

Food Insecurity and Gender in Turbulent Times: Evidence from New Data for Egypt

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Abstract

The Russian war in Ukraine led to significant disruptions in trade in cereals, especially wheat and other products that are key for food security. This paper investigates the impact of the war in Ukraine on food security in Egypt through a gender lens using a newly collected dataset. The case of Egypt is of particular interest as it is a large importer of wheat; experienced other concurrent economic crises; and is among the largest economies in the Middle East and North Africa. The analysis distinguishes the impact of the war in Ukraine from other factors resulting in more fragile food security. Results indicate that the way domestic economic policies were implemented increased food insecurity caused by the war. Female headed-households and women in female-headed households were more strongly impacted by increasing food insecurity. Government support measures did not significantly reduce the negative implications of the war on food insecurity.

Keywords: Food insecurity, war in Ukraine, Gender, Egypt.

JEL classification: J16, H56, Q18.

ملخص

أدت الحرب الروسية في أوكرانيا إلى اضطرابات كبيرة في تجارة الحبوب، وخاصة القمح والمنتجات الأخرى التي تعتبر أساسية للأمن الغذائي. تبحث هذه الورقة في تأثير الحرب في أوكرانيا على الأمن الغذائي في مصر— من خلال عدسة النوع الاجتماعي باستخدام مجموعة بيانات تم جمعها حديثاً. وتكتسب حالة مصر أهمية خاصة لأنها مستورد كبير للقمح ؛ وشهدت أزمات اقتصادية أخرى متزامنة ؛ وهي من بين أكبر الاقتصادات في الشرق الأوسط وشمال أفريقيا. يميز التحليل تأثير الحرب في أوكرانيا عن العوامل الأخرى التي تؤدي إلى مزيد من هشاشة الأمن الغذائي. تشير النتائج إلى أن الطريقة التي تم بها تنفيذ السياسات الاقتصادية المحلية زادت من انعدام الأمن الغذائي الناجم عن الحرب. وتأثرت الأسر المعيشية التي ترأسها إناث والنساء في الأسر المعيشية التي ترأسها إناث تأثراً أكبر بتزايد انعدام الأمن الغذائي. لم تقلل تدابير الدعم الحكومية بشكل كبير من الآثار السلبية للحرب على انعدام الأمن الغذائي.

1. Introduction

The economic impacts of the war in Ukraine are high and uncertain (Zaki et al., 2023), especially on food security (Ben Hassen and El Bilali, 2022). Indeed, the war led to significant disruptions in trade in cereals, especially wheat and other products that are key for food security. For instance, Devadoss and Ridley (2024) find that the conflict causes wheat prices to increase in most of the countries by around 2%. Hence, with Ukraine and Russia among the most important producers and exporters of arable crops (cereals and oilseed) in the world, the war has significant implications for producers and consumers, especially on food security. Thus, the objective of this paper is to investigate the impact the war in Ukraine on food security in Egypt using a newly collected dataset.

The case of Egypt is of particular interest as it is the largest importer of wheat; it experienced other concurrent economic crises; and is among the largest economies the Middle East and North Africa. Indeed, the war was accompanied by several other shocks (increase in debt, IMF Loans, currency devaluation, and soaring inflation). Moreover, the impact of the war has been amplified by other structural characteristics such as the distortion of energy and fertilizer markets as well as domestic policies, like in other developing countries (Chepeliev et al., 2023). Egypt is also characterized by several vulnerable categories such as informal workers (that are mainly blue collars), women, and female-headed households. For women and female-headed households, this is because the labor force participation of females is relatively low compared to other countries. Blue collar workers are likely to be informal workers as a non-trivial share does not benefit from a social insurance scheme. Thus, these categories are more exposed to economic vulnerability during any external or internal shock. In such a poly-crisis context, the impact on households is heterogeneous and the coping strategies were diverse.

The literature has shown that gender and food security are interconnected through several channels. First, women working in the agriculture sector generally experience a limited access to land, natural resources, and inputs (fertilizer, seed varieties, tools, and pesticide). This can negatively affect their ability to produce and procure food (Agarwal, 2018). Second, food security is influenced by total household income (Kennedy and Peters, 1992). Given that women have a low labor force participation in the manufacturing and service sector, the household income can be affected, which can affect their access to food. Third, even in situations when there is an adequate supply of food, unequal feeding and caring behaviors may favor men over women and boys over girls when allocating food within the same household, which could result in less nutritious results for women (Gittelsohn, 1991). All these effects can be amplified in a period of economic crisis, wars or conflicts.

Against this background, this paper investigates the impact the war in Ukraine on food security in Egypt and tries to distinguish the impact of the war in Ukraine from other reasons that led to a more fragile food security from a gender lens. To do so, I use a newly collected dataset by the

Economic Research Forum through phone survey. The main findings show that, the war is not the sole responsible of food insecurity in Egypt. Indeed, the way the domestic economic policies were implemented increased this insecurity. Second, female headed-households and females in female-headed household were the most to bear the cost of the crisis. Finally, whereas these categories were more likely to adopt different coping strategies to face the crisis, the government support did not a significant impact to reduce the negative implications of the war.

The rest of the paper is organized as follows. Section briefly reviews the literature. Section 3 sets the macroeconomic scene in Egypt that is needed to understand the microeconomic effects of the war. Section 3 presents the data and some stylized facts. Section 4 is dedicated to methodology. Section 5 analyzes the results and Section 6 concludes and provides some policy implications of the results.

2. Literature review

The literature on the impact of conflicts or wars on food security can be divided in two main types. The first one includes ex-ante studies using Computable General Equilibrium (CGE) models along with either household or labor force surveys. The CGE/ microsimulation approach determines the effects of macro policies and external shocks (Arndt et al., 2022, Rose et al., 2023 and Yalew et al., 2024). The second type of studies includes ex-post studies that use econometric tools to examine the determinants and implications of food insecurity (Mottaleb et al., 2022). Yet, most of the available literature examines this topic either at the macroeconomic level or for developed countries. Studies using individual data are scarcer, especially those on the Middle East and North Africa (MENA) while the latter is one of the most exposed and most volatile regions to such global developments in the food market. It is also among the largest food importers worldwide, with an average of more than 50% of the calorie consumption coming from imported food (Mandour, 2021).

Thus, this paper bridges the gap between three strands of the literature. The first one is on conflicts and development, and the second is on conflicts and food security and finally gender and food security. First, the literature on conflicts and development is abundant (Munroe et al., 2023). For instance, Liadze et al. (2022), using the National Institute Global Econometric Model (NiGEM), quantify the effect of the war on the global economy and show that the cost is around \$1.5 trillion (PPP). Sertyesilisik and Sertyesilisik (2024) show also how development and sustainable development is affected in different countries.

Second, studies examining the nexus between conflicts and food security is also abundant (Martin-Shields and Stojetz, 2019) but inconclusive. In addition, when it comes to the impact of war in Ukraine, most of the literature is, so far, rather descriptive, using macroeconomic models or datasets and not focusing on the MENA and Sub-Sahara regions. Among the few studies, Yalew

et al. (2024), using a CGE model for Ethiopia, show that the overall effects of the war on urban households are stronger severe compared to the rural ones (especially through higher prices of fertilizers). Similar findings are found by Abay et al. (2023) who argue that, even if the absolute level of food insecurity is higher in rural areas, urban poor are likely to suffer more of the war, especially if they do not have social protection or food subsidies. In the same vein, Arndt et al., (2022), using the Rural Investment and Policy Analysis (RIAPA) model (that is based on a CGE model) examine the economy-wide effects of the war and show that the food, fuel and fertilizer price shocks. They show that household consumptions fall more than GDP. As per econometric tools, using macro data, Mottaleb et al. (2022) show that a 1% decrease in global wheat trade can increase producer's price of wheat by 1.1%. Moreover, a 1% increase in producer's price reduces wheat consumption by 0.59%, showing the pass-through effect from the global to the domestic level. Some studies focus on the impact of war on other development outcomes such as migration. For instance, as public assistance is important for Ukrainians in Poland, its impact is limited because of health problems, language barriers and a lack of professional qualifications (Kochaniak et al, 2024).

Third, on gender and food security, the literature shows that, while the relation is complex, reducing gender inequality is an important part of the solution to global hunger (Smith et al. 2003). In addition, for women, the capacity to access food is contingent upon their agency and the resources at their disposal. This encompasses their ability to produce food (Kiptot et al., 2014 and Doss et al., 2014), purchase it, and the intra-household allocation of food (Njuki et al., 2016). In addition, as it was mentioned before, women have a limited access to land, natural resources, and other relevant inputs for the agriculture sector such as fertilizer, seed varieties, and pesticide. In the case of Egypt, Ellaithy (2001), using the Household Expenditure, Income and Consumption Survey of 1999/2000, shows that females are more likely to be poor than males and that female-headed households are smaller in size and have lower individual per earner ratio. From a food security perspective, this result is important as it shows to what extent there is feminization of poverty and that female-headed households can be more vulnerable. Ramadan (2017) examines the determinants of food security and shows that in crisis years, both food access and food utilization are strongly affected. A similar conclusion applies to the COVID-19 pandemic, with a stronger impact for females, low-educated, and self-employed (Ramadan, 2022). Working in the subsistence sector is also essential for women in developing countries. Indeed, Elkhazraty and Zaky (2022) show that Egyptian rural women work longer hours than men in total subsistence labor. In addition, the impact of hours spent in subsistence agriculture by women in the household on the likelihood of their household's food security was higher than their male counterparts.

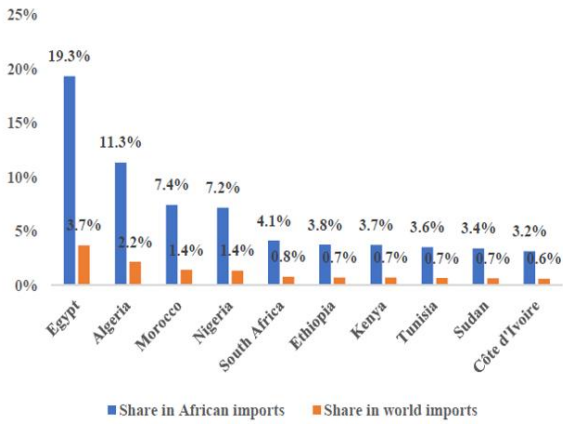
2. Setting the scene

The case of Egypt is of particular interest for several reasons. First, it is the largest importer of wheat and highly dependent on its imports, especially from Ukraine and Russia as it is shown in Figure 1. This clearly increased Egypt's vulnerability to the external shocks, especially the war.

However, this was not the only shock that Egypt faced. Indeed, it experienced other concurrent economic crises as the war was accompanied by several other shocks (increase in debt, IMF loans, currency devaluation, and soaring inflation). Figure 2 shows that, until 2015/2016, domestic debt was increasing with a rather stable external debt. However, with the IMF program in 2016, this trend changed as the former decreased (from 95% of GDP in 2015/2016 to 68% in 2021/2022) and the latter has been increasing to reach historical levels, reaching around 37% of GDP in 2021. This increased even further until 2022 reaching 163 billion USD. As of 2024, the debt was composed as follows. In terms of maturity, long-term debt accounted for 135.3 billion USD, whereas short-term debt accounted for 25.3 billion USD. In terms of composition, 37% of the long-term external debt is due to multilateral institutions (especially the IMF), 21.4% bonds, 11% deposits and 23% other lenders. Clearly, with the decrease in the real sources of foreign currency (FDI, exports, tourism, etc.), the Egyptian pound experienced a series of currency devaluation as the Central Bank of Egypt maintained, globally, a fixed adjustable peg of the Egyptian pound to the US dollar to keep inflation low, reflecting a high level of misalignment (Hosni and Rofael, 2015 and Nourledin, 201). In November 2016, amid negotiations with the IMF, the CBE announced its decision to adopt a liberalized exchange rate regime, and the Egyptian pound was floated against the US dollar at US \$1 = £E13.00. Thereafter, there was a slight appreciation in the Egyptian pound and in February 2022 the exchange rate was US \$1 = £E15.70. However, in response to the effects of the pandemic and the war in Ukraine and the consequent pressure on Egypt's foreign reserves, the CBE commenced a series of currency devaluations in early 2022 and by May 2023 the official exchange rate was US \$1 = £E31.00 and it reached £E49.00 in 2024 (see Figure 3).

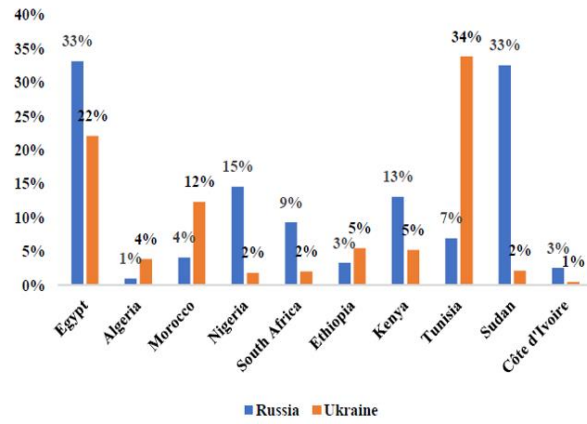
Figure 1: Imports dependency

a). Share of African in global cereals imports for major African importers



Source: Authors' elaboration, based on ITC website.
 Note: Figures are averages over the period 2017–2021.

b). Share of Russia and Ukraine in global cereals imports for major African importers



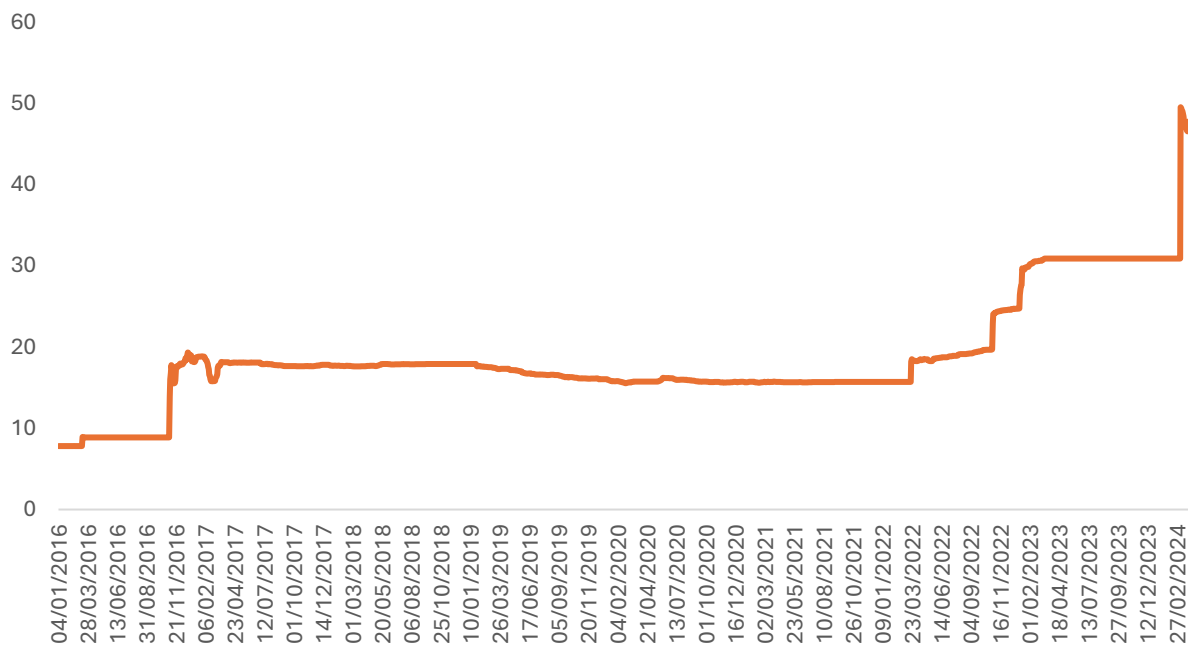
Source: Authors' elaboration, based on ITC website.
 Note: Figures are averages over the period 2017–2021.

Figure 2: Gross public debt (domestic and external) - share to GDP (2005-2022)



Source: Author's own elaboration using the Central Bank of Egypt online dataset.
 Note: Figures of gross domestic debt are missing for 2021 and 2022.

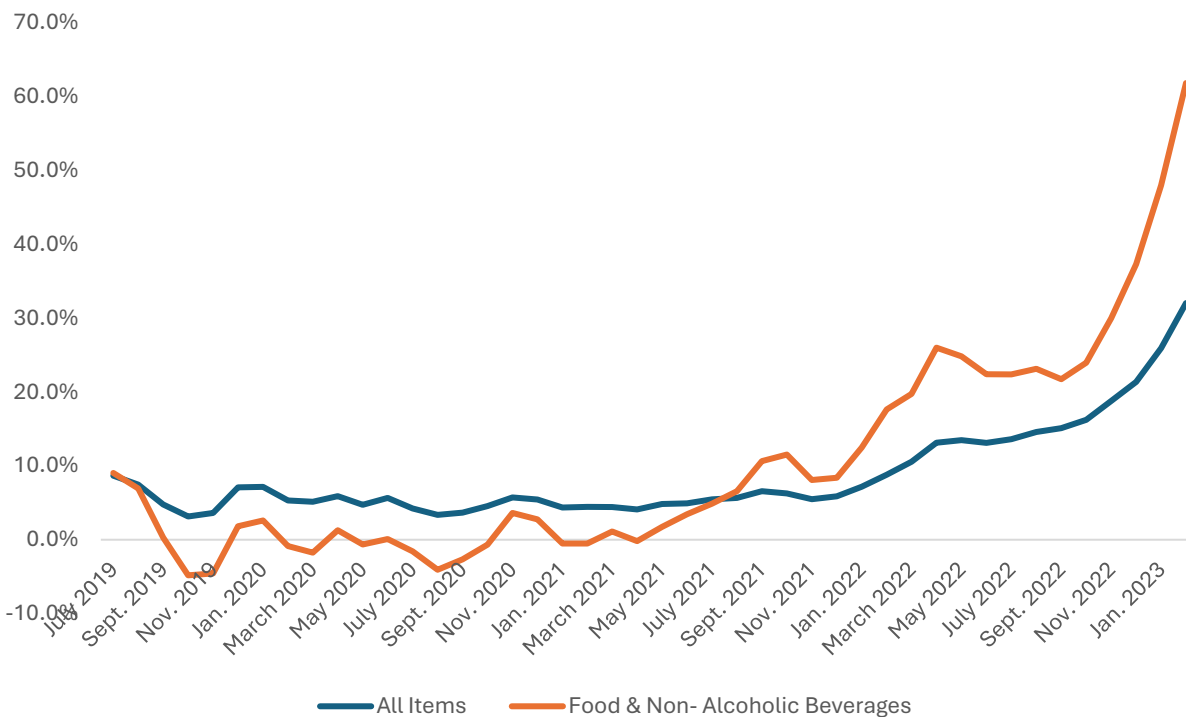
Figure 3: Daily exchange rate



Source: Authors' own elaboration using the CBE data.

With the surge in imports bill (due to the war and the increase in wheat prices) and the currency devaluation, inflation also increased significantly (Figure 4). Both headline and core inflations increased to reach around 32% and 40% in February 2023, a year after the war, then reached 35.7% and 35.1% respectively in February 2024. Yet, it is important to note that fruit and vegetables inflation amounted to 62.7% in the same month, exerting further pressure on poor and food security according to the Central Bank data.

Figure 4: Monthly inflation in Egypt



Source: Authors' own elaboration using the CBE data.

Thus, the macroeconomic scene dictated by Egypt's dependency on food imports, the increase in external debt and the successive currency devaluation led to high and volatile inflation rates that increased people vulnerability with the regard to food security.

4. Data and stylized facts

In order to examine the impact of the war in Ukraine on food security, I use a recently collected data by the Economic Research Forum. These data are collected for two countries (Egypt and Kenya) with a sample of 2000 observations per country. They include several modules starting with a basic one (including socio-economic characteristics), food security, income, farmers, workers, business, and the reasons behind recent crisis. The data were collected through phone survey, which means that most of the variables we use in the empirical analysis are perception-based.

Before analyzing the nexus between food security and gender, it is important to understand the differences between male-headed and female-headed households. Using nationally representative data from the Egyptian Labor Market Panel Survey (2018), Table 1 shows that female-headed households are not employed (with the market definition), slightly more concentrated in rural areas, mainly widowed, and having an intermediate level of education. Table 2 shows similar observations based on our survey for the location, the education and the marital status (bearing in

mind that widowed and divorced are combined in one category). For the employment status, most of female headed households are either full time carer, self employed or unemployed.

Table 1: Characteristics of the head of household from ELMPS - by gender (%)

	Males	Females
Employed with market definition (ref 1-week)		
NO	11.2	76.1
YES	88.8	23.9
Urban/Rural		
Urban	42	47
Rural	58	53
Marital status		
Never married	2.1	3.9
Married	94	22.5
Divorced	1.1	7.9
Widowed	2.9	65.7
Educational Attainment (7 Categories, age 10+)		
Illiterate	22.4	51
Reads & Writes	8.6	5.3
Less than Intermediate	14.1	11.2
Intermediate	32.8	19.2
Above Intermediate	3.1	2.2
University	19	11.1
Total	100	100

Source: Authors' own elaboration using the Egyptian Labor Market Panel Survey - 2018

Note: Survey weights are used.

Table 2: Characteristics of the head of household from Egypt's survey - by gender (%)

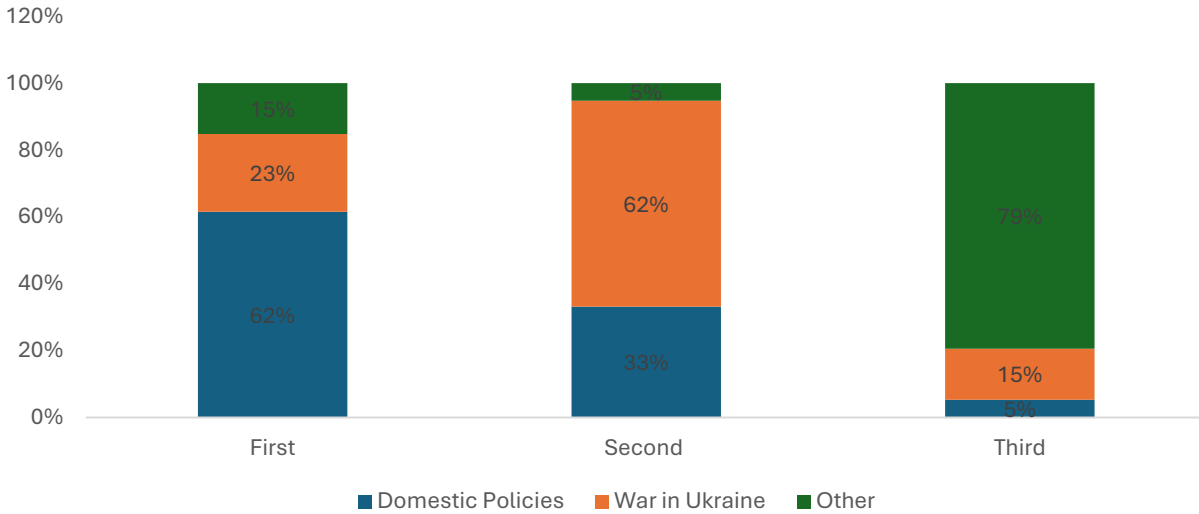
	Males	Females
Main job		
Farmer (owns a farm/self-employed on a farm)	5.6	8.3
Business owner \self-employed (but not a farmer)	17.5	23.5
Unpaid family worker on a farm	0.7	0
Unpaid family worker (but not a farmer)	1.7	0
Wage worker for Government / Public sector	16.8	25.4
Wage Worker for a private sector /NGO	49.1	15.9
Unemployed and looking for work	1.4	5.9
Full time carer (e.g. housewife)	0	20.6
Full Time Student	0	0
Retired	6.8	0
Other, not employed and not looking for work	0.4	0.3
Urban/Rural		
Urban	39.7	35.4
Rural	60.3	64.6
Marital status		
Never Married	9.8	0.7
Currently Married	88.8	27.5
Widowed/divorced	1.4	71.8
Education		
Less than primary	20.7	9.2
Primary/ Preparatory	19.2	24.9
Secondary Technical/ (general or Azhar)	36.1	32.8
Intermediate Institute/ Higher Institute	8.2	5.2
University and above	15.8	28
Total	100	100

Source: Authors' own elaboration using Egypt's Survey.

Note: Survey weights are used. Education, marital status, and main job are those of the head of the household.

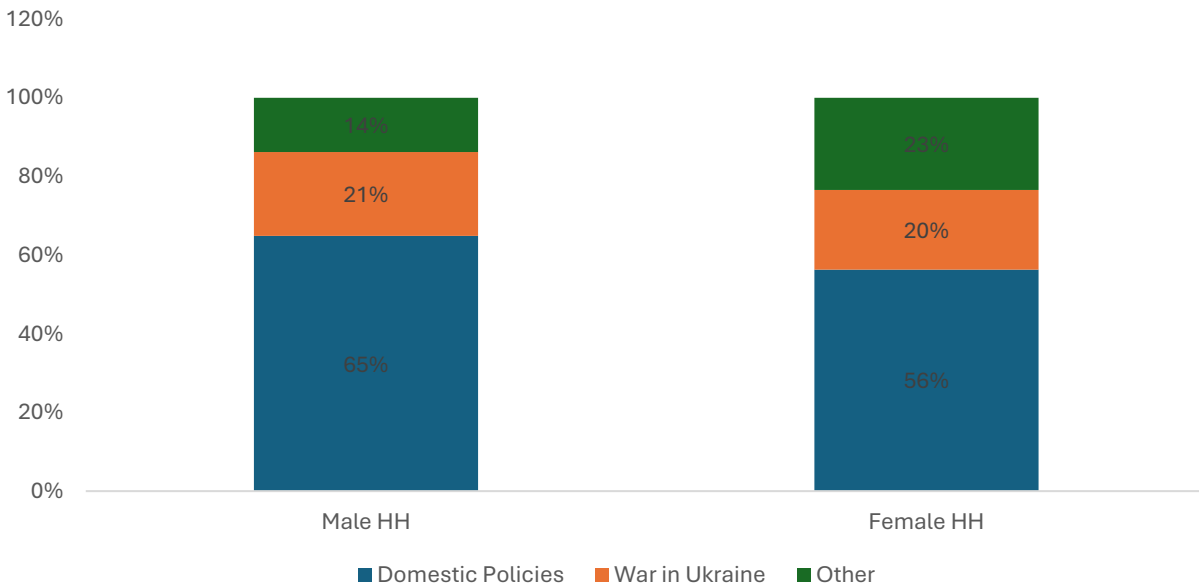
Based on the survey responses, Figure 5 shows that the war is not the only reason behind food insecurity. Indeed, domestic economic policies are more important for Egyptian households as 62% rank them as the most important reasons behind the current situation while 23% rank the war in Ukraine. The same patterns are observed for female and male-headed households (Figure 6).

Figure 5: Ranking of the reasons behind current economic conditions



Source: Authors' own elaboration using Egypt's Survey
 Note: Survey weights are used.

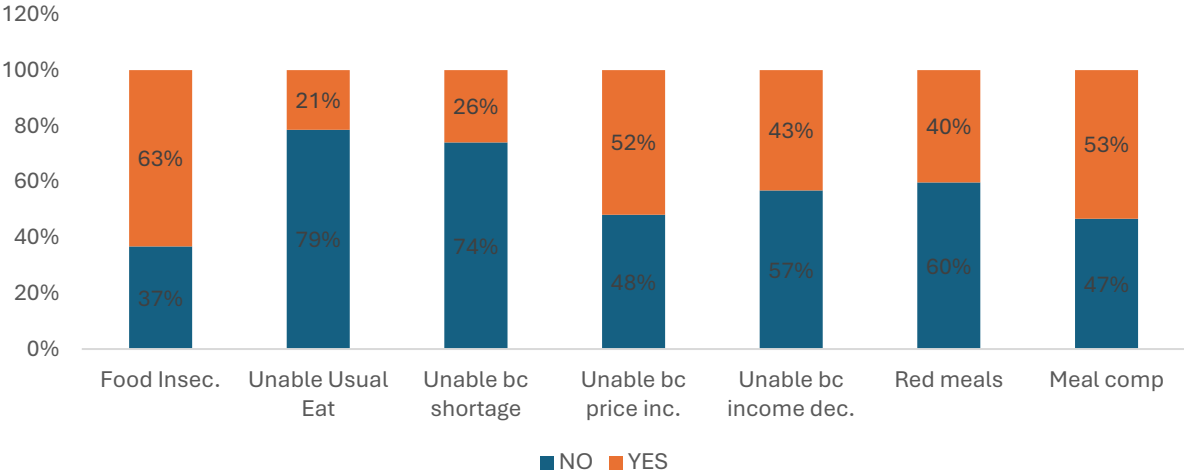
Figure 6: Ranking of the reasons behind current economic conditions – gender of head



Source: Authors' own elaboration using Egypt's Survey
 Note: Survey weights are used.

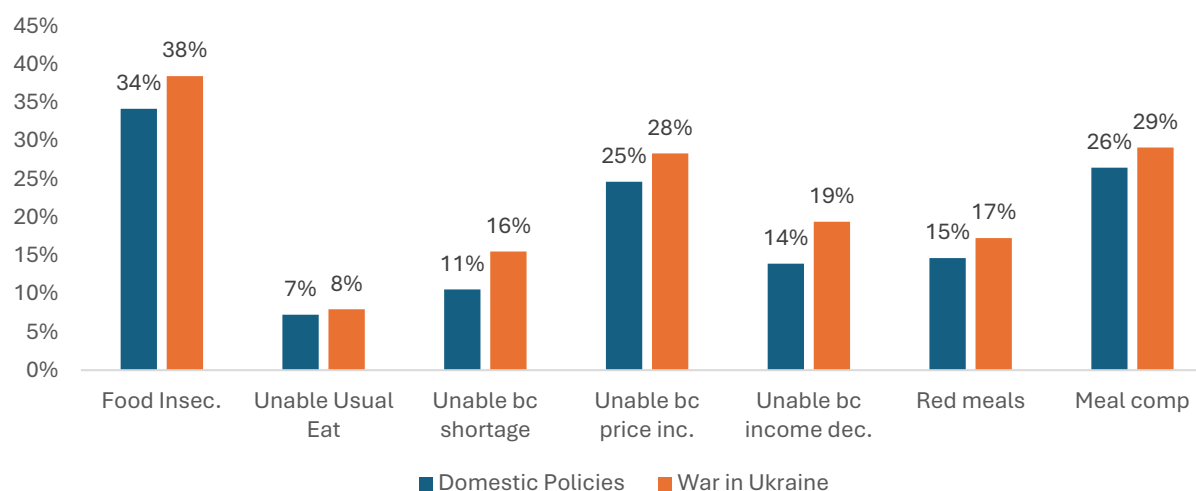
As per our variable of interest, namely food insecurity, I use self-reported variables that take the value of 1 if the individual is food insecure, and 0 otherwise. Thus, an individual is food insecure if, during the past 7 days, they were unable to eat the usual amount; they were unable to buy the usual amount because of shortages; they were unable to buy the usual amount because of price increases; they were unable to buy the usual amount because of decreased income; they reduced meals/portions; or they have to change the meal composition. In the empirical part, I mainly focus on two variables: a binary variable that takes the value of 1 if the households have one of the previous dimensions and zero otherwise. The second variable is a continuous one constructed using a principal component analysis (PCA) for the six measures aforementioned. Food insecurity measures are heterogeneous, with most of the households unable to buy because of higher prices or had to change the meal composition, and to a lesser extent income decrease (see Figure 7). Yet, there is a positive association between those who report that the War in Ukraine is the primary reason of their economic conditions and the share of food insecure (Figure 8), pointing out to what extent the war increased their vulnerability given the high levels of inflation.

Figure 7: Food insecurity in Egypt



Source: Authors' own elaboration using Egypt's Survey
 Note: Survey weights are used.

Figure 8: Food insecurity and crisis reasons



Source: Authors' own elaboration using Egypt's Survey.

Note: Survey weights are used.

Female-headed households were more likely to suffer in most of the measures (see Table 3). More importantly, when the gender of the household is interacted with the gender of the respondent, it is clear that females in female-headed households were always more food insecure than their counterparts in other households. For instance, Table 4 shows that 88% of females in female-headed households had at least one dimension of food insecurity whereas this figure is 5% for males in female-headed households, 60% for females in males-headed households, and 49% for males in males-headed households. These figures show to what extent women in this case can bear a double cost: being a female and in a female-headed household. This will further be explored in the empirical part.

Table 3: Food insecurity in Egypt – Gender of HH head

		Males	Females
Food Insec.	NO	42%	21%
	YES	58%	79%
Unable Usual Eat	NO	84%	36%
	YES	16%	64%
Unable bc shortage	NO	79%	68%
	YES	21%	32%
Unable bc price inc.	NO	54%	26%
	YES	46%	74%
Unable bc income dec.	NO	61%	28%
	YES	39%	72%
Red meals	NO	65%	69%
	YES	35%	31%
Meal comp	NO	49%	22%
	YES	51%	78%

Source: Authors' own elaboration using Egypt's Survey

Note: Survey weights are used.

Table 4: Food insecurity in Egypt – Gender of individuals and HH head

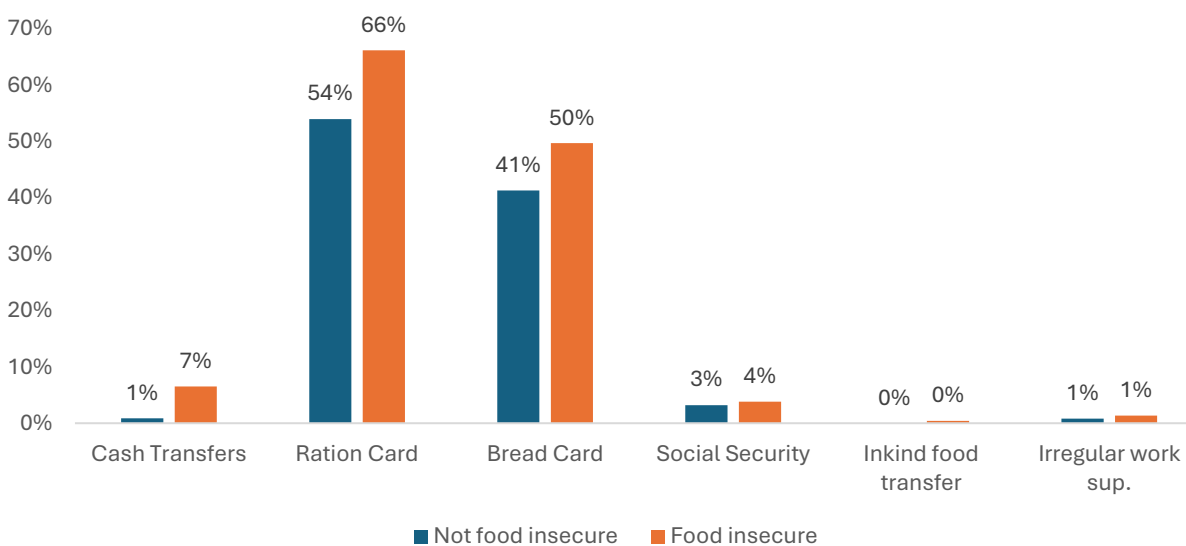
		Male in Male	Fem. in Male	Male in Fem.	Fem. in Fem.
		HH	HH	HH	HH
Any dim.	NO	51%	40%	95%	12%
	YES	49%	60%	5%	88%
Unable Usual Eat	NO	85%	85%	95%	19%
	YES	15%	15%	5%	81%
Unable bc shortage	NO	78%	80%	98%	57%
	YES	22%	20%	2%	43%
Unable bc price inc.	NO	60%	54%	97%	14%
	YES	40%	46%	3%	86%
Unable bc income dec.	NO	59%	67%	95%	15%
	YES	41%	33%	5%	85%
Red meals	NO	71%	65%	98%	62%
	YES	29%	35%	2%	38%
Meal comp	NO	59%	46%	100%	12%
	YES	41%	54%	0%	88%

Source: Authors' own elaboration using Egypt's Survey

Note: Survey weights are used.

Finally, the data show that there is a positive association between food insecure people and the likelihood of receiving government support, especially cash transfers, and ration card, bread card (Figure 9). Here, it is difficult to infer any causal relationship between these two variables, as perhaps, the needy people (who receive government support) are food insecure.

Figure 9: Government support and food insecurity



Source: Authors' own elaboration using Egypt's Survey

Note: Survey weights are used.

5. Methodology

To understand the impact of trade effect on food security, I define the following equation:

$$FI_{ij} = \lambda_0 + \lambda_1 H_{ij} + \lambda_2 X_{ij} + \lambda_3 Dom\ pol_{ij} + \lambda_4 Ukraine_{ij} + v_{ijst}$$

The dependent variable (FI) is a binary variable that takes the value of 1 if the individual I in region j is food insecure, and 0 otherwise. An individual is food insecure if, during the past 7 days they were unable to eat the usual amount; or they were unable to buy the usual amount because of shortages; or they were unable to buy the usual amount because of price increases; or they were unable to buy the usual amount because of decreased income; or they reduced meals/portions; or they have to change the meal composition. The second variable is a continuous one constructed using a principal component analysis (PCA) for the six measures aforementioned.

The explanatory variables consist of the individual characteristics X_{ij} , which include: the gender of the respondent (a dummy variable taking the value of 1 if the individual is a female and zero otherwise), age, marital status (a dummy variable taking the value of 1 if the individual is married and zero otherwise), education (a dummy variable that takes the value of 1 if the individual has an education higher or equal to the secondary level). Moreover, I add some household characteristics H_{ij} , which include the household size, the gender of the household head, the geographical location with a dummy variable that takes the value of 1 if the individual is working in an urban region and zero otherwise.

To better capture the poly-crisis Egypt was facing, two dummy variables are included, which are *Dom pol* for those who rank domestic policies as the most important reasons behind their current situation and *Ukraine* for those who rank the war in Ukraine as the most important reasons behind their current situation.

Several empirical remarks are worth mentioning. First, all the regression are run with an Ordinary Least Squares estimator to obtain elasticities. Second, after running the baseline regression, the analysis is extended in three ways by examining the interaction between the gender variables and the reasons of the crisis to see how various crises affected differently males and females, how the interaction between coping strategies and gender on the one hand and gender and government support on the other, affected food insecurity. The robustness of the results is tested using a different estimator, which is a probit model and alternative measures of food insecurity (the six individual measures). Finally, to reduce the endogeneity of the perception-based variables (when it comes to the *Dom Pol* and *Ukraine* variable), a shift share variable has been used where these variables have been averaged by individuals sharing similar characteristics (such as gender, age, region) minus the individual's own perception.

6. Empirical results

6.1. Baseline regressions

Tables 5 and 6 present the results of the baseline regressions. Regarding the control variables, while age and marital status do not have a statistically significant impact on food insecurity variables, the household size and living in rural areas increases food insecurity. In addition, being educated (having an education level higher than or equal to secondary level) reduces food insecurity. This is in line with the fact that people that are more educated are more likely to be working and thus have a source of income that reduces food insecurity. However, for women, this observation does not fully apply as their labor force participation rate is relatively low despite high levels of education (Hendy, 2015).

As per our variables of interest, while the war is not the only reason behind food insecurity, domestic economic policies (repetitive currency devaluation, increase in external debt, excessive infrastructure spending) have been more onerous for Egyptian households (Chepeliev et al., 2023). However, the effect of the war in Ukraine has a higher coefficient (26% higher) than that of domestic economic policies in both of the two regressions of the binary variable of food insecurity and the index constructed using the PCA. This confirms two important facts. While the war in Ukraine was the main contributor to food insecurity, domestic economic policies added another layer of economic difficulties.

Finally, regarding our variables of interest, while the gender of the respondent does not affect the likelihood of being food insecure, female-headed households are more likely to be food insecure. One of the reasons behind this result can be attributed to the fact that female-headed households, on average, have lower resilience than male-headed ones (Fuller and Lain, 2020) because of higher poverty rates and fewer job opportunities. Table 4 shows the same results but measures gender in a different way by interacting the two gender variables at hand. Thus, we have four categories where the baseline one is male living in male-headed household. The three other categories are females in male-headed households, males in female-headed households and females in female-headed households. While a female in a male-headed household does have a statistically significant coefficient, those that bear the highest cost are females in female-headed households. Indeed, this variable has the highest coefficient compared to other categories and is positively associated to both of the two measures of food insecurity.

Table 5: Determinants of food security and gender I

	Any dim.	Index
Ln(Age)	-0.0145 (0.109)	-0.0699 (0.289)
Ln(Hhsize)	0.202** (0.0798)	0.576*** (0.204)
Married	0.0935 (0.0865)	0.341 (0.242)
Rural	0.211*** (0.0627)	0.289* (0.153)
Female	0.0891 (0.0710)	-0.0338 (0.175)
Female Head	0.261 (0.161)	0.974** (0.473)
Education	-0.372*** (0.127)	-1.033*** (0.318)
Ukraine	1.926*** (0.586)	4.119*** (1.393)
Dom. Pol.	1.577*** (0.596)	3.064** (1.547)
Constant	-1.177** (0.541)	-2.824** (1.401)
Observations	1,449	1,449
R-squared	0.126	0.158

Notes: Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; Individual weights are used.

Table 6: Determinants of food security and gender II

	Any dim.	Index
Ln(Age)	-0.0204 (0.105)	-0.0872 (0.271)
Ln(Hhsize)	0.219*** (0.0769)	0.627*** (0.192)
Married	0.111 (0.0843)	0.391* (0.233)
Rural	0.203*** (0.0623)	0.266* (0.151)
Fem. in Male HH	0.0500 (0.0699)	-0.149 (0.167)
Male in Fem. HH	-0.477*** (0.149)	-1.202*** (0.416)
Fem. in Fem. HH	0.519*** (0.0873)	1.437*** (0.272)
Education	-0.395*** (0.125)	-1.101*** (0.308)
Ukraine	1.954*** (0.563)	4.201*** (1.333)
Dom. Pol.	1.614*** (0.581)	3.175** (1.501)
Constant	-1.178** (0.509)	-2.826** (1.290)
Observations	1,449	1,449
R-squared	0.149	0.197

Notes: Robust standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; Individual weights are used

These baseline regressions show to what extent it is important to consider the impact of the war on food insecurity from a gender lens. In what follows, the analysis is extended in several ways.

6.2. Extensions

6.2.1. Interaction between gender and crisis reasons

In the first extension, we examine how gender interacts with the reasons behind the crisis. Table 7 shows similar findings where female-headed households are likely to be food insecure, with a greater effect of the war in Ukraine than domestic economic policies. Yet, when these two variables are interacted, the interaction variable with the war in Ukraine is statistically significant and negative, whereas the one with economic policies is insignificant. This shows that, while the gender of the household does not matter in the effect of the domestic economic policies on food insecurity, the war in Ukraine reduces the effect of being a female-headed household on food security. However, the net effect of the war in Ukraine is still positive and significant pointing out that the latter increases the perception of being food insecure. The lower part of Table 7 shows that no interaction variables with the gender of the respondent have a statistically significant effect. Thus, there is no additional effect of being a female for the impact of the war or domestic economic policies on food insecurity.

Table 7: Interaction of crisis reasons and gender

	Gender of HH			
	Any dim.		Index	
Female Head	0.814*** (0.224)	-0.995 (1.269)	2.520*** (0.570)	-3.040 (3.590)
Ukraine	2.102*** (0.578)	1.893*** (0.606)	4.611*** (1.343)	4.015*** (1.467)
Dom. Pol.	1.698*** (0.569)	1.513** (0.629)	3.405** (1.460)	2.862* (1.659)
Female Head*Ukraine	-1.854* (1.006)		-5.183* (2.846)	
Female Head*Dom. Pol.		2.131 (2.010)		6.812 (5.702)
R-squared	0.130	0.130	0.165	0.167
	Gender of Individual			
	Any dim.		Index	
Female	-0.0308 (0.226)	-0.190 (0.661)	-0.219 (0.467)	-0.0613 (1.670)
Ukraine	1.817*** (0.654)	1.773*** (0.621)	3.951*** (1.412)	4.104*** (1.531)
Dom. Pol.	1.767*** (0.623)	1.085 (1.254)	3.359** (1.664)	3.016 (3.179)
Female*Ukraine	0.455 (0.786)		0.701 (1.670)	
Female*Dom. Pol.		0.435 (1.016)		0.0429 (2.545)
R-squared	0.127	0.127	0.158	0.158
Observations	1,449	1,449	1,449	1,449

Notes: (i) Robust standard errors in parentheses. (ii) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (iii) Individual weights are used. (iv) The controls and the intercept are included.

Table 8 details the analysis by introducing the categorical variable (including the gender of the respondent and the gender of the head of household). Similar results are obtained with a stronger impact of the war (than economic policies) and the most vulnerable being females in female-headed households who perceive that they are more likely to be food insecure. Interestingly, the only category where the effect of domestic economic policies is amplified is the one of males in female-headed households. This confirms again the vulnerability of the latter, especially in crisis times.

Table 8: Interaction of crisis reasons and gender

	Gender of Individual and HH			
	Any dim.			Index
Fem. in Male HH	-0.0181 (0.229)	-0.818 (0.503)	-0.162 (0.464)	-1.785 (1.193)
Male in Fem. HH	1.334** (0.619)	-2.525*** (0.585)	4.026*** (1.329)	-6.402*** (1.308)
Fem. in Fem. HH	0.723*** (0.233)	0.425 (0.984)	2.049*** (0.459)	1.318 (2.660)
Ukraine	1.994*** (0.639)	1.544*** (0.587)	4.434*** (1.359)	3.451** (1.404)
Dom. Pol.	1.791*** (0.602)	0.145 (1.043)	3.353** (1.624)	0.412 (2.534)
Fem. in Male HH*Ukraine	0.271 (0.783)		0.0738 (1.592)	
Male in Fem. HH*Ukraine	-5.346*** (1.824)		-15.52*** (4.071)	
Fem. in Fem. HH*Ukraine	-0.687 (0.808)		-2.095 (1.833)	
Fem. in Male HH*Dom. Pol.		1.350* (0.794)		2.546 (1.871)
Male in Fem. HH*Dom. Pol.		3.619*** (1.020)		9.338*** (2.255)
Fem. in Fem. HH*Dom. Pol.		0.0931 (1.586)		0.0830 (4.345)
R-squared	0.153	0.160	0.201	0.206
Observations	1,449	1,449	1,449	1,449

Notes: (i) Robust standard errors in parentheses. (ii) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (iii) Individual weights are used. (iv) The controls and the intercept are included.

6.2.2. Gender and coping strategies

In crisis times, different households can mobilize different mechanisms to cope with and manage hard times, which in turn can affect food security. The dataset includes several coping mechanisms such as resorting to take money out of savings; resorting to family, relatives, or friends in (country); resorting to family, relatives, or friends abroad; going back to the village or family; borrowing from a bank, employer, or private lender; reducing expenditure on education of boys; reducing expenditure on education of girls; reducing expenditure on basic non-food expenditure; and reducing expenses on health. Tables 9-11 examine the association between these coping strategies and food security in addition to their interaction with gender variables.

Generally, all coping strategies (except relying on domestic families and going back to village) are positively associated with food security, showing to what extent different household had to adopt various mechanisms to reduce the negative impact of the crisis on food insecurity. As per the interaction with gender, all interaction with the gender of the respondents is insignificant except borrowing. This is of particular interest as it confirms the fact that females still face different impediments in access to finance, especially through banks (see Table 9). In addition, the interaction with the female-headed households shows that the latter were less likely to reduce spending on education of boys and of girls as it is shown in Table 10. When the gender of the respondent is interacted with that of the households, the results show that females in female headed households were less likely to use savings (given the high poverty rates), less likely to borrow (because of access to finance difficulties) and less likely to reduce spending on boys' education (as women are more sensitive to spending on education). Most of the results are the same for both the binary variable of food insecurity and the index constructed using a PCA (Table 11).

6.2.3. Gender and government support

The exchange rate floatation - driving inflation - together with the introduction of VAT tax and the restructuring of subsidies schemes, have increased the cost of living and accordingly, weakened the purchasing power of the average Egyptian. This has incentivized the Egyptian government to act on the social protection front in order to alleviate the reform's subsequent economic repercussions on the Egyptian citizen. This includes Takaful and Karama (*solidarity and dignity*) project. The program's beneficiaries of the conditional (Takaful) and unconditional (Karama) cash transfer program includes poor women and children, poor people with dis-abilities, poor orphans and poor widows. To mitigate this situation, the Egyptian government has attempted to activate Takaful's beneficiaries into work training programs that encourage economic self-reliance via income generating activities (Forsa or *opportunity*).

In addition, several social protection programs have been put in place in response to COVID-19 and the war in Ukraine. Indeed, the COVID-19 outbreak in March 2020 was accompanied by important socio-economic repercussions, especially on vulnerable groups including poor households and irregular workers. Thus, the Ministry of Social Solidarity allocated more funds to Takaful and Karama program in order to accommodate 411 thousand new families in 2020, reaching a total number of 4 million families (15 million individuals). Additionally, an exceptional allowance of EGP 500 for 6 months was provided to informal and irregular workers who are highly exposed to the risk of falling into poverty (IMF, 2022). With the war in Ukraine, an Emergency Relief Fund for irregular workers was created and a subsidy of 1,000 EGP (32.5 USD) should be disbursed to irregular workers who do not benefit from social protection programs. This is why another channel through which gender can affect food security is the government support. Because of the poly-crisis Egypt faced, we focus here on four main types of support, which are ration cards, bread cards, social security and cash transfers.

Generally, based on the results of the phone survey, all government support programs did not help reduce food insecurity with the exception of social security. This result is of particular interest as Egypt is characterized by a high level of informal employment (without social security). This is why formalizing informal employment can also be perceived as a food security policy. While most of the interactions with gender variables are statistically insignificant (see Table 12), a few yields interesting results. First, for female-headed households, ration cards, cash transfers and to a lesser extent bread cards reduce food insecurity as pointed out by the negative interaction in panel b of Table 12. Second, for females in female-headed households, cash transfers seem to matter in reducing food insecurity as the interaction variable between the former and the latter is negative and statistically significant (panel c in Table 12). Finally, surprisingly, the interaction between females and social security is positive, showing that social security increases food insecurity for females. These results still need further investigation.

6.3. Robustness checks

The robustness of the results is tested using a different estimator, which is a probit model and alternative measures of food insecurity (the six individual measures). Tables A1 and A2 show qualitatively the same results for most of the food insecurity measures where the gender of the respondent does not affect the likelihood of being food insecure and female-headed household are more likely to be food insecure. Females in female-headed households are also the most likely to be food insecure for their inability to eat what they usually eat, inability to consume because of higher prices and lower income and changing their meal composition.

As the social security variable matters, the employment status was also introduced in the regression (either by a dummy variable that takes the value of 1 if the respondent is employed and 0 otherwise or whether the individual is a wage worker and 0 otherwise). While all the results remain unchanged, individuals that are employed or wage workers are more likely to perceive that they are food insecure. In addition, the interaction variable with the gender of the household variable is negative and statistically significant showing that they are less likely to perceive that they are food insecure (see Table A3).

Finally, as our main food security variables are binary, Tables A4 and A5 show the same results using a probit model. Again, most of the previously explained results remain unchanged.

Table 9: Food security, coping strategies and gender

	Any dim.								
	Savings	Family dom.	Family abroad	Back to village	Borrow	Reduce educ. Boys	Reduce educ. Girls	Reduce basic non-food	Reduce health
Female	0.143*	0.0974	0.0806	0.104	0.157**	0.0958	0.0785	0.109	0.0866
	(0.0744)	(0.0748)	(0.0711)	(0.0714)	(0.0726)	(0.0714)	(0.0708)	(0.0729)	(0.0694)
Coping	0.443***	0.205	0.400***	0.137	0.524***	0.415***	0.554***	0.538***	0.561***
	(0.102)	(0.167)	(0.0816)	(0.155)	(0.0843)	(0.127)	(0.103)	(0.0852)	(0.0806)
Female*Coping	-0.0779	0.139	0.00776	0.198	-0.279**	-0.0680	-0.175	-0.139	-0.155
	(0.113)	(0.174)	(0.116)	(0.168)	(0.112)	(0.138)	(0.122)	(0.0979)	(0.100)
Observations	1,449	1,449	1,449	1,449	1,449	1,449	1,449	1,449	1,449
R-squared	0.170	0.157	0.136	0.152	0.186	0.170	0.179	0.261	0.207
	Index								
	Savings	Family dom.	Family abroad	Back to village	Borrow	Reduce educ. Boys	Reduce educ. Girls	Reduce basic non-food	Reduce health
Female	0.0968	0.0320	-0.0625	0.0714	0.178	-0.0890	-0.120	-0.00616	-0.0984
	(0.183)	(0.177)	(0.174)	(0.159)	(0.165)	(0.167)	(0.169)	(0.168)	(0.157)
Coping	1.072***	0.879*	1.135***	0.692	1.702***	0.830***	0.788***	1.329***	1.408***
	(0.269)	(0.459)	(0.194)	(0.443)	(0.252)	(0.320)	(0.276)	(0.239)	(0.367)
Female*Coping	-0.165	0.148	0.223	0.414	-0.775**	0.786**	0.496	-0.246	0.145
	(0.438)	(0.502)	(0.335)	(0.489)	(0.362)	(0.389)	(0.410)	(0.297)	(0.424)
Observations	1,449	1,449	1,449	1,449	1,449	1,449	1,449	1,449	1,449
R-squared	0.208	0.223	0.178	0.220	0.286	0.273	0.230	0.332	0.331

Notes: (i) Robust standard errors in parentheses. (ii) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (iii) Individual weights are used. (iv) The controls and the intercept are included.

Table 10: Food security, coping strategies and gender

Any dim.									
	Savings	Family dom.	Family abroad	Back to village	Borrow	Reduce educ. Boys	Reduce educ. Girls	Reduce basic non-food	Reduce health
Female HH	0.225 (0.172)	0.172 (0.198)	0.268* (0.163)	0.340*** (0.0962)	0.173 (0.192)	0.287* (0.158)	0.320** (0.156)	0.158 (0.215)	-0.0151 (0.215)
Coping	0.419*** (0.0671)	0.276*** (0.0900)	0.407*** (0.0742)	0.288*** (0.0729)	0.378*** (0.0656)	0.374*** (0.0636)	0.427*** (0.0595)	0.442*** (0.0472)	0.428*** (0.0481)
Female HH*Coping	-0.145 (0.182)	0.0493 (0.251)		-0.565 (0.449)	-0.0314 (0.203)	-1.112*** (0.169)		0.0309 (0.221)	0.190 (0.223)
Observations	1,449	1,449	1,449	1,449	1,449	1,449	1,449	1,449	1,449
R-squared	0.170	0.155	0.136	0.157	0.178	0.171	0.177	0.258	0.207
Index									
	Savings	Family dom.	Family abroad	Back to village	Borrow	Reduce educ. Boys	Reduce educ. Girls	Reduce basic non-food	Reduce health
Female HH	0.943* (0.523)	0.833 (0.622)	0.997** (0.477)	1.221*** (0.299)	0.774 (0.567)	1.062** (0.460)	1.133** (0.458)	0.743 (0.644)	0.244 (0.677)
Coping	1.056*** (0.238)	0.995*** (0.260)	1.333*** (0.242)	1.066*** (0.203)	1.331*** (0.213)	1.342*** (0.211)	1.146*** (0.240)	1.164*** (0.153)	1.494*** (0.187)
Female HH*Coping	-0.765 (0.561)	-0.345 (0.763)		-1.939 (1.270)	-0.489 (0.665)	-3.107*** (0.496)		-0.0259 (0.713)	0.204 (0.742)
Observations	1,449	1,449	1,449	1,449	1,449	1,449	1,449	1,449	1,449
R-squared	0.210	0.223	0.178	0.238	0.277	0.266	0.228	0.330	0.331

Notes: (i) Robust standard errors in parentheses. (ii) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (iii) Individual weights are used. (iv) The controls and the intercept are included.

Table 11: Food security, coping strategies and gender

Any dim.									
	Savings	Family dom.	Family abroad	Back to village	Borrow	Reduce educ. Boys	Reduce educ. Girls	Reduce basic non-food	Reduce health
Fem. in Male HH	0.107 (0.0744)	0.0611 (0.0743)	0.0410 (0.0699)	0.0867 (0.0725)	0.124* (0.0729)	0.0545 (0.0701)	0.0394 (0.0698)	0.0773 (0.0734)	0.0608 (0.0697)
Male in Fem. HH	-0.409*** (0.142)	-0.445*** (0.149)	-0.476*** (0.147)	-0.138 (0.135)	-0.393*** (0.142)	-0.438*** (0.143)	-0.401*** (0.137)	-0.386*** (0.121)	-0.425*** (0.148)
Fem. in Fem. HH	0.552*** (0.106)	0.528*** (0.109)	0.518*** (0.0890)	0.490*** (0.0941)	0.552*** (0.121)	0.547*** (0.0863)	0.559*** (0.0864)	0.520*** (0.150)	0.371** (0.175)
Coping	0.409*** (0.103)	0.184 (0.168)	0.389*** (0.0808)	0.231 (0.142)	0.501*** (0.0858)	0.394*** (0.127)	0.535*** (0.103)	0.513*** (0.0858)	0.549*** (0.0805)
Fem. in Male HH*Coping	-0.0212 (0.122)	0.171 (0.175)	0.0284 (0.113)	0.0850 (0.153)	-0.271** (0.120)	-0.0366 (0.139)	-0.153 (0.124)	-0.114 (0.0994)	-0.171* (0.0994)
Male in Fem. HH*Coping		-0.0201 (0.216)		-0.717*** (0.202)				0.680*** (0.145)	
Fem. in Fem. HH*Coping	-0.353** (0.137)	-0.126 (0.225)		0.0614 (0.200)	-0.421*** (0.151)	-1.329*** (0.157)		-0.336** (0.170)	-0.252 (0.191)
Observations	1,449	1,449	1,449	1,449	1,449	1,449	1,449	1,449	1,449
R-squared	0.189	0.176	0.160	0.180	0.202	0.194	0.201	0.276	0.219
Index									
	Savings	Family dom.	Family abroad	Back to village	Borrow	Reduce educ. Boys	Reduce educ. Girls	Reduce basic non-food	Reduce health
Fem. in Male HH	-0.0122 (0.177)	-0.0770 (0.170)	-0.179 (0.165)	0.0177 (0.159)	0.0854 (0.162)	-0.214 (0.156)	-0.238 (0.159)	-0.103 (0.164)	-0.171 (0.153)
Male in Fem. HH	-1.043*** (0.400)	-1.067*** (0.405)	-1.199*** (0.408)	-0.175 (0.271)	-0.929** (0.378)	-1.130*** (0.390)	-1.024*** (0.377)	-0.948*** (0.364)	-1.066*** (0.409)
Fem. in Fem. HH	1.624*** (0.301)	1.653*** (0.352)	1.436*** (0.274)	1.412*** (0.306)	1.624*** (0.350)	1.464*** (0.263)	1.510*** (0.272)	1.532*** (0.421)	1.089* (0.586)
Coping	0.963*** (0.264)	0.816* (0.462)	1.103*** (0.191)	0.988*** (0.383)	1.638*** (0.255)	0.766** (0.317)	0.729*** (0.275)	1.258*** (0.238)	1.376*** (0.369)
Fem. in Male HH*Coping	0.0833 (0.481)	0.316 (0.508)	0.284 (0.327)	0.0842 (0.422)	-0.684* (0.391)	0.882** (0.392)	0.562 (0.417)	-0.164 (0.303)	0.164 (0.431)
Male in Fem. HH*Coping		-0.199 (0.609)		-2.407*** (0.490)				0.616 (0.451)	
Fem. in Fem. HH*Coping	-1.356*** (0.374)	-0.990 (0.665)		-0.242 (0.546)	-1.590*** (0.515)	-3.104*** (0.424)		-1.006* (0.541)	-0.668 (0.720)
Observations	1,449	1,449	1,449	1,449	1,449	1,449	1,449	1,449	1,449
R-squared	0.244	0.258	0.218	0.272	0.313	0.315	0.269	0.359	0.351

Notes: (i) Robust standard errors in parentheses. (ii) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (iii) Individual weights are used. (iv) The controls and the intercept are included.

Table 12: Food security, government support and gender

	Any dim.				Index			
	Cash Transfers	Ration Card	Bread Card	Social Security	Cash Transfers	Ration Card	Bread Card	Social Security
(a) Gender of Individual								
Female	0.0864 (0.0709)	0.0319 (0.109)	0.0248 (0.0983)	0.0597 (0.0700)	-0.102 (0.173)	-0.0196 (0.261)	-0.276 (0.251)	-0.112 (0.167)
Gov. Sup.	0.108 (0.297)	0.110 (0.107)	0.0280 (0.107)	-0.521*** (0.183)	-0.0983 (0.732)	0.153 (0.258)	-0.213 (0.268)	-1.328** (0.562)
Female*Gov. Sup.	0.0785 (0.303)	0.0762 (0.130)	0.127 (0.123)	0.608** (0.249)	0.889 (0.749)	-0.0213 (0.308)	0.408 (0.306)	1.784** (0.704)
R-squared	0.132	0.144	0.142	0.141	0.179	0.161	0.165	0.179
(b) Gender of HH								
Female HH	0.414*** (0.0982)	0.598*** (0.143)	0.494*** (0.114)	0.373*** (0.0951)	1.444*** (0.291)	1.906*** (0.413)	1.587*** (0.332)	1.334*** (0.312)
Gov. Sup.	0.248*** (0.0860)	0.181*** (0.0643)	0.137** (0.0564)	-0.124 (0.129)	0.804*** (0.235)	0.201 (0.154)	0.127 (0.143)	-0.0336 (0.325)
Female HH*Gov.	-1.193*** (0.160)	-0.506** (0.249)	-0.559* (0.307)	-0.225 (0.416)	-3.691*** (0.397)	-1.410* (0.725)	-1.521 (0.932)	-1.055 (1.193)
R-squared	0.158	0.152	0.150	0.131	0.219	0.173	0.174	0.166
(c) Gender of Individual and HH								
Fem. in Male HH	0.0708 (0.0722)	-0.00699 (0.110)	-0.00639 (0.0990)	0.0445 (0.0711)	-0.149 (0.176)	-0.125 (0.262)	-0.363 (0.252)	-0.162 (0.169)
Male in Fem. HH	-0.153 (0.133)	-0.0964 (0.104)	-0.00698 (0.212)	-0.154 (0.141)	-0.268 (0.268)	0.0166 (0.228)	0.114 (0.564)	-0.242 (0.285)
Fem. in Fem. HH	0.536*** (0.0924)	0.641*** (0.149)	0.532*** (0.124)	0.486*** (0.0897)	1.483*** (0.281)	1.843*** (0.430)	1.358*** (0.370)	1.376*** (0.317)
Gov. Sup.	0.422** (0.191)	0.133 (0.106)	0.0569 (0.106)	-0.237* (0.132)	0.726* (0.377)	0.218 (0.255)	-0.134 (0.266)	-0.403 (0.273)
Fem. in Male HH*Gov.	-0.227 (0.201)	0.0765 (0.132)	0.113 (0.124)	0.230 (0.240)	0.104 (0.431)	-0.0309 (0.312)	0.370 (0.308)	0.751 (0.581)
Male in Fem. HH*Gov.	-0.869*** (0.222)	-0.424** (0.177)	-0.550** (0.253)	-0.273 (0.204)	-2.034*** (0.421)	-1.330*** (0.476)	-1.430** (0.685)	-1.102** (0.441)
Fem. in Fem. HH*Gov.	-0.248 (0.237)	-0.194 (0.190)	0.0110 (0.188)	0.337 (0.240)	-1.804*** (0.546)	-0.669 (0.562)	0.132 (0.597)	0.607 (0.622)
R-squared	0.167	0.173	0.170	0.154	0.228	0.204	0.206	0.203
Observations	1,449	1,449	1,449	1,449	1,449	1,449	1,449	1,449

Notes: (i) Robust standard errors in parentheses. (ii) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (iii) Individual weights are used. (iv) The controls and the intercept are included.

7. Conclusion

The war as an external shock had serious implications on developing economies, including Egypt. However, its effect was amplified by the structural weaknesses of Egyptian economy. This is why the Russia-Ukraine war cannot be held solely responsible for the current food crisis. Thus, the objective of this paper is to investigate the impact the war in Ukraine on food security in Egypt from a gender lens using a newly collected dataset. In addition, this paper tries to distinguish the impact of the war in Ukraine from other reasons that led to a more fragile food security.

The main findings show that, the war is not the sole responsible of food insecurity in Egypt. Indeed, the way the domestic economic policies were implemented increased this insecurity. The war impact was heterogeneous depending on the individual characteristics of households. Thus, larger households and rural ones were more likely to be food insecure. Second, female headed-households and females in female-headed household were the most to bear the cost of the crisis. Whereas these categories were more likely to adopt different coping strategies to face the crisis, the government support did not a significant impact to reduce the negative implications of the war, with the exception of cash transfers for females in female-headed households and for female-headed households.

As food insecurity is female-sensitive, it is important to develop policies where gender is mainstreamed. While most of the policies are rather reactive and vague, it is important to develop more proactive policies that consider the gender component. This will help increase the resilience of vulnerable households. Yet, more structural reforms are needed to address the structural problems of the Egyptian economy given that food insecurity reflect other weaknesses of the economy. Among these reforms, it is crucial to diversify trade partners from Egypt imports basic food (such as cereals) to reduce its vulnerability. Second, for the agriculture sector, the government needs to provide stronger support to small-scale farmers and food producers, which can partially address the problems related to gender and food security. Indeed, in recent years, the government was primarily focusing on mass production and incentives to major Egyptian and foreign investors.

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Appendix

Table A1: Alternative measures of food security and gender I

	Unable Usual Eat	Unable bc shortage	Unable bc price inc.	Unable bc income dec.	Red meals	Meal comp
Ln(Age)	-0.0307 (0.109)	-0.0373 (0.117)	-0.0296 (0.116)	-0.0591 (0.121)	0.0703 (0.133)	-0.0519 (0.116)
Ln(Hhsize)	0.120 (0.0814)	0.0369 (0.0765)	0.186** (0.0816)	0.299*** (0.0864)	0.157* (0.0817)	0.268*** (0.0805)
Married	-0.0245 (0.0916)	0.167* (0.101)	0.164* (0.0912)	0.122 (0.0946)	0.0887 (0.0999)	0.145 (0.0923)
Rural	-0.0379 (0.0528)	0.0706 (0.0549)	0.131** (0.0647)	0.0553 (0.0667)	0.135** (0.0655)	0.236*** (0.0636)
Female	0.0363 (0.0567)	-0.0881 (0.0636)	-0.00704 (0.0691)	-0.0917 (0.0705)	0.0308 (0.0653)	0.103 (0.0714)
Female Head	0.452*** (0.167)	0.251 (0.165)	0.382** (0.178)	0.410** (0.198)	0.0394 (0.162)	0.357** (0.158)
Education	-0.270* (0.138)	-0.199 (0.131)	-0.446*** (0.141)	-0.385*** (0.142)	-0.372*** (0.144)	-0.278** (0.134)
Ukraine	0.577 (0.599)	0.689 (0.510)	1.701*** (0.644)	1.336** (0.629)	1.877*** (0.566)	1.705*** (0.601)
Dom. Pol.	0.426 (0.683)	0.482 (0.540)	1.554*** (0.547)	1.050 (0.672)	1.053 (0.650)	1.340** (0.604)
Constant	-0.141 (0.589)	-0.148 (0.580)	-1.034** (0.511)	-0.690 (0.617)	-1.189** (0.603)	-1.137* (0.584)
Observations	1,449	1,449	1,449	1,449	1,449	1,449
R-squared	0.139	0.069	0.142	0.141	0.117	0.146

Notes: (i) Robust standard errors in parentheses. (ii) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (iii) Individual weights are used.

Table A2: Alternative measures of food security and gender II

	Unable Usual Eat	Unable bc shortage	Unable bc price inc.	Unable bc income dec.	Red meals	Meal comp
Ln(Age)	-0.0365 (0.102)	-0.0410 (0.120)	-0.0363 (0.109)	-0.0665 (0.114)	0.0670 (0.129)	-0.0579 (0.111)
Ln(Hhsize)	0.137* (0.0783)	0.0478 (0.0751)	0.205*** (0.0775)	0.321*** (0.0813)	0.166** (0.0809)	0.286*** (0.0774)
Married	-0.00755 (0.0891)	0.178* (0.101)	0.183** (0.0885)	0.143 (0.0910)	0.0983 (0.0978)	0.163* (0.0901)
Rural	-0.0458 (0.0523)	0.0655 (0.0550)	0.122* (0.0641)	0.0453 (0.0660)	0.131** (0.0655)	0.227*** (0.0633)
Fem. in Male HH	-0.00234 (0.0543)	-0.113* (0.0639)	-0.0515 (0.0665)	-0.141** (0.0664)	0.00884 (0.0656)	0.0629 (0.0705)
Male in Fem. HH	-0.279* (0.145)	-0.217** (0.0981)	-0.458*** (0.149)	-0.519*** (0.190)	-0.376*** (0.141)	-0.406*** (0.119)
Fem. in Fem. HH	0.656*** (0.0893)	0.270 (0.180)	0.567*** (0.0889)	0.531*** (0.0935)	0.165 (0.179)	0.634*** (0.0878)
Education	-0.293** (0.135)	-0.214* (0.130)	-0.472*** (0.138)	-0.414*** (0.137)	-0.385*** (0.144)	-0.302** (0.133)
Ukraine	0.605 (0.586)	0.706 (0.494)	1.732*** (0.635)	1.371** (0.597)	1.893*** (0.569)	1.734*** (0.577)
Dom. Pol.	0.463 (0.668)	0.506 (0.530)	1.597*** (0.534)	1.097* (0.650)	1.074* (0.651)	1.378** (0.589)
Constant	-0.142 (0.559)	-0.149 (0.565)	-1.035** (0.475)	-0.691 (0.572)	-1.189** (0.593)	-1.138** (0.552)
Observations	1,449	1,449	1,449	1,449	1,449	1,449
R-squared	0.180	0.083	0.172	0.180	0.125	0.171

Notes: (i) Robust standard errors in parentheses. (ii) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (iii) Individual weights are used.

Table A3: Food security, gender and working status

	Any dim.	Any dim.	Index	Index
Ln(Age)	-0.0805 (0.121)	-0.0328 (0.118)	-0.268 (0.331)	-0.144 (0.318)
Ln(Hhsize)	0.157** (0.0787)	0.168** (0.0741)	0.448** (0.193)	0.470*** (0.177)
Married	0.0778 (0.0871)	0.0572 (0.0852)	0.303 (0.244)	0.243 (0.238)
Education	-0.449*** (0.121)	-0.441*** (0.123)	-1.247*** (0.300)	-1.234*** (0.303)
Rural	0.218*** (0.0619)	0.225*** (0.0591)	0.311** (0.149)	0.332** (0.139)
Female	0.236*** (0.0747)	0.198*** (0.0664)	0.380* (0.205)	0.291* (0.170)
Female Head	0.435*** (0.0913)	0.440*** (0.0962)	1.395*** (0.290)	1.409*** (0.301)
Ukraine	2.203*** (0.555)	2.269*** (0.549)	4.871*** (1.394)	5.099*** (1.425)
Dom. Pol.	1.879*** (0.542)	1.859*** (0.541)	3.897*** (1.399)	3.878*** (1.392)
Employed	0.246*** (0.0690)		0.687*** (0.196)	
Female Head*Employed	-0.551** (0.279)		-1.383 (0.881)	
Wage worker		0.286*** (0.0669)		0.843*** (0.195)
Female Head*Wage worker		-0.635** (0.282)		-1.650* (0.889)
Constant	-1.264** (0.516)	-1.405*** (0.510)	-3.007** (1.312)	-3.411*** (1.300)
Observations	1,449	1,449	1,449	1,449
R-squared	0.164	0.179	0.213	0.242

Notes: (i) Robust standard errors in parentheses. (ii) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (iii) Individual weights are used.

Table A4: Probit model I

	Any dim	Unable Usual Eat	Unable bc shortage	Unable bc price inc.	Unable bc income dec.	Red meals	Meal comp
Ln(Age)	-0.0446 (0.320)	-0.118 (0.445)	-0.0758 (0.393)	-0.0883 (0.336)	-0.185 (0.362)	0.172 (0.390)	-0.193 (0.334)
Ln(Hhsize)	0.586** (0.238)	0.527 (0.328)	0.128 (0.261)	0.531** (0.244)	0.880*** (0.269)	0.505** (0.254)	0.783*** (0.244)
Married	0.248 (0.255)	-0.211 (0.385)	0.584* (0.353)	0.443 (0.279)	0.374 (0.292)	0.299 (0.309)	0.414 (0.274)
Rural	0.568*** (0.171)	-0.181 (0.259)	0.273 (0.217)	0.374** (0.183)	0.166 (0.196)	0.421** (0.201)	0.647*** (0.178)
Education	-1.123*** (0.434)	-1.125** (0.492)	-0.663 (0.466)	-1.257*** (0.445)	-1.068** (0.422)	-1.061** (0.420)	-0.830* (0.426)
Ukraine	5.761*** (1.970)	2.356 (2.170)	2.554 (2.163)	4.987** (2.186)	3.850* (2.037)	5.912*** (2.111)	5.201** (2.112)
Dom. Pol.	4.755** (2.075)	2.126 (2.290)	1.976 (2.527)	4.722** (2.135)	3.062 (2.128)	3.333 (2.209)	4.144* (2.141)
Female	0.264 (0.197)	0.170 (0.262)	-0.330 (0.246)	-0.0191 (0.207)	-0.256 (0.219)	0.133 (0.216)	0.318 (0.209)
Female Head	0.681 (0.483)	1.249** (0.531)	0.896* (0.479)	1.029** (0.513)	1.108* (0.593)	0.135 (0.483)	0.978** (0.477)
Constant	-4.956*** (1.763)	-2.568 (2.091)	-2.551 (2.208)	-4.581** (1.793)	-3.472* (1.899)	-5.235*** (2.018)	-4.819** (1.931)
Observations	1,449	1,449	1,449	1,449	1,449	1,449	1,449

Notes: (i) Robust standard errors in parentheses. (ii) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (iii) Individual weights are used.

Table A5: Probit model II

	Any dim	Unable Usual Eat	Unable bc shortage	Unable bc price inc.	Unable bc income dec.	Red meals	Meal comp
Ln(Age)	-0.0706 (0.327)	-0.132 (0.446)	-0.0773 (0.400)	-0.112 (0.341)	-0.225 (0.376)	0.153 (0.384)	-0.222 (0.343)
Ln(Hhsize)	0.673*** (0.239)	0.645** (0.323)	0.178 (0.258)	0.629*** (0.244)	1.015*** (0.267)	0.546** (0.253)	0.886*** (0.247)
Married	0.315 (0.255)	-0.137 (0.383)	0.622* (0.355)	0.523* (0.282)	0.479 (0.295)	0.332 (0.305)	0.481* (0.275)
Rural	0.543*** (0.171)	-0.230 (0.264)	0.253 (0.219)	0.344* (0.183)	0.128 (0.199)	0.405** (0.202)	0.621*** (0.179)
Education	-1.230*** (0.439)	-1.245** (0.497)	-0.730 (0.471)	-1.363*** (0.455)	-1.208*** (0.420)	-1.106*** (0.424)	-0.940** (0.431)
Ukraine	6.036*** (1.958)	2.429 (2.158)	2.671 (2.102)	5.159** (2.231)	4.138** (1.998)	5.907*** (2.099)	5.483*** (2.103)
Dom. Pol.	4.947** (2.085)	2.231 (2.281)	2.140 (2.517)	4.875** (2.135)	3.302 (2.120)	3.353 (2.213)	4.353** (2.144)
Fem. in Male HH	0.154 (0.197)	-0.0222 (0.260)	-0.432* (0.256)	-0.162 (0.205)	-0.427** (0.216)	0.0622 (0.218)	0.203 (0.211)
Male in Fem. HH	-1.771*** (0.681)	-1.393* (0.772)	-1.220* (0.647)	-1.997*** (0.692)	-1.951** (0.770)	-1.777** (0.720)	
Fem. in Fem. HH	1.661*** (0.353)	2.046*** (0.372)	0.870* (0.505)	1.752*** (0.347)	1.731*** (0.358)	0.532 (0.517)	2.035*** (0.371)
Constant	-5.066*** (1.743)	-2.608 (2.038)	-2.659 (2.146)	-4.651*** (1.757)	-3.603* (1.866)	-5.175*** (1.979)	-4.951*** (1.920)
Observations	1,449	1,449	1,449	1,449	1,449	1,449	1,438

Notes: (i) Robust standard errors in parentheses. (ii) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (iii) Individual weights are used.