

Households' Food Insecurity in the Era of COVID-19: Application on MENA Countries

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Households' food insecurity in the era of COVID-19: Application on MENA countries

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Abstract

Food security is an important issue for economic development and the COVID-19 pandemic may have threatened it. Using a survey in five MENA countries, this paper assesses the food insecurity situation during the COVID-19 pandemic. I show, using descriptive statistics and the logit method, that characteristics such as age, income, and being employed, increase/decrease the level of food insecurity of an individual. Additionally, the government policies implemented during the period, such as stay-at-home requirements, are studied. To this end, I use a new instrument variable for COVID-19, the Google Trends index. I show that there is no significant effect of these policies on food insecurity, except for the access to "food markets due to mobility restrictions".

JEL: E21, E31, I15, I18, I31, Q18,

Keywords: MENA region, Food security, Food consumption, Economic access, COVID-19

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1 Introduction

The COVID-19 pandemic had a strong impact on the daily life of almost every citizen across the world. Its effects and its consequences on health, and the economy became quickly one of the most important subjects of study. This article is part of this line. This study aims to assess the food insecurity situation of the inhabitants of five MENA countries, Egypt, Jordan, Morocco, Sudan, and Tunisia.

The food insecurity of those inhabitants are studied under the prism of two of the most important component of the Food and Agriculture Organization's food security definition: availability and accessibility The "food availability" is "achieved when sufficient quantities of food are consistently available to all individuals within a country", and "food accessibility" is "achieved when food is accessible physically and economically to everyone". Mandour (2021) found, using macroeconomic data, that in the MENA region the most critical aspect is accessibility. The most important component of the accessibility pillar is affordability, which refers to the ability to afford food considering income and food prices.

Although multiple papers (Krafft, Assaad, Marouani, Cheung, et al., 2022 ; Krafft, Assaad, & Marouani, 2022 ; Krafft, Selwaness, et al., 2022) use similar surveys, produced by the Economic Research Forum, to assess employment, care work, and income, none to the best of my knowledge, assess one of the most important issues of the region: food security. This paper aims to fill this gap in the vast literature on the effect of COVID-19 in MENA. Additionally, it is the first to use microeconomics data on this topic.

In the first part, using descriptive statistics and logit estimations, the heterogeneity of food insecurity situation according to the countries, the region/districts, and the socio-economic characteristics of the individuals is assessed.

The population of the five countries has been negatively affected, particularly in the "accessibility" component. Tunisia is the most impacted country and the only one with a strong effect on the "availability" pillar.

There is an important heterogeneity between the different regions and it seems that the ones with a higher population density or a higher nightlight intensity are less afflicted by food insecurity.

The socio-economic characteristics of the individuals that increase the probability to be food insecure are being a Tunisian woman, not married, with low education, living in an urban area, and participating in the labor force, while not employed.

In the second part, using a new instrumental variable, the Google Trends index for the search term "Covid", the effect of government policies implemented during the COVID-19 pandemic is estimated. It seems that those policies had no effect on food insecurity during the period of the study, except for an increase in the

“difficulties in going to food markets due to mobility restrictions imposed by government/closures”.

The remainder of the article is structured as follows. Section 2 describes the food security and COVID-19 background in the MENA region. Section 3 describes and presents the data. Section 4 outlines the empirical strategy. Section 5 presents the results. Section 6 concludes.

2 MENA background

2.1 Food security

Food security and adequate nutrition are some of the most important development priorities according to the Sustainable Development Goal of the United Nations. Food security is inherently linked to economic development, while the meaning of the causal relationship is debated¹.

In 2019, 55 million inhabitants of the MENA region, 13.2% of the population, are undernourished (FAO, 2020).

According to the Food and Agriculture Organization (FAO), the concept of food security corresponds to a situation where “human beings have, at all times, the physical, social and economic ability to secure sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life”. An individual is considered undernourished if his habitual food consumption is insufficient to provide the dietary energy levels that are required to maintain a normally active and healthy life. This definition highlights the multifaceted nature of food security and allows four dimensions to be extracted: accessibility, availability, use, and stability.

MENA countries have to face multiple challenges to tackle food insecurity. First, it is the most water-scarce region in the world. Climate change, as well as being responsible for this water stress, will probably worsen the condition suitable for local agriculture. Second, the population is growing fastly. In 2018, 484 million people were living in MENA, they will be 723 million in 2050, according to the UN projection ((UNICEF), 2019). These two challenges lead to the third, the MENA region is highly dependent on food imports, half of the food consumed is imported. Wheat, the foundation stone of the MENA’s diet, represents one-third of the calories absorbed (Larson et al., 2012). This cereal is heavily imported compared to the rest of the world, MENA contains 6% of the world’s population while importing around 33% of the international wheat (Abis, 2012).

The diversity of MENA countries resulted in a very heterogeneous food insecurity situation. Figure 1 shows the overall food security score of the MENA region, in 2019, calculated by The Economist on three core issues: affordability, availability, and quality and safety (Unit, 2019). It shows that countries members of the Gulf Cooperation Council (GCC) are not food insecure. The median score of the 113 countries analyzed is 64. Egypt, is the only country, not part of the GCC, above this median, by half a point.

There is a structural food insecurity issue in the MENA countries. The high reliance on food importation is worrying.

¹ see Fernandes & Samputra (2022) for a recent literature review on the debate.

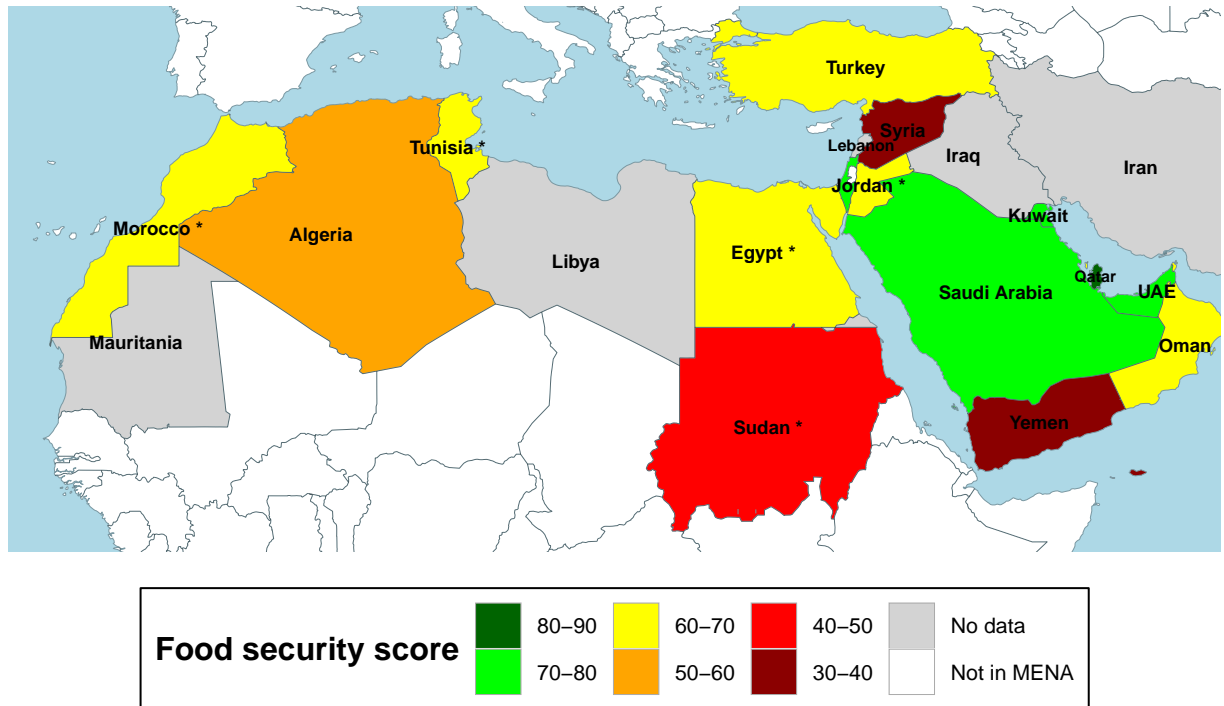


Figure 1: Food security in MENA region

Note: This map shows the food security score of MENA countries. The food security score is estimated by The Economist, in 2019.

2.2 COVID-19

On the 11th of March 2020, the World Health Organization (WHO) declared that the COVID-19 epidemic was now a pandemic. This statement means that the disease has spread worldwide. The virulence of this coronavirus has led governments in almost all countries to take measures to contain its spread.

The governments' responses and the disease severely disrupted the global economy. A substantial literature has been devoted to understanding the implications for a wide range of topics, mainly in high-income countries. The consequences on the labor market have been negative with an increase in unemployment (Coibion et al., 2020 ; Gupta et al., 2020). This increase is heterogeneous based on the job typology. Employees unable to perform their tasks remotely are more at risk to lose their job, except the "essential workers" (Béland et al., 2020). This heterogeneity leads to an increase in inequality as it affects the financially vulnerable population, workers with lower levels of education, younger adults, and immigrant (Yasenov, 2020). Additionally, women have been more concerned than men about job or work hours loss (Bui et al. (2020) ; Forsythe et al. (2020)). This effect can be explained by their job and skill characteristics, less involved in "essential industries". Additional explanations can be the government's policies, especially the school closure which leads women

to affect more of their time on childcare [Couch et al. (2020)]².

School closure is one of the most important measures taken by governments in response to the COVID-19 outbreak. The “Oxford Covid-19 Government Response Tracker” which has collected data on the measures that governments took identifies nine metrics to create a “Stringency Index”. Figure 3, panel A, represents this index for various countries during the pandemic. Eight of the nine measures used to create this index are “Containment and closure policies”. It shows that governments of the countries included in the study took, at the beginning of the pandemic, very stringent measures. Those measures had negative effects on the employment rates and income of the population in those countries (Krafft, Assaad, & Marouani, 2022).

COVID-19 harmed the living conditions of workers across the world. The five countries included in the study have established a very stringent set of measures that led to a decrease in income and employment rates.

2.3 Food security during COVID-19

To understand how COVID-19 impacted the food situation of MENA countries, the effect on the four pillars of food security should be examined.

The first pillar is “food availability” which is “achieved when sufficient quantities of food are consistently available to all individuals within a country”. Due to the COVID-19 pandemic, during the 2008 food price crisis, multiple countries introduce food export restrictions, notably Ukraine and Russia two of the biggest wheat exporter (COVID-19 food trade policy tracker). The high reliance on importation could have led to a lack of food availability. However, thanks to the appropriate stock of food products saved by the governments upstream of the crisis, it seems that globally no significant food shortage was observed.

The second pillar is “food accessibility” which is achieved when food is accessible physically and economically to everyone. The main component of this pillar is the affordability of food which can be affected by the price of the product and/or by the income of the individual. From the offer side, Figure 2 shows, for each country included in the study, and for the international market, the food price inflation compared to the corresponding month of the previous year. The inflation on the international market is even higher than the level reached during the 2008 peak³. However, international prices do not translate into food inflation in the countries included in the study, at least during the COVID-19 period studied, and with the exception of Sudan. Despite the food supply chain disruption resulting from export restrictions, increase in transport costs, and closure of food processing factories had not driven the food price of those MENA countries. On the demand side, multiple studies assess an unemployment increase in MENA countries which mechanically leads to a

²see Brodeur et al. (2021) for an extensive literature review

³36.47% of inflation compared to the corresponding month of the previous year

decrease in the available income. This income decrease can affect the ability to purchase food products. The accessibility aspect of food security encompasses the affordability of the product which depends on the price but also the individual's income.

There is no reason that the third pillar, "utilization", has been affected by COVID-19. "food utilization" is achieved when individuals have basic nutrition knowledge and have access to water and sanitation for preparing food.

The last pillar, "stability", is, the capacity for an individual to be food secure no matter a sudden shock or cyclical events. As food accessibility is negatively impacted by a crisis, by definition, the stability pillar is affected.

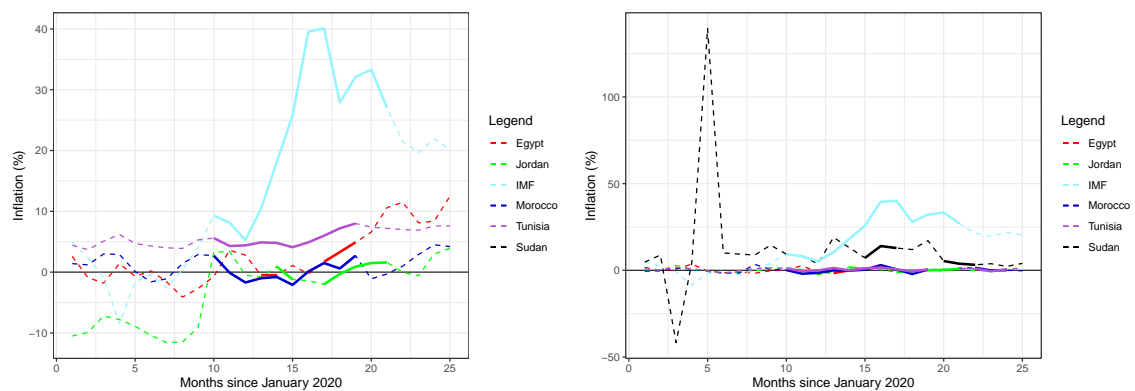


Figure 2: Food price inflation

Note: Panel A shows food price inflation, according to Trading Economics, based on a government source in each country. Panel B shows food price inflation according to the International Monetary Fund. Both panels show the percentage change from the corresponding month of the previous year. Dotted lines indicate periods, not in the survey, filled periods correspond to those in the survey.

3 Data

3.1 COVID-19 MENA Monitor Household Survey

To study the situation of households in the era of COVID-19, the Economic Research Forum (ERF) led a four waves survey. The COVID-19 MENA Monitor Household Survey (CMMHH) have been conducted in Egypt, Jordan, Morocco, Sudan, and Tunisia between October 2020 and October 2021. Additionally, the ERF harmonized and included a survey conducted and prepared by Baseera ⁴, in June 2020. Approximately 2,000 unique individuals from different households are surveyed in each country and each wave.

The survey covered a national random sample of mobile phone users aged 18-64. The method to contact those individuals was to pick a random digit dialing, within the range of valid numbers, and try three times to contact them for the interview. Due to this sampling procedure, the individuals surveyed are not nationally representative. The individuals surveyed are mostly urban, 71%, and few are working on a farm, 3%, which does not reflect the living conditions of the population.

To reduce bias ERF builds weights using three different inputs, 1) telephone operators and their market shares, 2) Number of phones by operator for individuals and household, and 3) representative data with comparable demographic and household characteristics to weight for non-response ⁵. This last input is obtained through the most recent publicly available data with individual phone ownership and relevant demographic and labor market characteristics.

The main variables of interest for the study of food security are “cor21_1” to “cor21_5” which indicate whether the respondent had difficulties in consuming food. These six variables are nominal, taking the value 1 if the respondent agrees with the sentences and 0 otherwise. Agreement corresponds to an increase in food insecurity for five of the six variables. A variable named “FoodInsecurity” summing up the five variables is built. This variable gives a rating of food insecurity for each individual.

Table 1 presents the main statistics of the sample.

3.2 Oxford Covid-19 Government Response Tracker

Policy responses to COVID-19 have potentially indirectly impacted the food security of MENA households. The Oxford Covid-19 Government Response Tracker (OxCGRT) is an initiative that “collects systematic

⁴It is the Egyptian Center for Public Opinion Research, “an independent and nonpartisan organization aims to conduct public opinion research impartially and professionally”.

⁵Sex, Age group, Education level, Household size, Labor market status in Feb. 2020, Administrative geography, Urban vs rural, Interaction between admin. geo. and urban, Marital status, Presence of kids 0-5, Presence of kids in school, Nationality, Interaction of covariates and sex, Household income/wealth quartile, Interaction of covariates and urban

Table 1: Descriptive statistics

| Variables | Egypt (N=4007) | Jordan (N=7625) | Morocco (N=8120) | Sudan (N=4401) | Tunisia (N=8143) | Overall (N=32296) |
|---|-------------------|--------------------|---------------------|-------------------|---------------------|----------------------|
| cor21_1: Difficulties food market b/c govt. mobility restrictions/closures | | | | | | |
| Mean (SD) | 0.136 (0.477) | 0.129 (0.539) | 0.222 (1.01) | 0.146 (0.966) | 0.350 (1.01) | 0.211 (0.865) |
| Median [Min, Max] | 0 [0, 1.00] | 0 [0, 1.00] | 0 [0, 1.00] | 0 [0, 1.00] | 0 [0, 1.00] | 0 [0, 1.00] |
| cor21_2: Unable to buy usual amount b/c of shortages | | | | | | |
| Mean (SD) | 0.204 (0.574) | 0.131 (0.525) | 0.118 (0.747) | 0.378 (1.59) | 0.523 (1.21) | 0.270 (0.993) |
| Median [Min, Max] | 0 [0, 1.00] | 0 [0, 1.00] | 0 [0, 1.00] | 0 [0, 1.00] | 0 [0, 1.00] | 0 [0, 1.00] |
| cor21_3: Unable to buy usual amount b/c of price increases | | | | | | |
| Mean (SD) | 0.455 (0.775) | 0.477 (0.904) | 0.517 (1.45) | 0.810 (2.22) | 0.786 (1.41) | 0.608 (1.41) |
| Median [Min, Max] | 0 [0, 1.00] | 0 [0, 1.00] | 0 [0, 1.00] | 1.00 [0, 1.00] | 1.00 [0, 1.00] | 1.00 [0, 1.00] |
| cor21_4: Unable to buy usual amount b/c of decreased income | | | | | | |
| Mean (SD) | 0.457 (0.773) | 0.560 (0.955) | 0.618 (1.54) | 0.555 (2.00) | 0.714 (1.38) | 0.600 (1.39) |
| Median [Min, Max] | 0 [0, 1.00] | 1.00 [0, 1.00] | 1.00 [0, 1.00] | 0 [0, 1.00] | 1.00 [0, 1.00] | 1.00 [0, 1.00] |
| cor21_5: Reduced meals/portions | | | | | | |
| Mean (SD) | 0.432 (0.766) | 0.411 (0.878) | 0.327 (1.18) | 0.506 (1.92) | 0.543 (1.26) | 0.439 (1.23) |
| Median [Min, Max] | 0 [0, 1.00] | 0 [0, 1.00] | 0 [0, 1.00] | 0 [0, 1.00] | 1.00 [0, 1.00] | 0 [0, 1.00] |
| FoodInsecurity | | | | | | |
| Mean (SD) | 1.68 (2.56) | 1.71 (3.00) | 1.80 (4.70) | 2.40 (7.20) | 2.92 (5.46) | 2.13 (4.83) |
| Median [Min, Max] | 2.00 [0, 5.00] | 2.00 [0, 5.00] | 1.00 [0, 5.00] | 2.00 [0, 5.00] | 3.00 [0, 5.00] | 2.00 [0, 5.00] |
| Sex | | | | | | |
| Mean (SD) | 0.445 (0.853) | 0.490 (0.922) | 0.376 (1.28) | 0.414 (1.52) | 0.460 (1.17) | 0.438 (1.17) |
| Median [Min, Max] | 0 [0, 1.00] | 0 [0, 1.00] | 0 [0, 1.00] | 0 [0, 1.00] | 0 [0, 1.00] | 0 [0, 1.00] |
| Employment status | | | | | | |
| Mean (SD) | 0.533 (0.762) | 0.401 (0.770) | 0.488 (1.37) | 0.457 (1.69) | 0.541 (1.11) | 0.482 (1.18) |
| Median [Min, Max] | 1.00 [0, 1.00] | 0 [0, 1.00] | 1.00 [0, 1.00] | 0 [0, 1.00] | 1.00 [0, 1.00] | 1.00 [0, 1.00] |
| Labor force participation | | | | | | |
| Mean (SD) | 0.741 (0.825) | 0.674 (0.956) | 0.715 (1.63) | 0.784 (2.20) | 0.794 (1.35) | 0.738 (1.44) |
| Median [Min, Max] | 1.00 [0, 1.00] | 1.00 [0, 1.00] | 1.00 [0, 1.00] | 1.00 [0, 1.00] | 1.00 [0, 1.00] | 1.00 [0, 1.00] |
| Age (in years) | | | | | | |
| Mean (SD) | 36.2 (37.6) | 36.8 (45.5) | 37.4 (69.8) | 32.4 (84.4) | 38.4 (58.4) | 36.7 (61.0) |
| Median [Min, Max] | 34.0 [18.0, 64.0] | 35.0 [18.0, 64.0] | 36.0 [18.0, 64.0] | 27.0 [18.0, 64.0] | 40.0 [18.0, 64.0] | 35.0 [18.0, 64.0] |
| Age (in years) | | | | | | |
| Mean (SD) | 0.281 (0.648) | 0.301 (0.745) | 0.419 (1.42) | 0.409 (1.42) | 0.372 (0.993) | 0.361 (1.10) |
| Median [Min, Max] | 0 [0, 1.00] | 0 [0, 1.00] | 0 [0, 1.00] | 1.00 [0, 1.00] | 0 [0, 1.00] | 0 [0, 1.00] |
| Income, dummy = 1 if part of the two highest income quartiles (approximate). | | | | | | |
| Mean (SD) | 0.346 (0.655) | 0.371 (0.767) | 0.0936 (0.673) | 0.612 (1.86) | 0.485 (1.05) | 0.365 (1.04) |
| Median [Min, Max] | 0 [0, 1.00] | 0 [0, 1.00] | 0 [0, 1.00] | 1.00 [0, 1.00] | 1.00 [0, 1.00] | 0 [0, 1.00] |
| Missing | 333 (8.3%) | 311 (4.1%) | 1835 (22.6%) | 705 (16.0%) | 1263 (15.5%) | 4447 (13.8%) |
| Level of education | | | | | | |
| Less than basic | 687 (17.1%) | 836 (11.0%) | 3088 (38.0%) | 464 (10.5%) | 2128 (26.1%) | 7203 (22.3%) |
| Basic | 507 (12.7%) | 2159 (28.3%) | 1482 (18.3%) | 458 (10.4%) | 1341 (16.5%) | 5947 (18.4%) |
| Secondary | 1866 (46.6%) | 2463 (32.3%) | 1485 (18.3%) | 1808 (41.1%) | 2915 (35.8%) | 10537 (32.6%) |
| Higher education | 947 (23.6%) | 2167 (28.4%) | 2065 (25.4%) | 1671 (38.0%) | 1759 (21.6%) | 8609 (26.7%) |
| Wave | | | | | | |
| 1 | 0 (0%) | 0 (0%) | 2007 (24.7%) | 0 (0%) | 2000 (24.6%) | 4007 (12.4%) |
| 2 | 2000 (49.9%) | 2549 (33.4%) | 2002 (24.7%) | 0 (0%) | 2077 (25.5%) | 8628 (26.7%) |
| 3 | 0 (0%) | 0 (0%) | 2105 (25.9%) | 2400 (54.5%) | 2057 (25.3%) | 6562 (20.3%) |
| 4 | 2007 (50.1%) | 2503 (32.8%) | 2006 (24.7%) | 0 (0%) | 2009 (24.7%) | 8525 (26.4%) |
| 5 | 0 (0%) | 2573 (33.7%) | 0 (0%) | 2001 (45.5%) | 0 (0%) | 4574 (14.2%) |

Note: This table present the descriptives statistics of the mains variables. The mean and its clustered standard error are calculated using individual weights.

information on policy measures that governments have taken to tackle COVID-19”. The main policies of interest are school and workplace closures. Indeed, the health measures, such as the face covering injunction or the testing and contact tracing, are not susceptible to impact food consumption, contrary to the measures limiting mobility or affecting income.

The indicators are ordinal variables. The mobility variables are ranked from 0 to 4 with 0 being an absence of measures and 4 being the most strict measures.

The “Stringency index”, a composite of nine response indicators (eight on “Closures and Containment”, and one on “public information campaign”), is also used. Figure 3 shows the “Stringency index” for the five countries, besides the cumulative number of COVID-19 cases.

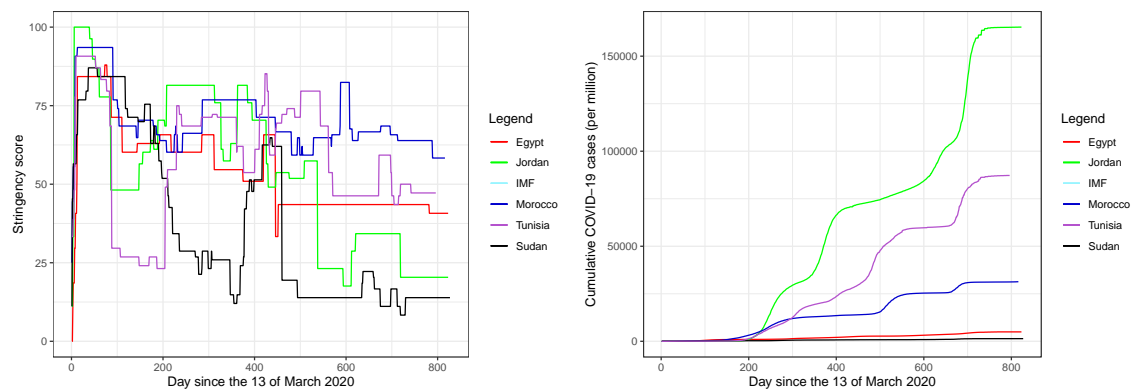


Figure 3: Stringency index and cumulative COVID-19 cases

Note: Panel A shows the Stringency index, since the beginning of the pandemic. Panel B shows the number of cumulative COVID-19 cases, since the beginning of the pandemic.

3.3 Geographic variables

The CMMHH survey collects information on the level 2 administrative area of individuals. This level corresponds to the districts for Sudan, Tunisia (Mutamadiyat), and Jordan (Liwa), to the prefectures/provinces for Morocco (Aqalim/Eumalate), and the municipalities for Egypt (Markaz/Kim). From now on, the district is used to refer to all the level 2 areas. The administrative information can be crossed with a geographic dataset characterizing the districts. The economic development of the districts is proxied by the night lights (Chen & Nordhaus, 2011 ; Henderson et al., 2012 ; Kocornik-Mina et al., 2020), using the “Visible and Infrared Imaging Suite” dataset (VIIRS) as suggested by Gibson et al. (2021). The population density is estimated through the “Grilled Population of the World, v4”. Estimates of the distance from the center of the district to the county capital and the nearest seaport are also calculated.

4 Empirical framework

To give an overview of the factors which affect the food consumption of the individuals, descriptive statistics, t-tests, and simple correlation with geographic variables, are presented.

Following those descriptive statistics, the food security variables are regressed on a range of explanatory variables using a logit model for the binary variables and an ordered logit regression for the variable “FoodInsecurity”. The regressions are estimated on the following covariates: sex, employment status, labor force participation, age, education, urban/rural, country, and wave. All estimations are weighted using ERF individual weights.

Another aspects that this study aim to analyse is the effect of the COVID-19 government policies on food insecurity. To this purpose, it is necessary to use an instrumental variables approach. Indeed, while it is plausible that the stringency of government policies hand an effect on food insecurity through restricted mobility and places closure, it is also plausible that the food insecurity situation of individuals is at the root of COVID-19 policies. Although government stringency is more likely to be related to health indicators, such as the age structure of the population, hospitalization capacity, and access to vaccines, COVID-19 policies are also politically motivated. The choice of the intensity of mobility restriction, or closure is determined by the living conditions of the population, including their food insecurity. Thus, an endogeneity problem due to simultaneity arises.

To overcome the endogeneity issue, this study suggests relying on a new instrumental variable: the Google Trends index for the search term “Covid”. The Google Trends index gives the interest evolution of a topic in a country or region. The research term “Covid” is strongly correlated with the COVID-19 stringency measures. People are looking on Google the information on the pandemic while government applies a response to it. To be sure to respect the “exclusion restriction”, the Google Trends index of the term “Covid” is the average of every MENA country except for the ones included in this study. Figure 4 shows the Google Trends index compare to the “Stringency Index”. It seems graphically that both are correlated.

The equation using this Instrumental variable approach is:

$$Y_{ijt} = \alpha + \beta Stringency_{jt} + \delta X_{i,j,t} + \mu_j + \gamma_t + \epsilon_{ijt} \quad (1)$$

Y_{ijt} is one of the five dummy variables that mention a food insecurity issue or the aggregated score “FoodInsecurity”. $Stringency_{jt}$ is the score of the Stringency index or the variables indicating a school/workplace closures, and a stay-at-home-requirement, of the country/region j , lagged by two weeks. $X_{i,j,t}$ a set of

variables on the characteristics of the individual i , in country/region j , at period t . μ_j is a country/region fixed effect, and γ_t is a period fixed effect.

$Stringency_{jt}$ is the variable instrumented by the Google Trends index.

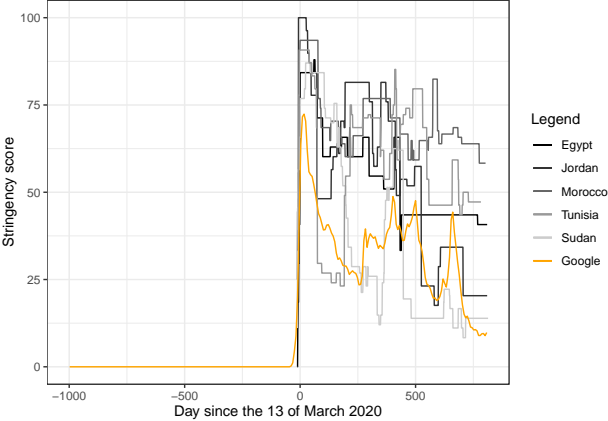


Figure 4: Google Trend index and Stringency Index

Note: The figure plot together the Google Trend index and the Stringency Index, since the beginning of the pandemic.

5 Results

To understand the food security situation during COVID-19, the CMMHH asked the individuals to mention if, in the past 7 days, they or any household member experienced any of the following 1) difficulties in going to food markets due to mobility restrictions imposed by government/closures, 2) unable to buy the amount of food we usually buy because of shortages of food in markets, 3) unable to buy the amount of food we usually buy because the price of food increased, 4) unable to buy the amount of food we usually buy because our household income has dropped, and 5) had to reduce the number of meals and/or the portion of each meal we would usually eat. The first five bars in Figure 5 show the answers to the questions, while the sixth bar shows the number of experiments mentioned.

According to panel F of this figure, it seems clear that the main issue faced by the population in those five countries was less related to the availability aspect of food security but rather the affordability aspect. The other panels, by country, do not change this finding while introducing some heterogeneity. Sudanese and Tunisians had an important problem of food shortages compared to their neighbors with respectively one third and half of them mentioning it, while the other countries are around 15%.

However, even in those countries, the main issue remains affordability, with 78% and 75% of the population claiming that food price increase prevents them to buy the same amount of food as usual. Even if the situation is better in the three other countries, almost half of the individuals report the same phenomenon. This food price increase is of even greater concern as around 57% of the interviewed believe they have suffered a drop in income. These problems of availability, but especially affordability, led to a decrease in the amount of food consumed among 41% of respondents.

The “Foodinsecurity” bar shows how widespread food insecurity is. More than 75% of the individuals experienced at least one food issue and around 40% at least three. Again, there is the heterogeneity, with Sudan and Tunisia being the most affected with around 85% of the population for at least one issue and 58% of the Tunisians affected by at least three issues.

Figure 6 presents another way to visualize the food security situation. Each plot shows the average answer score, by month, for each country, and overall. Again, Tunisia is a clear outlier. Tunisian people mention way more than others that they face issues related to food security. These graphs allow also us to see that it seems not that there is a clear tendency across the period. There is possibly a slight increase in food insecurity but not very strong. The only marked tendency is in Panel D, it is the mention that people can not buy the same amount of food because their income decreased. This tendency is upward across time.

There is heterogeneity between countries and, likely, there is also heterogeneity between individuals according

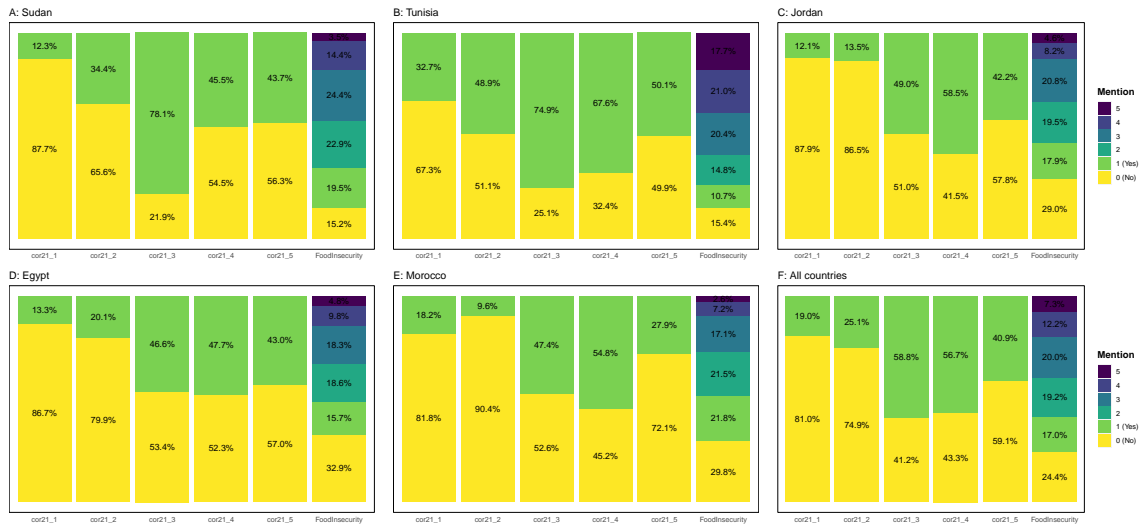


Figure 5: Stacked barplot of Food insecurity variables

Note: Panel A shows stacked barplot of Food insecurity variables for Sudan, Panel B for Tunisia, Panel C for Jordan, Panel D for Egypt, Panel E for Morocco, and Panel F, overall.

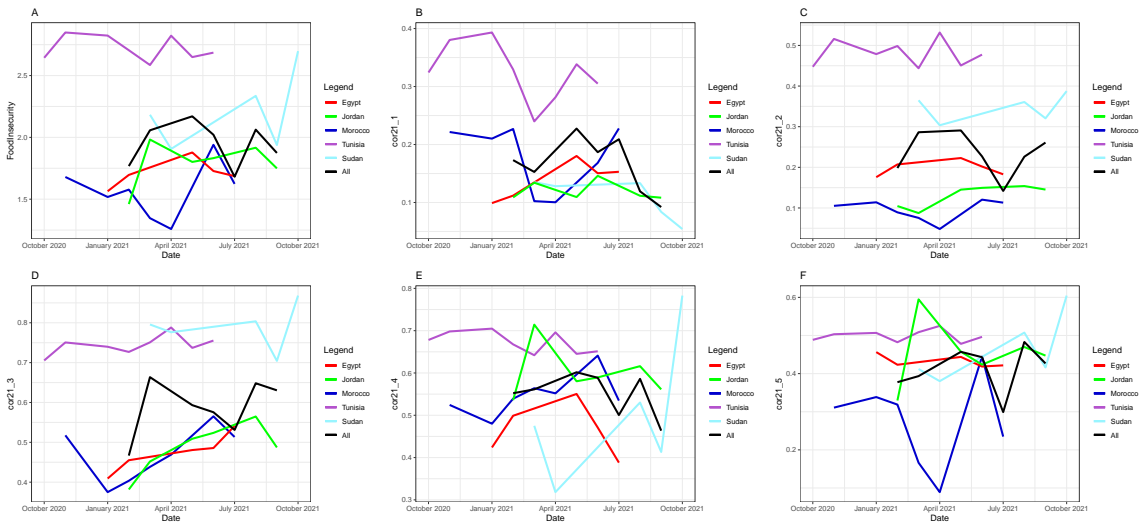


Figure 6: Food insecurity score by month.

Note: Panels show the average food insecurity score by country, and by month, according to the different variables of food insecurity.

to their socio-demographic profile. Table 2 presents Student's t-test between each issue that an individual could have faced and its characteristics.

This table indicates that for every issue, being more educated reduce the probability to report food insecurity, as well as being rich, living in a rural area, and not participating in the labor force. Being a male and being currently married reduce also the probability, except for food market access which is not significant.

Being employed has mixed results. Being an employee leads to mentioning more that they do not have

market access but they do not mention buying less either because of the price increase or their income decrease. Logically, they report less frequently that they reduce the amount of food they eat.

Table 2: Student t-test - All countries

| | Access market | | | Shortages | | | Price | | | Income | | | Reduce food | | |
|---------|---------------|-------|------------|-----------|-------|------------|-------|-------|------------|--------|-------|------------|-------------|-------|------------|
| | 0 | 1 | Difference | 0 | 1 | Difference | 0 | 1 | Difference | 0 | 1 | Difference | 0 | 1 | Difference |
| Educ | 0.260 | 0.140 | 0.120 *** | 0.301 | 0.224 | 0.078 *** | 0.661 | 0.530 | 0.132 *** | 0.696 | 0.461 | 0.235 *** | 0.507 | 0.340 | 0.168 *** |
| Sex | 0.210 | 0.213 | -0.004 | 0.257 | 0.286 | -0.029 *** | 0.580 | 0.644 | -0.064 *** | 0.583 | 0.622 | -0.039 *** | 0.411 | 0.475 | -0.063 *** |
| Lfp | 0.156 | 0.231 | -0.076 *** | 0.202 | 0.293 | -0.091 *** | 0.552 | 0.628 | -0.076 *** | 0.550 | 0.618 | -0.067 *** | 0.395 | 0.454 | -0.059 *** |
| Urban | 0.196 | 0.245 | -0.049 *** | 0.252 | 0.308 | -0.056 *** | 0.592 | 0.642 | -0.050 *** | 0.593 | 0.616 | -0.023 *** | 0.422 | 0.475 | -0.053 *** |
| Marital | 0.210 | 0.214 | -0.004 | 0.276 | 0.259 | 0.017 *** | 0.633 | 0.563 | 0.071 *** | 0.631 | 0.545 | 0.086 *** | 0.477 | 0.372 | 0.105 *** |
| Age | 0.209 | 0.214 | -0.005 | 0.263 | 0.275 | -0.012 ** | 0.576 | 0.637 | -0.061 *** | 0.559 | 0.638 | -0.078 *** | 0.392 | 0.482 | -0.091 *** |
| Emp | 0.206 | 0.217 | -0.011 ** | 0.266 | 0.273 | -0.006 | 0.623 | 0.591 | 0.032 *** | 0.627 | 0.571 | 0.055 *** | 0.466 | 0.410 | 0.056 *** |
| Income | 0.241 | 0.157 | 0.084 *** | 0.279 | 0.258 | 0.021 *** | 0.650 | 0.559 | 0.091 *** | 0.693 | 0.464 | 0.229 *** | 0.511 | 0.350 | 0.161 *** |

Note: This table presents Student t-test on five issues of food insecurity in all the countries. All estimations are weighted using individual weights. * p<0.1, ** p<0.05, *** p<0.01

Table 3: Student t-test - All countries

| | Reduce food | | | Reduce good | | |
|---------|-------------|-------|------------|-------------|-------|------------|
| | 0 | 1 | Difference | 0 | 1 | Difference |
| Educ | 0.498 | 0.323 | 0.175 *** | 0.447 | 0.322 | 0.126 *** |
| Sex | 0.383 | 0.425 | -0.043 *** | 0.369 | 0.390 | -0.021 * |
| Urban | 0.412 | 0.343 | 0.069 *** | 0.387 | 0.333 | 0.054 *** |
| Marital | 0.418 | 0.369 | 0.049 *** | 0.397 | 0.339 | 0.059 *** |
| Age | 0.363 | 0.440 | -0.077 *** | 0.334 | 0.421 | -0.086 *** |
| Emp | 0.447 | 0.338 | 0.109 *** | 0.420 | 0.319 | 0.101 *** |
| Income | 0.481 | 0.291 | 0.190 *** | 0.432 | 0.296 | 0.135 *** |
| Lfp | 0.402 | 0.404 | -0.002 | 0.387 | 0.376 | 0.011 |

Note: This table presents Student t-test on five issues of food insecurity in all the countries. All estimations are weighted using individual weights. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Jordan waves have two additional questions on the change in household spending on foods/goods compared to February 2020, before COVID-19. Table 3 presents the results of a similar Student's t-test using those additional questions. It indicates that individuals being less educated, male, living in a rural area, not married, older, not employed, and with a lower income, reduce the spending on food. All results are in line with those shown in Table 2.

In addition to the intra-country heterogeneity due to individual characteristics, spatial heterogeneity is also expected. Indeed, the economic development is not the same across the different regions of each country and, therefore, the intensity of reported food insecurity can vary.

Figure 7 shows for each region the average score of the variable "FoodInsecurity." While the district level is available, the low number in some districts makes the maps less trustworthy. The regional maps show the importance of spatial differences. In Egypt, the difference between the most food insecure and the less food insecure is one point half, and almost one point in Tunisia and Sudan. These are important gaps as the score is ranked from 0 to 5.

To understand which geographic aspect affect the FoodInsecurity score, spatial data are employed. Using a simple correlation between the FoodInsecurity score and measure of crop, and nightlight intensity, population density, and the distance to the capital or the closest seaport are estimated and plotted. The estimations are at the district level. The results seem to indicate that there is no correlation between the distance to the capital/seaport, the crop intensity, and the FoodInsecurity score. However, the nightlight intensity, as well as the population density correlate. The higher the nightlight/density, the lower the "FoodInsecurity". It is not surprising as nightlight and density are proxies for economic development and economic development is positively correlated with food security. However, it is interesting to verify that this link hold also at the district level.

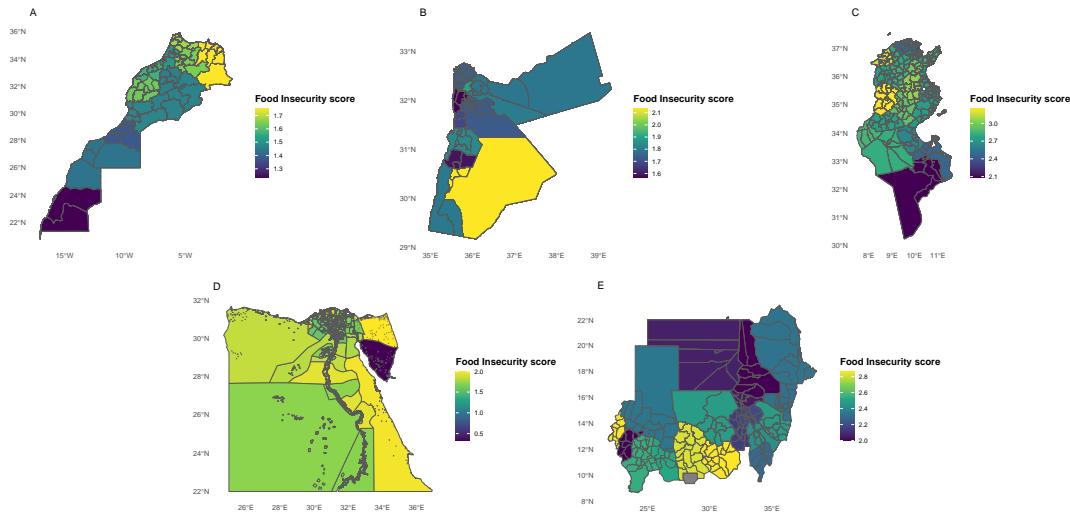


Figure 7: Stringency index and cumulative COVID-19 cases

Note: Panel A shows the average FoodInsecurity score by region for Morocco, Panel B for Jordan, Panel C for Tunisia, Panel D for Egypt, and Panel E for Sudan.

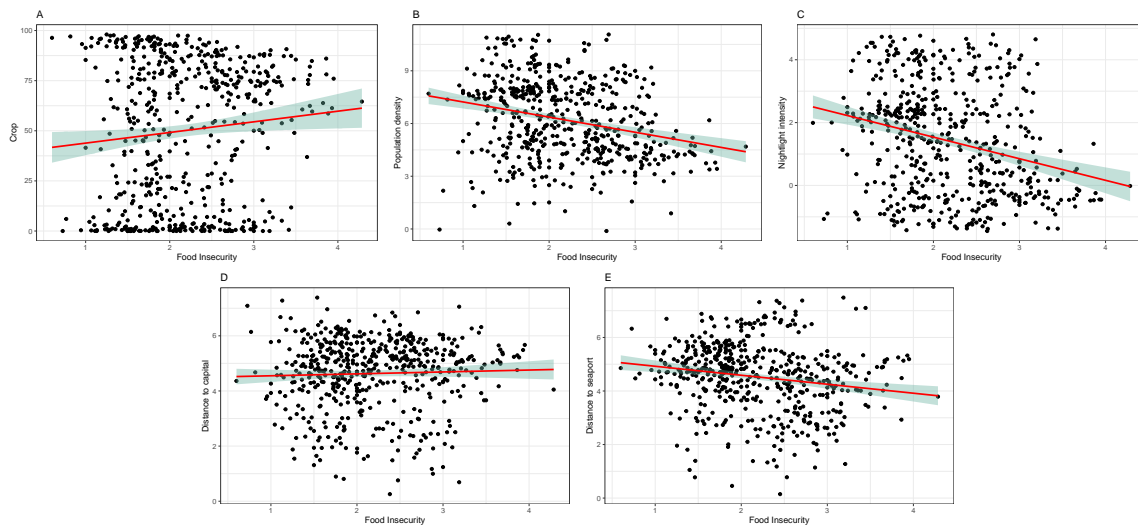


Figure 8: Stringency index and cumulative COVID-19 cases

Note: Panel A shows the correlation between average districts' FoodInsecurity score and crop intensity, Panel B with density population, Panel C with nightlight intensity, Panel D with distance to the capital, and Panel E with distance to the seaport. The correlations do not include districts with less than 10 individuals.

Following those descriptive statistics, Table 4 present the results of multiple logistic estimations for the five issues. The results confirm what has been illustrated with the Student's t-test. Indeed, being female, not employed, participating in the labor force, and being low educated decrease food security. The age criteria have mixed results according to the issue. Table 5 presents similar results with an ordered logistic regression, for all countries but also each country separately.

The government policy to tackle COVID-19 could explain partly the food insecurity score of individuals. Table

Table 4: Logit table - Five issues

| Variables | cor21 | | cor21 | | cor21 | | cor21 | | cor21 | |
|--|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Sex (Male omit) | | | | | | | | | | |
| Female | 0.084** (0.034) | 0.086** (0.034) | 0.132*** (0.032) | 0.136*** (0.032) | 0.351*** (0.028) | 0.354*** (0.029) | 0.162*** (0.028) | 0.168*** (0.028) | 0.281*** (0.028) | 0.283*** (0.028) |
| Employment status (Not employed omit) | | | | | | | | | | |
| Employed | -0.166*** (0.038) | -0.166*** (0.038) | -0.219*** (0.036) | -0.214*** (0.036) | -0.378*** (0.033) | -0.374*** (0.033) | -0.619*** (0.032) | -0.617*** (0.033) | -0.480*** (0.031) | -0.479*** (0.032) |
| Labor force participation (Not in labor omit) | | | | | | | | | | |
| In labor force | 0.485*** (0.044) | 0.476*** (0.045) | 0.487*** (0.041) | 0.482*** (0.042) | 0.635*** (0.036) | 0.632*** (0.036) | 0.826*** (0.036) | 0.819*** (0.036) | 0.678*** (0.035) | 0.676*** (0.035) |
| Age by group (20-24 omit) | | | | | | | | | | |
| 25-29 | 0.024 (0.053) | 0.024 (0.053) | 0.160*** (0.049) | 0.176*** (0.050) | 0.330*** (0.043) | 0.334*** (0.043) | 0.431*** (0.041) | 0.437*** (0.042) | 0.384*** (0.043) | 0.394*** (0.044) |
| 30-34 | -0.001 (0.052) | 0.008 (0.053) | 0.075 (0.050) | 0.100** (0.050) | 0.452*** (0.043) | 0.452*** (0.043) | 0.548*** (0.042) | 0.553*** (0.042) | 0.481*** (0.043) | 0.489*** (0.044) |
| 35-39 | -0.187*** (0.056) | -0.183*** (0.057) | -0.074 (0.053) | -0.055 (0.054) | 0.522*** (0.045) | 0.525*** (0.046) | 0.579*** (0.044) | 0.584*** (0.045) | 0.515*** (0.045) | 0.519*** (0.046) |
| 40-44 | -0.170*** (0.056) | -0.169*** (0.056) | -0.132** (0.053) | -0.121** (0.054) | 0.534*** (0.046) | 0.537*** (0.046) | 0.614*** (0.045) | 0.627*** (0.045) | 0.571*** (0.045) | 0.583*** (0.046) |
| 45-49 | -0.255*** (0.063) | -0.244*** (0.063) | -0.106* (0.060) | -0.093 (0.060) | 0.480*** (0.051) | 0.483*** (0.051) | 0.595*** (0.050) | 0.603*** (0.051) | 0.649*** (0.051) | 0.660*** (0.051) |
| 50-54 | -0.190*** (0.062) | -0.190*** (0.062) | 0.000 (0.058) | 0.016 (0.059) | 0.573*** (0.052) | 0.577*** (0.052) | 0.659*** (0.051) | 0.664*** (0.051) | 0.773*** (0.051) | 0.785*** (0.051) |
| 55-59 | -0.247*** (0.074) | -0.249*** (0.075) | -0.106 (0.071) | -0.105 (0.072) | 0.472*** (0.061) | 0.474*** (0.062) | 0.479*** (0.060) | 0.486*** (0.060) | 0.577*** (0.060) | 0.592*** (0.061) |
| 60-64 | -0.253*** (0.076) | -0.252*** (0.076) | -0.076 (0.072) | -0.063 (0.073) | 0.364*** (0.064) | 0.365*** (0.064) | 0.266*** (0.062) | 0.264*** (0.063) | 0.504*** (0.063) | 0.510*** (0.063) |
| Education (Less than basic omit) | | | | | | | | | | |
| Basic | -0.168*** (0.045) | -0.182*** (0.045) | -0.232*** (0.045) | -0.237*** (0.046) | -0.117*** (0.041) | -0.118*** (0.041) | -0.219*** (0.041) | -0.210*** (0.041) | -0.266*** (0.039) | -0.263*** (0.039) |
| Secondary | -0.500*** (0.042) | -0.518*** (0.043) | -0.565*** (0.041) | -0.583*** (0.041) | -0.474*** (0.037) | -0.475*** (0.038) | -0.653*** (0.037) | -0.639*** (0.037) | -0.711*** (0.036) | -0.705*** (0.036) |
| Higher Education | -0.811*** (0.047) | -0.832*** (0.048) | -1.012*** (0.045) | -1.039*** (0.046) | -0.894*** (0.038) | -0.898*** (0.039) | -1.314*** (0.038) | -1.304*** (0.039) | -1.245*** (0.039) | -1.243*** (0.039) |
| Urban (Rural omit) | | | | | | | | | | |
| Rural | 0.221*** (0.033) | 0.190*** (0.036) | 0.171*** (0.032) | 0.156*** (0.035) | 0.074*** (0.029) | 0.091*** (0.031) | 0.070** (0.028) | 0.095*** (0.031) | 0.060** (0.028) | 0.082*** (0.030) |
| Country (Egypt omit) | | | | | | | | | | |
| Jordan | 0.079 (0.063) | | -0.473*** (0.057) | | -0.028 (0.044) | | 0.372*** (0.044) | | -0.139*** (0.045) | |
| Morocco | 0.412*** (0.059) | | -0.964*** (0.060) | | -0.105** (0.045) | | 0.219*** (0.045) | | -0.780*** (0.046) | |
| Sudan | 0.442*** (0.080) | | 0.872*** (0.067) | | 1.468*** (0.061) | | 0.061 (0.057) | | 0.398*** (0.058) | |
| Tunisia | 1.249*** (0.056) | | 1.334*** (0.050) | | 1.134*** (0.045) | | 0.811*** (0.045) | | 0.261*** (0.044) | |
| Wave (First wave omit) | | | | | | | | | | |
| Wave 2 | -0.134*** (0.048) | -0.137*** (0.048) | -0.128** (0.051) | -0.129** (0.051) | -0.283*** (0.045) | -0.287*** (0.045) | 0.053 (0.044) | 0.046 (0.045) | 0.014 (0.045) | 0.008 (0.045) |
| Wave 3 | -0.578*** (0.053) | -0.589*** (0.053) | -0.124** (0.053) | -0.132** (0.054) | 0.036 (0.048) | 0.031 (0.048) | 0.053 (0.046) | 0.047 (0.047) | -0.345*** (0.047) | -0.353*** (0.048) |
| Wave 4 | -0.100** (0.048) | -0.114** (0.049) | -0.021 (0.051) | -0.030 (0.052) | 0.120*** (0.045) | 0.115** (0.046) | 0.161*** (0.045) | 0.156*** (0.045) | 0.128*** (0.045) | 0.123*** (0.045) |
| Wave 5 | -0.494*** (0.073) | -0.510*** (0.074) | 0.011 (0.066) | 0.005 (0.067) | 0.185*** (0.058) | 0.179*** (0.058) | 0.326*** (0.056) | 0.325*** (0.057) | 0.213*** (0.056) | 0.211*** (0.057) |
| Fixed effects and observations | | | | | | | | | | |
| Geo F.E | Country | Region | Country | Region | Country | Region | Country | Region | Country | Region |
| Num.Obs. | 32296 | 32296 | 32296 | 32296 | 32296 | 32296 | 32296 | 32296 | 32296 | 32296 |

Note: This table present the logit estimations on five issue of food insecurity in all the countries. All estimations are weighted using individual weights, and include period fixed effects. * p<0.1, ** p<0.05, *** p<0.01

Table 5: Logit table - FoodInsecurity

| Variables | FoodInsecurity | | Morocco | Tunisia | Egypt | Sudan | Jordan |
|--|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Sex (Male omit) | | | | | | | |
| Female | 0.354*** (0.023) | 0.374*** (0.023) | 0.441*** (0.048) | 0.394*** (0.047) | 0.487*** (0.073) | 0.312*** (0.062) | 0.241*** (0.048) |
| Employment status (Not employed omit) | | | | | | | |
| Employed | -0.453*** (0.026) | -0.450*** (0.026) | -0.618*** (0.053) | -0.488*** (0.053) | -0.589*** (0.083) | 0.001 (0.064) | -0.440*** (0.056) |
| Labor force participation (Not in labor omit) | | | | | | | |
| In labor force | 0.844*** (0.029) | 0.835*** (0.029) | 0.854*** (0.059) | 1.153*** (0.061) | 0.958*** (0.088) | 0.918*** (0.078) | 0.542*** (0.055) |
| Age by group (20-24 omit) | | | | | | | |
| 25-29 | 0.306*** (0.036) | 0.308*** (0.036) | -0.287*** (0.074) | 0.248*** (0.078) | 0.699*** (0.103) | 0.447*** (0.085) | 0.644*** (0.074) |
| 30-34 | 0.338*** (0.036) | 0.350*** (0.037) | -0.048 (0.075) | 0.283*** (0.076) | 0.617*** (0.104) | 0.451*** (0.095) | 0.546*** (0.076) |
| 35-39 | 0.363*** (0.038) | 0.354*** (0.038) | 0.075 (0.080) | 0.316*** (0.080) | 0.324*** (0.104) | 0.590*** (0.097) | 0.627*** (0.081) |
| 40-44 | 0.382*** (0.039) | 0.394*** (0.039) | -0.154* (0.082) | 0.331*** (0.083) | 0.410*** (0.113) | 0.581*** (0.111) | 0.710*** (0.075) |
| 45-49 | 0.376*** (0.041) | 0.399*** (0.041) | -0.206** (0.083) | 0.377*** (0.086) | 0.470*** (0.126) | 0.609*** (0.126) | 0.790*** (0.081) |
| 50-54 | 0.401*** (0.043) | 0.438*** (0.043) | -0.232*** (0.087) | 0.477*** (0.087) | 0.615*** (0.129) | 0.248* (0.128) | 0.908*** (0.089) |
| 55-59 | 0.162*** (0.047) | 0.187*** (0.048) | -0.354*** (0.091) | 0.241*** (0.092) | 0.015 (0.147) | -0.122 (0.160) | 0.559*** (0.109) |
| 60-64 | 0.193*** (0.054) | 0.206*** (0.054) | -0.488*** (0.115) | 0.556*** (0.106) | -0.228 (0.157) | 0.420** (0.185) | 0.410*** (0.105) |
| Education (Less than basic omit) | | | | | | | |
| Basic | -0.342*** (0.030) | -0.338*** (0.030) | -0.309*** (0.057) | -0.661*** (0.062) | -0.122 (0.118) | -0.309*** (0.088) | -0.275*** (0.062) |
| Secondary | -0.818*** (0.030) | -0.797*** (0.031) | -0.871*** (0.079) | -0.954*** (0.062) | -0.535*** (0.074) | -0.338*** (0.083) | -0.969*** (0.068) |
| Higher Education | -1.412*** (0.032) | -1.406*** (0.032) | -1.426*** (0.098) | -1.778*** (0.063) | -1.222*** (0.086) | -0.256*** (0.087) | -1.625*** (0.064) |
| Urban (Rural omit) | | | | | | | |
| Rural | 0.074*** (0.023) | 0.086*** (0.026) | 0.101** (0.047) | 0.126** (0.051) | 0.156** (0.073) | 0.084 (0.065) | 0.037 (0.069) |
| Country (Egypt omit) | | | | | | | |
| Jordan | -0.006 (0.039) | | | | | | |
| Morocco | -0.174*** (0.040) | | | | | | |
| Sudan | 0.896*** (0.048) | | | | | | |
| Tunisia | 1.360*** (0.040) | | | | | | |
| Wave (First wave omit) | | | | | | | |
| Wave 2 | -0.054 (0.037) | -0.061 (0.037) | 0.035 (0.059) | -0.103* (0.056) | | | |
| Wave 3 | -0.241*** (0.038) | -0.242*** (0.038) | -0.266*** (0.056) | -0.161*** (0.056) | | | |
| Wave 4 | 0.164*** (0.037) | 0.154*** (0.038) | 0.705*** (0.059) | -0.297*** (0.057) | 0.127** (0.057) | | 0.310*** (0.051) |
| Wave 5 | 0.286*** (0.047) | 0.268*** (0.047) | | | | 0.638*** (0.056) | 0.394*** (0.051) |
| Fixed effects and observations | | | | | | | |
| Geo F.E | Country | Region | Region | Region | Region | Region | Region |
| Num.Obs. | 32296 | 32296 | 8120 | 8143 | 4007 | 4401 | 7625 |

Note: This table present the ordered logit estimations on FoodInsecurity. All estimations are weighted using individual weights, and include period fixed effects.
* p<0.1, ** p<0.05, *** p<0.01

Table 6: Instrumental variables table - Five issues

| Variables | cor21 1 | cor21 1 | cor21 2 | cor21 2 | cor21 3 | cor21 3 | cor21 4 | cor21 4 | cor21 5 | cor21 5 |
|----------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| workplaceclosures | 0.343* | 0.343* | -0.277 | -0.264 | 0.260 | 0.279 | -0.451 | -0.452 | 0.203 | 0.215 |
| | (0.202) | (0.205) | (0.260) | (0.258) | (0.245) | (0.248) | (0.277) | (0.281) | (0.287) | (0.287) |
| Ftest | 322.02 | 311.183 | 322.02 | 311.183 | 322.02 | 311.183 | 322.02 | 311.183 | 322.02 | 311.183 |
| stayhomerequirements | 0.083* | 0.081* | -0.067 | -0.063 | 0.063 | 0.066 | -0.109 | -0.107 | 0.049 | 0.051 |
| | (0.048) | (0.048) | (0.061) | (0.059) | (0.057) | (0.056) | (0.068) | (0.067) | (0.068) | (0.066) |
| Ftest | 1348.885 | 1341.383 | 1348.885 | 1341.383 | 1348.885 | 1341.383 | 1348.885 | 1341.383 | 1348.885 | 1341.383 |
| Stringency | 0.009* | 0.009* | -0.007 | -0.007 | 0.007 | 0.007 | -0.012 | -0.012 | 0.005 | 0.006 |
| | (0.005) | (0.005) | (0.007) | (0.007) | (0.006) | (0.006) | (0.007) | (0.007) | (0.007) | (0.008) |
| Ftest | 768.678 | 762.388 | 768.678 | 762.388 | 768.678 | 762.388 | 768.678 | 762.388 | 768.678 | 762.388 |
| schoolclosures | 0.076* | 0.074* | -0.061 | -0.057 | 0.057 | 0.061 | -0.100 | -0.098 | 0.045 | 0.047 |
| | (0.044) | (0.044) | (0.056) | (0.054) | (0.052) | (0.052) | (0.061) | (0.061) | (0.062) | (0.061) |
| Ftest | 1320.342 | 1296.975 | 1320.342 | 1296.975 | 1320.342 | 1296.975 | 1320.342 | 1296.975 | 1320.342 | 1296.975 |
| Geo F.E | Country | Region | Country | Region | Country | Region | Country | Region | Country | Region |
| Num. Obs. | 32296 | 32296 | 32296 | 32296 | 32296 | 32296 | 32296 | 32296 | 32296 | 32296 |

Note: This table present the instrumental variables estimations. All estimations are weighted using individual weights, and include period fixed effects. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Instrumental variables table - FoodInsecurity

| Variables | FoodInsecurity | FoodInsecurity | Morocco | Tunisia | Egypt | Sudan | Jordan |
|----------------------|----------------|----------------|----------|-----------|----------|---------|----------|
| workplaceclosures | 0.078 | 0.120 | 2.507 | -0.835 | 3.807 | 0.013 | 0.299 |
| | (0.742) | (0.744) | (18.607) | (0.536) | (6.549) | (1.704) | (0.605) |
| Ftest | 322.02 | 311.183 | 0.764 | 524.976 | 1.806 | 106.334 | 453.472 |
| stayhomerequirements | 0.019 | 0.028 | | -111.954 | 0.142 | 0.004 | -0.072 |
| | (0.179) | (0.176) | | (111.804) | (0.148) | (0.462) | (0.146) |
| Ftest | 1348.885 | 1341.383 | | 2.01 | 1113.568 | 402.822 | 566.846 |
| Stringency | 0.002 | 0.003 | -0.010 | -0.021 | 0.006 | 0.000 | 0.024 |
| | (0.020) | (0.020) | (0.074) | (0.013) | (0.007) | (0.014) | (0.048) |
| Ftest | 768.678 | 762.388 | 721.645 | 2884.2 | 1081.761 | 428.287 | 357.262 |
| schoolclosures | 0.017 | 0.026 | -0.026 | -1.082 | 0.142 | 0.002 | -0.073 |
| | (0.164) | (0.161) | (0.192) | (0.690) | (0.148) | (0.201) | (0.149) |
| Ftest | 1320.342 | 1296.975 | 1645.887 | 390.995 | 1113.568 | 453.624 | 1081.402 |
| Geo F.E | Country | Region | Region | Region | Region | Region | Region |
| Num. Obs. | 32296 | 32296 | 8120 | 8143 | 4007 | 4401 | 7625 |

Note: This table present the instrumental variables estimations. All estimations are weighted using individual weights, and include period fixed effects. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

6 and 7 presents the estimations of equation 1. While the F-statistic, computed following (Olea & Pflueger, 2013), confirms that the instrument is strong enough for the estimations, it seems that the government policies are not correlated with the food insecurity score. The only significant effects, at a 0.90 confidence level, are found for the issue related to government mobility restrictions. The results seem to indicate that indeed, the workplace, and school closures as well as the stay-at-home requirements, have increased the mention of difficulties in going to food markets due to mobility restrictions imposed by government/closures. However, this effect is not significant at the standard level of confidence, and the overall effect presented in Table 7 is not significant.

6 Conclusion

This study assesses the food insecurity situation during the COVID-19 pandemic in Egypt, Jordan, Morocco, Sudan, and Tunisia. Focusing on the five food security issues asked by the ERF interviewers, the heterogeneity between countries, region, and individuals have been measured using descriptive statistics and logit estimation.

At the country level, Tunisia, and, to a lesser extent, Sudan is much more affected by food insecurity than their neighbors. Both of these countries are more affected in every aspect than others, but it is important to note that Tunisia is the only one strongly affected by the availability aspect of food security. The accessibility component is still the major driver of food insecurity, but food shortages seem to have been an important phenomenon in Tunisian daily life during COVID-19.

At the region/district level, descriptive statistics show that exists heterogeneity between the different regions up to one point on grading of five. In addition, the nightlight and the population density seem to be correlated with the food security of the districts.

At the individual level, the estimations show that multiple socio-economic characteristics emerge to understand which profile is more at risk to be food insecure. It is a woman, not married, with low education, living in an urban area, participating in the labor force, while not employed

Then, an instrumental variable approach, using the Google Trends index, has been used to estimate if the government policies set up during the pandemic had affected the population's food security. Results indicate that on the measured variables it has not, except for the logical decrease in access to "food markets due to mobility restrictions", and even not by a significant level standard.

Through this study, the profile of the individual affected the most by food insecurity in those five MENA countries has been shown. The profile found was expected and close to what can be found in many studies focusing on inequality. An aspect that this paper did not focus on but should be of interest is how few people mention having received support from the government during the pandemic. Indeed, except for Egypt, thanks to its ration cards program, few individuals receive support. In Morocco, Tunisia, and Sudan, around 90% of the individuals had no help from the government. Egypt is the country that helped the most people with almost 80% of individuals mentioning support. It is also the country with a higher number of people declaring having no food security issue. Those two pieces of information combined should be taken into consideration by policymakers.

7 References

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