Regional Study on Vulnerability and Inter-Related Factors[1]

Introduction The Sustainable Development Goals (SDGs) are a collection of 17 global goals designed to be a "blueprint to achieve a better and more sustainable future for all". The SDGs, set in 2015 by the United Nations General Assembly and intended to be achieved by 2030, are part of UN Resolution 70/1, the 2030 Agenda. To achieve SDGs, it is crucial to understand possible drivers of vulnerability, to prioritize programs and policies that would have the strongest effect on lifting vulnerability off communities. The World Food Programme (WFP) is the world's largest humanitarian organization, delivering food assistance in emergencies, and working with communities to improve nutrition and build resilience. Acknowledging the importance of information and analysis, WFP dedicated a full team, the Vulnerability Analysis and Mapping (VAM) team, to act as a compass for programme design, to ensure efficiency and effectiveness of assistance provided in communities. This study is a product of the VAM team in the Regional Bureau in Cairo (RBC), covering countries in Central Asia, Eastern Europe, Middle East, and North Africa. These countries are namely Armenia, Kyrgyzstan, Tajikistan, Ukraine, Turkey, Iraq, Jordan, Libya, Palestine, Sudan, Syria, Yemen, Egypt, Lebanon, and Tunisia. The study attempts to define determinants of vulnerability from different angles, with a focus on those countries covered by WFP RBC.

Methodology Vulnerability is witnessed through different aspects. This study focuses on vulnerability in terms of food security (as WFP defines it)[2], national poverty, and undernourishment. Data on demographics, nutrition, socio-economic, and other thematic indicators were all extracted from the World Bank's World Development Indicators. The data used in the analysis was the most recent data available for each indicator.

Pearson's correlation coefficient has been calculated for different thematic indicators, against vulnerability indicators, to examine the strength and direction of a linear relationship between any two indicators. The coefficient can vary between -1 and 1, and the closer it is to 1 or -1, the stronger the correlation is. A coefficient of the value 0 means that there is no correlation between the two indicators, and the closer the coefficient is to 0, the weaker the correlation is. A positive correlation means that an increase in the first indicator is associated with an increase in the other indicator, while a negative correlation means that an increase in the first indicator is associated with a decrease in the other indicator.

Limitations of the study A key assumption made in this study is that the most recent figure available for different indicators is the number that represents the current situation. This creates a limitation, but also allows for studying trends between different indicators. Also, regional differences could be affected by both the spatial allocation of resources and the interconnectivity of regions. Additionally, number of countries included in each developed relation varies according to data availability of both indicators being assessed. Often the number of countries included in a correlation is too limited to produce a statistically significant result. However, the results reported here are those with a moderate or strong correlation in either the positive or the negative direction.

Data used Details on data used for the analysis can be found in Annex 2.

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[1] This study is authored by Lina Badawy and Hazem AlMahdy
[2] The methodologies for calculating food insecurity used were either Consolidated Approach to Reporting Indicators of Food Security (CARI) or Integrated Food Security Phase Classification (IPC).

Key Findings

Vulnerability indicators Food insecurity, poverty, and undernourishment are all positively correlated, either moderately or strongly. The strongest association was found between poverty and undernourishment (r=0.79), followed by food security and poverty (r=0.72), and food security and undernourishment (r=0.39).

Demographic factors of vulnerability

- ***Efforts made towards incorporating gender-sensitive programming has led to lower food insecurity among female-headed households.*** Data shows that countries with high levels of female-headed households are less food insecure. A moderately negative correlation was found between the percent of female-headed households in a country and its food insecurity level (r=-0.4). This clearly indicates that focusing on gender equality (SDG 5) is an efficient route to ending hunger (SDG 2).
- ***The focus of the humanitarian community on supporting refugees and migrants has resulted with less poverty.*** Countries with high levels of refugees and migrants are less poor and food insecure. The correlation between the level of refugees/migrants in a country and its national poverty level was moderately negative (r=-0.5), which means that high levels of refugees and migrants are associated with low levels of poverty. Similarly, the correlation between food insecurity and level of refugees/migrants is moderately negative, with a coefficient of -0.47. All this shows the importance of addressing refugee and migrant needs to end poverty (SDG 1).
- ***Rural areas are more prone to being food insecure.*** A moderately positive correlation between agricultural land (as a percent of land area) and food insecurity was found (r=0.44), which means that countries with large rural areas are also facing high levels of food insecurity. This suggests the urgent need to target rural areas in programs working towards SDG2 (Zero Hunger), likely addressing also SDG 6, clean water and sanitation, SDG 8, decent work and economic growth, and SDG 12, responsible consumption and production.
- ***Low levels of education are positively associated with food insecurity. Furthermore, dropping out of school is strongly and positively associated with undernourishment.*** The lower the educational attainment, the higher the food insecurity levels in a country, with correlations varying between 0.47 with short-cycle tertiary up to 0.86 for primary education. When it comes to dropping out of school completely, a correlation of 0.64 was found between undernourishment and level of primary school aged children out of school. All this highlights the importance of education (SDG 4) in lifting vulnerability, especially ending hunger (SDG 2).
- ***Countries with high fertility rates and high age dependency ratio are more poor and undernourished, indicating that large households are more vulnerable.*** High fertility rates are strongly associated with undernourishment (r=0.78) and moderately associated with national poverty (r=0.42). Similarly, high age dependency ratios are also strongly associated with undernourishment (r=0.87) and moderately associated with national poverty (r=0.41). These findings indicate that large households are more prone to being undernourished and poor, and that contributing to decent work and economic growth (SDG 8) would be effective in ending poverty (SDG 1) and hunger (SDG 2).

Socio-economic factors of vulnerability

- ***The more developed the economy, the lower the food insecurity levels.*** For example, GDP, GNI, and receipts from international tourism (USD), among other indicators, are all negatively correlated with food insecurity, with correlations varying from -0.36 to -0.7 for different macroeconomic indicators. This clearly indicates that working towards SDG 8, decent work and economic growth, SDG 9, industry, innovation, and infrastructure, and SDG 11, sustainable cities and communities, would likely contribute to ending hunger (SDG 2).
- ***Employment opportunities are key drivers for determining the national poverty status.*** Formal employment is negatively attributed to poverty (r=-0.41 between poverty and the labor force, and r=-0.71 between poverty and new businesses registered). On the other hand, informal employment is positively associated with poverty (r=0.73), which means that countries with high informal employment are more vulnerable, and that the type of employment is key to determining vulnerability. This clearly stresses the importance of providing decent work and economic growth (SDG 8) to end poverty (SDG 1).
- ***The ability to produce food and crops is a key factor in fighting undernourishment.*** A negative moderate correlation was found between undernourishment and the food production index (r=-0.4) and the crop production index (r=-0.46), which means that countries that have low production of food and crops (i.e: less self-sufficient in food and crop production) are more vulnerable. This suggests that working towards responsible consumption and production (SDG 12) would contribute to ending hunger (SDG 2).

Vulnerability indicators and nutrition

- ***WFP's food insecurity indicator is able to capture the under-nutrition side of the story.*** A moderate to strong positive correlation was found between food insecurity and different under-nutrition indicators such as wasting, stunting, underweight, and severe wasting (r varies between 0.47 and 0.86).
- ***National poverty is a more comprehensive indicator that is able to capture both the under and over nutrition status in the country.*** Similar to correlations with food insecurity, a moderate to strong positive correlation was found between poverty and different under-nutrition indicators (r varied between 0.48 and 0.75). On the other hand, a moderate to strong negative correlation was found between poverty and overweight, showing that countries with high levels of overweight are less vulnerable.
- ***The ultimate indicator strongly capturing the nutrition status is undernourishment.*** Again, both over and under nutrition are moderately or strongly correlated with undernourishment (r varies between 0.55 and 0.8 with under-nutrition indicators and between -0.58 and -0.62 with over-nutrition indicators). This can be highly attributed to the fact that undernourishment is merely focused on food consumption.

Other thematic factors of vulnerability

- ***Countries with high levels of displacement are more prone to being undernourished.*** A strong positive correlation was found between the level of displacement and undernourishment (r=0.81), which means that in countries with high levels of displacement, prevalence of undernourishment is also high. This suggests that working towards SDG 16, peace, justice, and

strong institutions, along with SDG 11, sustainable cities and communities, among other SDGs which could lower displacement levels, would strongly contribute to ending hunger (SDG 2).

- ***Conflict and battle-related deaths are increasing vulnerability, particularly undernourishment.*** Countries with high levels of deaths as a result of battle and conflict are also highly undernourished, with a moderately positive correlation of 0.55 between the number of battle-related deaths and undernourishment. This clearly indicates that addressing peace, justice, and strong institutions (SDG 16) will have an impact on ending hunger (SDG 2).

- ***Climate change and air pollution are increasing vulnerability of households.*** Mortality levels attributed to air pollution are strongly and positively attributed to vulnerability on all fronts, with r=0.69 with food insecurity, r=0.67 with undernourishment, and r=0.74 with poverty. This highlights the clear negative impact of pollution on increasing vulnerability on all fronts. This highlights the importance of climate action (SDG 13) in fighting both poverty (SDG 1) and hunger (SDG 2).

- ***Social protection and labor programs are key to fighting poverty (r=-0.5) and undernourishment (r=-0.92).*** The higher the total transfer amount received by the population participating in social insurance, social safety net, and unemployment benefits and active labor market programs as a share of their total welfare, the less poor and undernourished those people are. This clearly suggests that reduced inequalities (SDG 10) can strongly contribute to ending hunger (SDG 2) and poverty (SDG 1).

Conclusion All SDGs are interlinked, and any programs targeting a specific SDG will most likely have a ripple effect on other SDGs. Taking into account the strength of the associations between the different SDGs, the most efficient and effective route to achieving SDGs is to partner for the goals (SDG 17) and work together towards a better world.

Annex 1: Abbreviations

ARM	**Armenia**
EGY	**Egypt**
GDP	**Gross Domestic Product**
GNI	**Gross National Income**
IRQ	**Iraq**
JOR	**Jordan**
KGZ	**Kyrgyzstan**
LBN	**Lebanon**
LBY	**Libya**
PSE	**Palestine**
RBC	**Regional Bureau in Cairo**
SDG	**Sustainable Development Goal**
SDN	**Sudan**
SYR	**Syria**
TJK	**Tajikistan**
TUN	**Tunisia**
TUR	**Turkey**
USD	**United States Dollars**
UKR	**Ukraine**
VAM	**Vulnerability Analysis and Mapping**
WFP	**World Food Programme**
YEM	**Yemen**

Annex 2: Indicators

Indicator	Source	Countries included
Vulnerability Indicators		
Food insecurity	WFP	ARM, TJK, UKR, IRQ, JOR, LBY, PSE, SDN, SYR, YEM
National poverty	World Bank	ARM, KGZ, TJK, UKR, TUR, EGY, IRQ, JOR, LBN, PSE, SYR, TUN, YEM
Undernourishment	FAO	ARM, KGZ, UKR, TUR, EGY, IRQ, JOR, SDN, YEM, LBN, YEM
Demographic Indicators		
Educational attainment (different levels)	UNESCO	ARM, KGZ, TJK, TUR, IRQ, JOR, PSE
Children out of school	UNESCO	ARM, KGZ, TJK, UKR, TUR, EGY, IRQ, JOR, PSE, SDN, YEM, LBN
Agricultural land and Arable land (% land area)	FAO	ARM, KGZ, TJK, UKR, TUR, EGY, IRQ, JOR, LBY, PSE, YEM, LBN
International Migrant Stock	UN Population Division	ARM, KGZ, TJK, UKR, TUR, EGY, IRQ, JOR, LBY, PSE, SDN, YEM, LBN
Refugee population by country of origin	UNHCR, UNRWA	ARM, KGZ, TJK, UKR, TUR, EGY, IRQ, JOR, LBY, PSE, SDN, YEM, LBN
Female headed households	DHS	ARM, KGZ, TJK, EGY, JOR, YEM
Fertility rate	UN Population Division, Census reports, Eurostat, UN Statistical Division, US Census Bureau, and Secretariat of Pacific Community	ARM, KGZ, TJK, UKR, TUR, EGY, IRQ, JOR, LBY, PSE, SDN, YEM, LBN
Age dependency ratio	World Bank and UN Population Division	ARM, KGZ, TJK, UKR, TUR, EGY, IRQ, JOR, LBY, PSE, SDN, YEM, LBN
Nutrition Indicators		
Underweight	WHO, UNICEF, World Bank	ARM, KGZ, TJK, UKR, TUR, EGY, IRQ, JOR, PSE, YEM, SDN
Stunting	WHO, UNICEF, World Bank	ARM, KGZ, TJK, UKR, TUR, EGY, IRQ, JOR, PSE, YEM, SDN
Wasting	WHO, UNICEF, World Bank	ARM, KGZ, TJK, UKR, TUR, EGY, IRQ, JOR, PSE, YEM, SDN
Severe wasting	WHO, UNICEF, World Bank	ARM, KGZ, TJK, UKR, TUR, EGY, IRQ, JOR, PSE, YEM, SDN
Overweight	WHO, UNICEF, World Bank	ARM, KGZ, TJK, UKR, TUR, EGY, IRQ, JOR, PSE, YEM, SDN
Socio-economic Indicators		
Informal employment	ILO	ARM, EGY, PSE, YEM
GINI Index	World Bank	ARM, KGZ, TJK, UKR, TUR, EGY, IRQ, JOR, PSE, YEM, LBN
GDP, GDP growth, GDP per capita, GDP per capita growth, GNI, GNI per capita	World Bank, OECD	ARM, KGZ, TJK, UKR, TUR, EGY, IRQ, JOR, LBY, PSE, SDN, YEM, LBN
Income share held by lowest 20%	World Bank	ARM, KGZ, TJK, UKR, TUR, EGY, PSE, YEM
Adjusted net national income per capita	World Bank	ARM, KGZ, TJK, UKR, TUR, EGY, IRQ, JOR, LBY, SDN, YEM, LBN
International tourism, receipts	World Tourism Organization	ARM, KGZ, TJK, UKR, TUR, EGY, IRQ, JOR, LBY, PSE, SDN, YEM, LBN
Final consumption expenditure	World Bank	ARM, KGZ, TJK, UKR, TUR, EGY, IRQ, JOR, LBY, PSE, SDN, LBN
Labor force	ILO and World Bank	ARM, KGZ, TJK, UKR, TUR, EGY, IRQ, JOR, LBY, PSE, SDN, YEM, LBN
Labor force participation rate	ILO	ARM, KGZ, UKR, TUR, EGY, IRQ, JOR, LBY, PSE, YEM
New businesses registered	World Bank	ARM, KGZ, TJK, UKR, TUR, IRQ, JOR
Food production index and Crop production index	FAO	ARM, KGZ, TJK, UKR, TUR, EGY, IRQ, JOR, LBY, PSE, SDN, YEM, LBN
Other Thematic Indicators		
Internally displaced persons	Internal Displacement Monitoring Center	ARM, KGZ, UKR, TUR, EGY, IRQ, LBY, PSE, SDN, YEM, LBN
Battle-related deaths	Uppsala Conflict Data Program	ARM, TJK, UKR, TUR, EGY, IRQ, JOR, LBY, PSE, SDN, YEM, LBN
Mortality rate attributed to air pollution	WHO	ARM, KGZ, TJK, UKR, TUR, EGY, IRQ, JOR, LBY, SDN, YEM, LBN
Adequacy of social protection and labor programs	World Bank	ARM, KGZ, TJK, UKR, TUR, IRQ, JOR, PSE, SDN