages by adapting through lower demand growth, raised agricultural technological progress, sea rise protection and water conservation strategies.

Climate change will not only affect food production but will affect the four dimensions of food security. Availability of food through local production will be affected by climate change in three ways. First the indirect impact of climate on water supply that may result from impacts on the principal sources of the River Nile. Second: degradation of agricultural land in the North Delta resulting from salt-water intrusion and limiting rice cultivations. Third: substantial reduction in agricultural productivity because of the heat and indirect environmental feedbacks.

Accessibility and affordability of food will be impacted because of infrastructure damage, asset losses, and loss of income and employment opportunities. Stability will be affected due to increased livelihood risks, pressure on food prices and higher dependency on food imports. Utilization will be impacted by human health risks.

The people most affected by climate change include: landless people dependent on wage earnings; small farmers living in the North Delta region; population living in coastal areas and low-lying flood plains; small-scale fishermen and coastal communities; indigenous people living in remote areas; small farmers in Upper Egypt, and urban consumers.

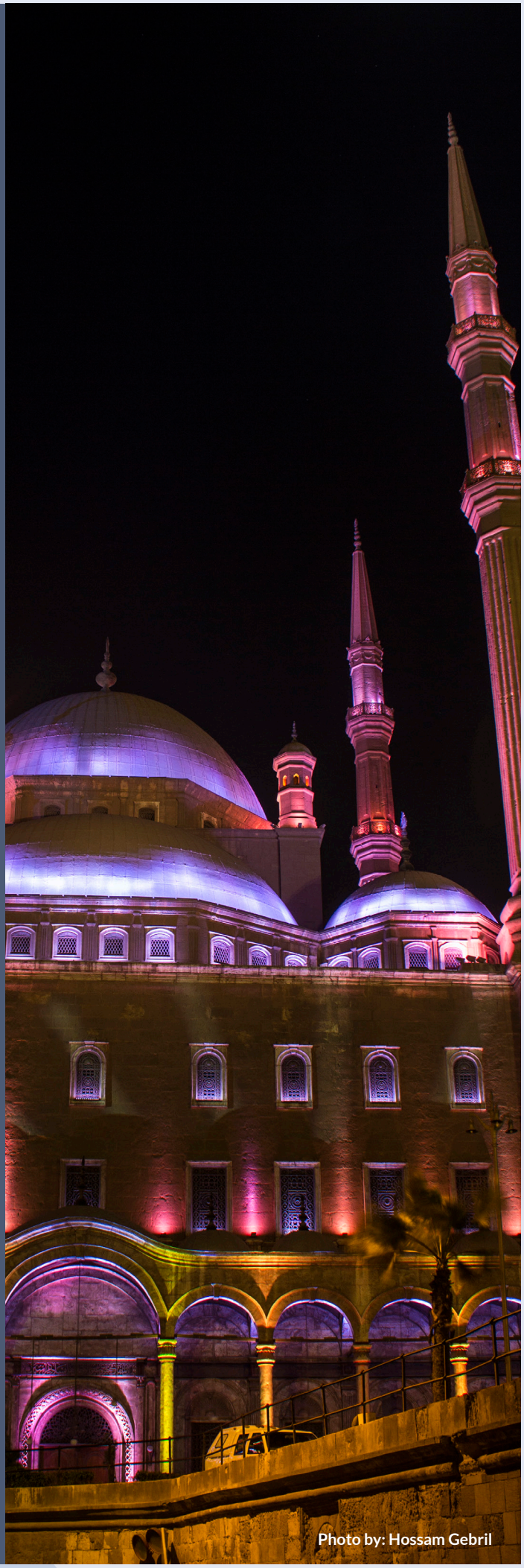


Photo by: Hossam Gebril

Jordan

Overview

Jordan has a total area land of 88,240 sq. km of which only 1.7% is arable (AOAD, 2015). Ninety% of the population lives on only 10% of the country's surface area. In 2015, Jordan's total population was about 6.8 million of which 78% lived in urban areas. Jordan's economy is largely dependent on trade and service-related activities. However, manufacturing, agriculture, mining and construction activities in recent years have contributed significantly to the country's economy. In 2009, GDP per capita was estimated at US$ 4,216, the poverty rate was at 2.6% and the unemployment rate was 12.9%. Since the year 2000, the country's GDP per capita has more than doubled with annual real GDP growth averaging around 7% due to growth in the manufacturing, construction, real estate and service sectors (World Bank, 2014b).

Growth of these sectors coupled with population growth has resulted in increased demand for energy and water. Water resources are scarce. Rainfall is irregular and groundwater is rapidly depleting due to over-exploitation. The Jordanian government is scaling up efforts to boost and diversify its energy sector. Due to Jordan's importation of 98% of its energy, its economy was negatively affected by the 2007 global financial crisis that caused fluctuations in prices and resulted in high unemployment rates. Jordan's topography is dominated by the arid deserts, the rift valley, and highlands and plains, which are characterized by hot and dry weather conditions. More than 80% of the country is unpopulated due to desert conditions, where annual precipitation falls under 50 millimeters (World Bank, 2014b).

As a result of the prolonged conflict in the Middle East, Jordan has hosted several waves of refugees, displaced persons and returnees. This has had a significant impact on the population growth rate. Since 1961, the population has increased fivefold, leading to increased pressure on natural resources, income disparities and growing poverty. Since 2000, the rapid growth rate has slowed down.

Poverty

About 20% of Jordanians live in rural areas where poverty is more prevalent than in urban areas. Approximately 19% of the rural population is classified as poor. Because of the arid nature of the land, many rural poor people cannot grow enough crops to feed themselves and their families. People who find other ways to supplement their incomes generally earn very little. Regular drought exacerbates the situation. For example, during the 1999/2000 drought, wheat production dropped from 70,000 to 9,000 tons, an amount that fell disastrously short of the country's demand for about 650,000 tons of wheat annually.

Many of Jordan's rural poor people live in extremely difficult conditions due to:

- Limited access to alternative sources of income;
- Limited opportunities to diversify their farming enterprises because of low rainfall, poor soil quality and the topography of the land they cultivate;
- Lack of collateral loans and difficulty in obtaining loans needed for investment in farm activities that could lead to higher incomes;

- Limited land owned by land users, thus unwillingness to make long-term investments on the land cultivated by tenant farmers.

The most vulnerable groups include large rural households (with eight family members) headed by illiterate or poorly educated people, households headed by women, households with sick or elderly people, and households that do not own land or have very little land.

Families headed by women tend to be among the poorest of the poor. They have fewer economic assets than households headed by men. For example, only 44% of households headed by women own agricultural land and 30% own livestock. Instead, 68% of households headed by men own land and 36% of them own livestock. Similarly, only 21% of women who are heads of households receive loans for agricultural development and 9% for income-generating activities, compared to 43 and 14% of men who are heads of households.

Poverty is not concentrated in a particular region or regions in Jordan. It is found in urban centers, refugee camps and rural areas. The poorest of the poor tend to be in low rainfall zones where agriculture is severely limited and where the environment is significantly degraded, leading to widespread erosion and desertification.

Rural poverty in Jordan has its roots in the following basic conditions:

- ***Landlessness:*** The landless usually depend on wage labor and informal employment in rural areas as share-croppers. They may have limited access to government services and may rely on their employer for additional assistance in the form of small loans to pay medical expenses if they are not beneficiaries of the social safety net.

- ***Small-scale farms:*** Unless the family owns livestock or has access to additional off-farm income, small-scale farmers are forced to enter

into less profitable farming arrangements, such as renting land and share-cropping. They may be indebted to middlemen who help them market their products.

- ***Large families:*** The average Jordanian family has six children, and many families have nine or more members. The composition of the family varies and may include children, elderly parents and unemployed young adults. Lack of resources to pay for health care and school fees can reduce the living standards of these families to a level of extreme poverty.

- ***Access to resources:*** Various development programs provide access to improved services for rural and agricultural development. Rural women and isolated and illiterate poor farmers have inadequate access to credit and other services.

Water Scarcity

Jordan is classified as a chronically water-scarce country. Water resources are scarce, with a total of 680 million m3 /year rendering per capita share to be as low as 135 m3; it is dependent mainly on rainfall, which is irregular and groundwater is rapidly depleting due to over-exploitation. Surface water in the Jordan River and its tributaries Yarmouk and Zarqa are saline and primarily used for irrigation, while underground aquifers are used as sources of drinking water. The King Abdullah Canal is also used for irrigation. Aridity and water scarcity make Jordan environmentally sensitive to climate change. For farmers, little or no rainfall means severely reduced cultivation and production. Not only do poor farmers have fewer products to sell, they also have less to eat. Hunger and food insecurity are constant threats. Jordan must effectively manage its water resources and cultivable land in order to meet the growing needs of its population (IFAD, 2014).

Food Insecurity

In terms of vulnerability to food-insecurity in Jordan, a study by the World Food Program (WFP, 2016) reveals the following:

a. The households that suffer from food insecurity represent 0.5% of all Jordanian households. However, 5.7% of all Jordanian households are vulnerable towards food insecurity. Ma'aan and Karak governorates witnessed the highest percentage (0.9%) of food-insecure households, while Aqaba Governorate did not at all record any food insecure households.

b. The highest percentage of food-insecure households (12.9%) was reported in Mreighah District, while the highest percentage (25.6%) of vulnerable-to-food insecurity households was reported in Umm Al-Rassas District.

c. In terms of quality of diet, all Jordanian households consume cereals and carbohydrates (wheat, various types of bread, various types of rice, etc.) on daily basis, followed by the food group: Sugar, at an average of 6 days a week. Food-secure households eat meat and poultry at an average of 6 days a week, while food-insecure households consume this group at an average of two days a week.

d. Fourteen percent of all food-insecure and vulnerable-to-food-insecurity households receive cash or in-kind assistance from the National Aid Fund (NAF). The annual income of 80% of food-insecure households is less than JD 5,000.

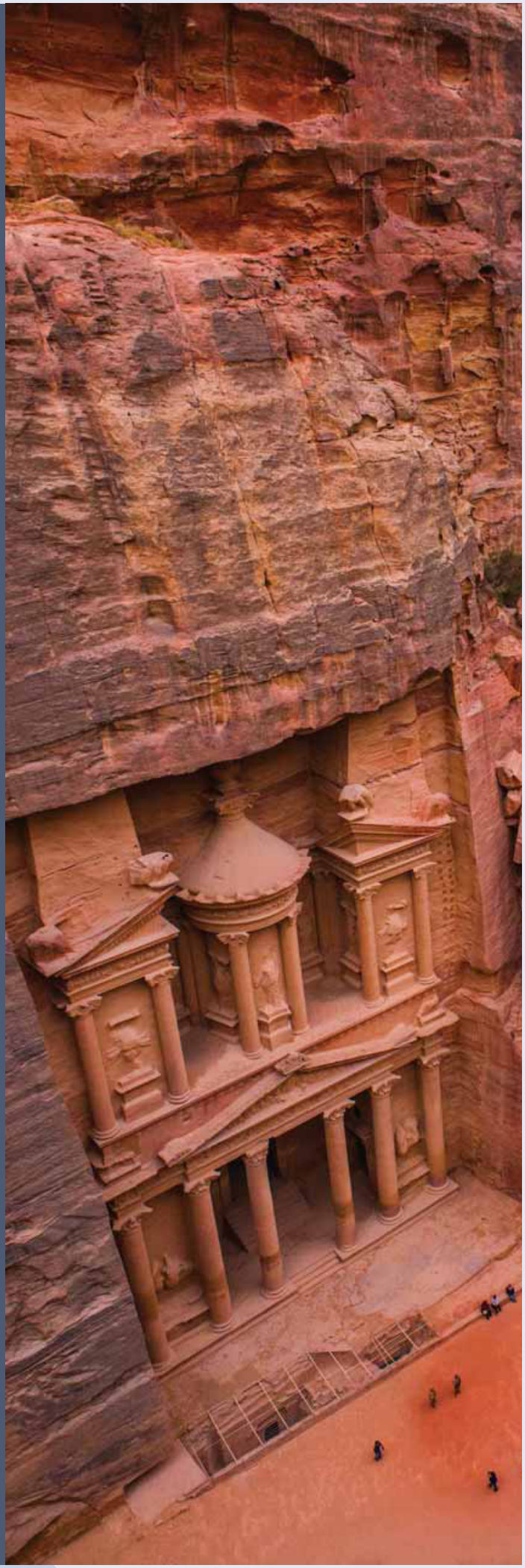
e. In terms of coping mechanism, 33.5% of Jordanian households used food- coping mechanisms during the survey year. On the Governorate level, more than half of all households in Mafraq Governorate used food-coping mechanisms during the survey year compared to more than 90% in Ruweished

District. A direct relationship exists between using coping mechanisms and the household size and an indirect relationship between using coping mechanisms and the educational level of the head of household. Around half the number of food-insecure households used severe food-coping mechanisms.

f. As per food assistance for households, 9.6% of Jordanian households received food assistance, while 5.9% received non-food assistance. More than half the households in Mafraq Governorate received food assistance, followed by Maan and Ajloun governorates. Around 71% of all households in Ruweished District received food assistance. Around 17% of all food insecure households received food assistance, against 17% of households that are vulnerable to food insecurity.

Climate Change

Already a victim to climate change, Jordan will witness a 15-60% decrease in precipitation and a 1-4°C increase in temperatures, which will in turn have serious potential impacts on its natural ecosystems, river basins, watersheds and bio-diversity, then cascading to impacts on food productivity, water resources, human health, public infrastructure, and human settlements. Climate change will have serious implications on the country's efforts to eradicate poverty and realize sustainable development for current and future generations—ultimately making climate change an issue of inter-generational equity. Climate change scenarios indicate that Jordan and the Middle East could suffer from reduced agricultural productivity and water availability among other negative impacts. At the same time, a substantial potential for cost-effective reduction of GHG emissions exists in Jordan (UNDP, 2013).



Sudan

Poverty

Poverty in the Sudan is deeply entrenched and is largely rural. Poverty particularly affects farmers who practice Rainfed agriculture and is more widespread and deeper in rural areas in southern Sudan and in areas affected by conflict, drought and famine.

The incidence of poverty varies considerably between sub-national regions, in part because economic growth has been unevenly distributed, but also because of the economic and social devastation caused by the conflict in certain parts of the country. There are severe inequalities in terms of access to education, sanitation and clean water, infrastructure and natural resources, income opportunities, justice and political protection.

Although sustained economic growth was behind a decline in extreme poverty from 85% in the 1990s to an estimated 60% at present, important regional disparities still exist. The Sudan remains a low-income, food-deficit country. It ranks 147th on the United Nations Development Program›s Human Development Index (2007/2008), among 177 countries.

In the country's poorest areas, the rapidly growing population, including displaced people and returnees, puts significant pressure on the already fragile ecosystems. Erosion, loss of soil fertility and damage of watersheds are affecting resources. Agricultural productivity is low. Farmers face the impact of the effects of climate change, such as water scarcity, on their livelihoods. Volatile food prices affect household food security.

In general, small-scale farmers and herders in the traditional rain-fed farming and livestock sectors are poorer than those in the irrigated agricultural sector, and people who do not have land to farm try to maintain their livelihood by undertaking casual labor such as collecting firewood and making charcoal. People living in areas that have been or continue to be affected by drought and conflict – particularly in the south and Darfur - are the most vulnerable to poverty.

Isolation is one of the key factors affecting poverty. Settlements located away from main thoroughfares have little or no access to social services and markets. Within rural communities, households without assets and labor power are the poorest. They include elderly or disabled people, and households headed by women with young dependents. Women and girls are the most disadvantaged members of society – less than one third of them have access to education.

The country's poorest areas include: southern Sudan, with the exception of Western Equatorial, the transition area between northern and southern Sudan, including the states of Blue Nile, Southern Darfur and Southern Kordofan, the states of Gedaref, Kassala, Northern Darfur, Northern Kordofan, Red Sea, Western Darfur and White Nile. Inadequate development strategies, slow adaptation to climatic volatility, and erosion of natural resources are the root causes of poverty. These causes have also fuelled the prolonged civil conflicts that have had a devastating effect on the rural population.

Poor rural people practice subsistence agriculture, and their livelihoods are based on crop cultivation,

herding and fishing, where available. Small-holder farmers are hindered by the limited size of their landholdings, low rates of productivity and an inability to improve their incomes. Because of the lack of rainfall and domestic water supplies, for most farmers, the growing season is brief and crop failures are frequent. The main constraints to their livelihoods include: the unpredictability of rainfall, water shortages during the dry season, barriers on migratory routes, which lead to disputes between pastoral and settled communities, or between local communities and commercial interests, cattle raiding.

Because of farmers' access to credit, distribution and marketing channels is limited, and because they have inadequate technical knowledge and poor skills in production and marketing, they find it difficult to break out of the cycle of low productivity and income. Seasonal migration of rural workers in pursuit of wage labor opportunities on mechanized and irrigated farms and in urban areas has become widespread.

Water Scarcity

With almost two-thirds of the Nile basin found within its borders, Sudan enjoys a substantial freshwater resource base. Sudan could be the only Arab country with an average above 1,000 m3 a year. At the same time, 80% of the country's total annual water resources are provided by rivers with catchments in other countries. This leaves Sudan vulnerable to externally induced changes in water flows. Sudan's total natural renewable water resources are estimated to be 149 km3 / year, of which 80% flows over the borders from upstream countries, and only 20% is produced internally from rainfall. This reliance on externally generated surface waters is a key feature of Sudan's water resources and is of critical importance for development projects and ecosystems alike, as flows are both highly variable on an annual basis and subject to long-term regional trends due to environmental and climate change (UNEP, 2006).

Water availability is a perennially critical issue in an extremely arid country. There will be a risk of decreased precipitation and/or increased temperature and evaporation that has grave repercussions for Sudan. The water assessment shows soil moisture declining under future climate conditions. A combination of water consumption, population growth, high rates of evaporation and high rainfall variation are predicted to lead to a situation of water crisis (Nimir et al., 2014).

Food Insecurity

Non-climatic factors also contribute to increased vulnerability, especially in rural areas and local communities. Studies from the preparation of the Sudan National Program of Action (NAPA) show that, in five states representative of the country›s five ecological zones, non-climatic factors that increased vulnerability included: deep poverty; lack of income diversity; lack of agricultural inputs; resource mis-management; increased cultivation; fragile land and water resources; poor soil fertility; deforestation; natural resource conflicts; poor extension services; community displacement, and poor sanitation and health services (Nimir et al., 2014).

Conflict

More than two decades of civil unrest in the Sudan have cost the lives of about 1.5 million people and had a devastating effect on the well-being of the population. Protracted civil conflict in the Sudan generally has its origin in socio-economic inequities caused by neglect of the agricultural sector, misguided land reforms, unfair distribution of resources for development between urban and rural areas and for irrigated and traditional farming, and exclusion of local communities from decision-making. These policies have led to the development of an economy-based impact mainly on export and lease of natural resources, to competition over access to scarce land and water, and to inadequate nation-building.

After decades of internal conflict, the Sudan signed a peace agreement in January 2005 and the new Government of National Unity and the Government of Southern Sudan launched a six-year recovery, peace building and development plan.

Climate Change

The majority of Sudan's land is quite vulnerable to change in temperature and precipitation. The country's inherent vulnerability may best be captured by the fact that food security is mainly determined by rainfall, particularly in the rural areas where more than 65% of the population lives.

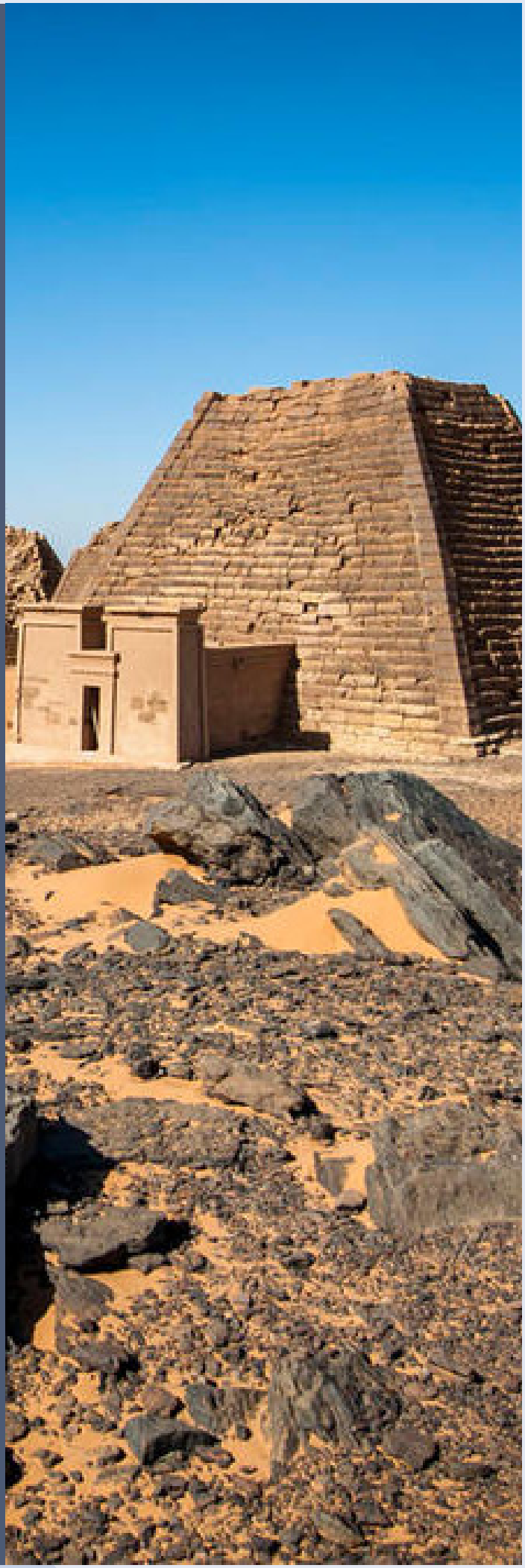
Mean annual temperature lies between 26° to 32° C but in some places it reaches 47° C causing a lot of stresses and heat-related diseases. Rainfall is erratic and varies significantly from the North to the South. The unreliable nature of rainfall, together with its concentration during the short growing season, increases the vulnerability of the rain-fed agricultural system. A trend of decreasing annual rainfall in the last 60 years (0.5%) and increased rainfall variability is contributing to drought conditions in many parts of the country. This pattern has led to serious and prolonged drought cycles. For example, Sudan experienced a succession of dry years in the 1980's resulting in severe social and economic impacts including many human and livestock fatalities and migration and displacement of several million people.

Sudan also experienced many devastating floods of two specific types during the past several decades. The first type occurs during torrential rain when high levels of water overflow the River Nile and its tributaries, usually due to above normal rainy seasons in the Ethiopian Plateau. The other type of flood occurs as a result of heavy localized rainfall during the rainy summer season. In addition to drought and floods, there are other climate extreme events such as dust storms, thunderstorms and heat waves which still pose serious threat to local livelihood.

Besides the adverse economic impacts of this climate change related phenomena, there are also associated social impacts. For example, during drought events, conflicts occur due to competition

over diminished natural resources. Also – as has happened many times – food shortages lead to famine, followed by displacement and refugees which, in turn, leads to misuse of the natural resources that remain. During floods and droughts, people typically move to cities where their settlement causes stress and shortages of the already limited services. The displaced population also live in very acute conditions that can lead to disturbances that undermine stability and security.

Climate scenario analysis indicates that the average temperature is expected to rise significantly relative to baseline expectations. By 2060, projected temperature increase ranges from 1.5° C to 3.1° C during August and from 1.1° to 2.1° C during January. Results from some models show that average rainfall decrease of about 6mm/month (5%) may occur during the rainy season. Such changes in temperature and rainfall will affect adversely the most important sectors in Sudan, namely agriculture, water resources and health (Nimir et al., 2014; WFP and UKMET, 2016).



Yemen

Overview

Yemen has a land area of 527,970 sq. km of which only 2.6% is arable. Yemen's economy has been dominated by the oil sector, which makes it vulnerable to declining oil revenues and resource depletion. The country has a predominantly rural and rapidly growing population of over 23 million, and per capita GDP of $1,118, one of the lowest in the Middle East Region. Despite modest gains against urban poverty in recent years, 40% of the country's population continues to be classified as poor. As a food-insecure nation that is highly dependent on staple food imports and with 32% of its population considered under-nourished, Yemen is exposed to international price fluctuations. Water resources are scarce and rapid groundwater depletion, along with inadequate infrastructure, pose challenges to sustainable development in the country.

In 2009, an estimated 59% of all children were stunted (too short for their age), mainly due to poor nutrition and health. Findings of the World Food Programme (WFP) Comprehensive Food Security Survey suggested that in late 2011, 45% of the Yemeni population — more than 10 million people — suffered from food insecurity (WFP 2012), up from 32% in 2009.

Poverty

Yemen is one of the driest, poorest and least developed countries in the world. It ranks 140 out of 182 countries on the UNDP Human Development Index (2009). An estimated 42% of the people are poor, and one Yemeni in five is malnourished. Poverty is endemic, particularly in more remote and less accessible areas.

About two thirds of the population, including 80% of the country›s poor people, live in rural areas and most of them depend on agriculture for their livelihoods. Agriculture is a vital economic sector, providing jobs and income in a country with an unemployment rate of 37% and averting migration to urban areas. But the country›s poor natural resource base cannot meet the needs of a population that is increasing by more than 3% annually. Yemen has the world›s fourth fastest growing population (IFAD, 2014).

People in rural areas are poor because they do not have adequate access to basic necessities such as land, safe water, health care and education. In Yemen, the ownership and exploitation of strategic resources such as land and water are controlled by the stronger, more influential sectors of society.

The country›s poor people are mainly small-scale farmers and share-croppers, landless people, nomadic herders and artisanal fishers. Women are the most vulnerable members of all groups.

Poverty in rural areas is a result of the lack of access to basic resources, such as land and water, and to services such as health care and education. Isolation makes it even more difficult for poor people to gain access to resources and services. In the country›s more remote regions, rural poor people are physically, intellectually, economically, and socially isolated from the rest of the nation.

Rural infrastructure is inadequate. Only 15% of the rural population is covered by the national

electric grid. The national road network is poorly maintained. Yemen has more than 60,000 km of dirt tracks and trails, most of them suitable only for powerful four-wheel drive vehicles. Transport is costly and time-consuming. This adds to the cost of goods, obstructs efficient administration and restricts social and economic opportunities. The massive return of migrant workers as a result of the Gulf Crisis left many rural households without remittance income and prospects for employment.

Water Scarcity

Yemen is among the water scarcest countries in the world, with less than 5% of the world average available per person per year. Each Yemeni›s average share of renewable water resources is estimated at 125 m3 /year. This is one tenth of the average in most Middle Eastern countries and one fiftieth of the world average. And as the population grows, this share shrinks. Agriculture uses more than 90% of the country›s scarce water supplies, leaving little for household consumption and sanitation. Only 0.7% of rural people have access to sanitation services. The lack of clean water has a negative impact on health and contributes to a high rate of child mortality.

For rural women, collecting water for household needs is one of the heavier burdens in a disproportionately large work-load. In highland and mountain areas, women and girls typically spend up to seven hours day collecting water. As a result, girls are deprived of an opportunity for education (Rural Poverty Portal). Water scarcity makes irrigation a key concern for farmers.

Food Insecurity

More than half of the total population of Yemen - some 14.4 million people - are food-insecure, as on-going conflict and import restrictions have reduced the availability of essential foods and sent prices soaring.

The number of food-insecure people has grown by 12% since June 2015 (36% since late 2014), according to the UN agency. Food insecurity and

malnutrition are becoming highly critical. Fuel shortages and restrictions on imports — which Yemen relies on for more than 90% of its staple foods — have reduced the availability of essential food commodities and caused food and fuel prices to soar since conflict escalated in March 2015. Yemen is heavily dependent on imports, as only 4% of the country›s land is arable and only a fraction of this land is currently used for food production.

In 2014, some 2.3 million people are internally displaced within Yemen — an increase of more than 400% compared with January 2015. This puts additional pressure on host communities already struggling with limited food resources. Shortage of critical inputs like seeds and fertilizers have severely reduced crop production, with estimates suggesting the recent conflict has caused dramatic losses to the agriculture sector. Diminishing income opportunities and disrupted markets are exacerbating the immense needs already present in Yemen prior to the current conflict.

Conflict

Yemen has seen a variety of conflicts over the past decade. As a consequence, an estimated 41% of the people in the country were directly affected by conflict in 2013. In addition, the country had been hit by a series of economic shocks, including the triple global crises in 2007–2008 and the food price spike in 2011 (Breisinger et al., 2011).

Throughout 2011, conflicts in various parts of the country led to disruptions in the supply of production inputs, and related higher prices were transmitted across all economic sectors. Overall, the consumer price index rose by 22.7% in 2011, compared with 12.5% in 2010 (IMF, 2016), including a significant rise in food prices. This rise apparently occurred due to reduced domestic supply and reduced imports, and was exacerbated by transportation and distribution disruptions due to the conflict situation and the deficient physical infrastructure, both factors adversely affected the overall supply chain. The reduction in availability of diesel has further aggravated shortages in electricity and water. Power cuts became so frequent that in some areas of Yemen power was available for only four hours out of the day (Yemen, MoPIC 2012), if at all. Rising fuel costs led to countless production disruptions as well as steep increases in transportation costs, reaching, at times, 100% in urban areas and 200 % in rural areas, compared with pre-conflict levels (Yemen, MoPIC, 2012). Temporarily, domestic gas prices rose to three times their 2010 levels, gasoline prices by 600%, and diesel prices by up to 800% during 2011 (Yemen, MoPIC, 2012). The persistent lack of security on the roads led to a sharp decrease in crude oil production, by about 25% in 2011, and further increased transportation costs (Yemen, MoPIC, 2012).

These disruptions had far-reaching repercussions throughout the economy. The agricultural, industrial, and service sectors faced significant cost increases for inputs such as irrigation, transportation, and marketing, ultimately reducing production and exports. Production processes were disrupted, leading businesses to close and causing workers to be let go in both public and private sectors. Delivery of public goods and services (including health, education, and social safety nets) was adversely affected throughout Yemen (World Bank et al., 2012).

As a result, the conflict led to a sharp drop in economic growth in 2011, which contributed to an increase in poverty and food insecurity. Even before 2011, poverty and food insecurity levels in Yemen were the highest in the Arab world, with 32% of the population food insecure (Breisinger, et al., 2011).

Climate Change

Climate change poses a significant threat to Yemen's development. Already early-signs of water shortages are apparent. Furthermore, a range of other socio-economic and institutional factors hamper Yemen's ability to respond to current and projected changes in climate, including: weak institutional structures, lack of long-term reliable data or technical capacity to analyze the data, uncertainties in regional and local climate scenarios, as well as socio-economic scenarios, generally low awareness levels regarding climate change, low institutional or technical capacity to interpret, modify, or develop existing models or methodologies, and a dearth of research on applicable policy measures to address climate change.

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