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What explains gender differences in food insecurity?☆

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ABSTRACT

There is a rich literature devoted to the role women play in ensuring the food security of the household and other household members. However, relatively little attention has been paid to their own food security situation. The challenge with investigating the food security of women is that most surveys collect food security data at the household level making inferences about individual-level food security difficult. Using a large international sample of individual-level data and the first global experiential measure of food insecurity, I show that women have a higher probability of being food insecure relative to men. The magnitude of the gender gap in food insecurity varies across regions and varies by the severity level of food insecurity. In the developed countries of the European Union, women are 4.7 percentage points more likely than men to experience some form of food insecurity. In the poor countries of South Asia and Sub-Saharan Africa, women are two percentage points more likely than men to be severely food insecure. Using a modification of the Blinder-Oaxaca decomposition technique, I find that gender differences in household income, educational attainment, and social networks explain the majority of the gender gap in food insecurity. However, in some regions, namely South Asia and Australia/New Zealand, gender differences in observable characteristics fail to account for gender differences in food insecurity. This analysis suggests that policies that address gender inequality in employment opportunities and educational attainment may also impact food insecurity.

1. Introduction

Food security is defined by the Food and Agriculture Organization of the United Nations (FAO) to "exist when all people, at all times, have physical, social, and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life." Given the complexity and multi-dimensionality of food security, a single measure cannot capture all dimensions of what it means to be food secure, see for example Coates (2013) and Jones et al. (2013). Additionally, the definition of food security allows for some level of subjectivity, such that an individual's perception of a sufficient food bundle to meet their individual and household needs may differ by their gender, class, and social environment.

This paper uses an experiential measure of food insecurity that is consistent with the FAO definition of food security, by measuring the access dimension of food security, to answer the following questions: (1.) Are there gender differences in food insecurity? (2.) Which regions exhibit the largest gender differences in food insecurity? and (3.) Do gender differences in education, employment, income, and social networks account for gender differences in food insecurity?

Experiential measures of food insecurity fall under a class of self-reported measures of food insecurity. Unlike measures based on caloric intake or anthropometric measurements, individuals define "adequate" consumption from their own perspective, as opposed to an external definition of adequate consumption. How households perceive a sufficient food bundle and their food needs may differ by socioeconomic status (Headey and Ecker, 2013). For example, wealthy households may be accustomed to a different diet than poor households. Additionally, men and women may differ in what they perceive to be a sufficient food bundle, leading to differences in how men and women respond to food insecurity questions (Croson and Gneezy, 2009). In this regard, self-reported measures of food insecurity face similar shortcomings of subjective measures of poverty (Mullainathan and Bertrand, 2001; Ravallion, 2012). However, responses to experience-based food security questions are not based on perceptions of food insecurity, but based on actual behaviors and experiences associated with food access (FAO,

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2013). Experiential measures of food insecurity have been shown to be a reliable and valid measure of food insecurity for use in the United States, Latin America, and Sub-Sahara Africa (Frongillo, 1999; Pérez-Escamilla et al., 2004; Frongillo and Nanama, 2006). Experiential measures of food insecurity are relatively new and are gaining popularity due to their relatively low cost to implement (e.g. FAO (2013)). Therefore, this paper not only contributes to our understanding of gender differences in food insecurity but also contributes to the literature on the use of self-reported indicators, which have been used to measure subjective well-being (Steptoe et al., 2015) and poverty (Pradhan and Ravallion, 2000).

The development of experiential measures began in the early 1990s and were developed as a way to measure food insecurity among women and children (Radimer et al., 1992). The United States Department of Agriculture has been using an 18-item food security scale since 1995 as part of the Current Population Survey's (CPS) Food Security Supplement to assess the prevalence and severity of food insecurity in the United States. Similar experience-based multi-item food insecurity scales have been developed and used in developing countries, for example, the Latin American and Caribbean Food Security Scale and the Food and Nutrition Technical Assistance (FANTA) Household Food Insecurity Access Scale (HFIAS) (Coates et al., 2007).

Experiential measures are based on a respondent's response to a series of questions about the household's or individual's behaviors towards and experiences with not having enough food. The suite of questions make up a scale and capture different domains of food insecurity found to be common among households experiencing food insecurity (Coates et al., 2007).[1] Because the questions capture mild to severe behaviors associated with limited access to food, individuals can be grouped by their severity of food insecurity determined by the number of affirmative replies after verification that the data do not reject the assumptions of the Rasch measurement model.

Few surveys contain questions about individual food security requiring inference about individual food security to be based on household food security status. Therefore, most studies assume that household food security status is a sufficient proxy for individual food security status. However, a recent study by Brown et al. (2017) challenges this assumption and documents the limitations of relying on household indicators of poverty to identify undernourished individuals. The few studies that have investigated individual-level consumption and nutrition have found that men consume more calories than women (Pitt et al., 1990; D'Souza and Tandon, 2015), men benefit more from additional food resources (Broussard, 2012), and that undernourished women exist in households throughout both the wealth and consumption distributions (Brown et al., 2017). The preference to ensure the food security of adult male household members over female household members has been attributed to differences in the returns to labor, women's limited educational attainment, limited access to employment opportunities, and limited bargaining power within the household. These studies provide evidence that women may be more food insecure, even though they are not measuring food insecurity directly. The individual-level food insecurity measure used in this study allows for disaggregation by gender to further investigate the trends pointed to by these studies.

The study of gender differences in food insecurity has a number of important policy implications. First, it helps to understand intra-household differences in food security and whether they merit policy attention. Secondly, in order to design programs that address food insecurity, policymakers need to identify the factors that lead to food insecurity. If there are gender differences in food insecurity then gender specific policies may also address food insecurity. Additionally, food aid programs or nutrition-based programs only provide temporary solutions to food insecurity. If limited employment and educational opportunities result in women being more likely to experience food insecurity, then policies aimed at employment and education for women and girls may have long-run consequences for food insecurity. Lastly, this analysis informs targeting decisions for food aid and nutrition-based programs.[2]

2. Data, methodology and variables

2.1. Data

To investigate if gender differences in food insecurity exist, I use data from the Gallup World Poll (GWP). Each year since 2005, a random sample of approximately 1000 individuals in each country are selected for participation in the GWP.[3] The GWP samples are nationally representative of the resident, non-institutionalized population aged 15 years and older in each country. Interviews are conducted either face-to-face or via telephone. Telephone surveys are conducted in countries with at least 80% telephone coverage. Samples from telephone survey countries are selected using random digit dialing from a nationally representative list of phone numbers. For face-to-face interview countries, the first stage of sampling involves the identification of sampling units (clusters of households). These clusters are stratified by population size or geographic units. The second stage of sampling involves the selection of households through a random selection procedure. The final stage of sampling for both telephone-based and face-to-face surveys is the selection of an individual member of the household to be interviewed. This is done by collecting each person's birthday and using a selection table to identify the selected individual.

The GWP consists of a set of core questions asked in all countries, plus additional region-specific questions. Questions cover individual opinions about national institutions, corruption, youth development, community basics, diversity, optimism, communications, religiosity, and numerous other topics. The majority of questions can be answered with yes/no responses. The GWP also collects information on the demographics, employment, and educational attainment of the selected respondent as well as information on a few household-level characteristics, namely, household income and household size. In most countries, approximately 50% of the respondents are women.

In 2014, the Food and Agriculture Organization (FAO) of the United Nations contracted the Gallup World Poll to collect Food Insecurity Experience Scale (FIES) data on behalf of FAO, in the context of the Voices of the Hungry (VoH) project. The FIES measure relies on respondents' self-reports of difficulty obtaining adequate food and is a direct measure of food access. The questions were tested and validated, using item response theory, to be cross-culturally comparable (FAO, 2016).[4] Additionally, FAO (2016) show that the country-level prevalence rates of food insecurity, measured by the FIES, is highly correlated with most accepted indicators of development and food security. For example, country-level prevalence rates of food insecurity displayed a high correlation with country-level estimates of under-5 mortality rates, poverty head-count ratios, child stunting, and life expectancy at birth. Food insecurity data, along with demographic characteristics and other well-being indexes, are available in the GWP for 147 countries around the world. The analysis is conducted using data from the 2014 round of the GWP for 146 countries.[5] The total sample size is 132,983 adults. Refer to Table A.1 in the appendix for a list of countries used in the analysis.

[1] The three main behaviors and attitudes towards food insecurity covered by most scales include: (1.) Anxiety about insufficient quantity of food; (2.) Compromising on the quality of food; and (3.) Reducing the quantity of food.

[2] Experience-based measures of food security are not appropriate for targeting individual beneficiaries, but can be used for identifying vulnerable sub-populations.

[3] The sample size may vary depending on the population size of the country.

[4] Unfortunately, the GWP does not provide information on nutritional outcomes, which would allow us to compare our findings to more traditional measures of food insecurity.

[5] Spain was omitted due to missing income data.

2.2. Methodology

To assess gender differences in food insecurity, I calculate relative prevalence rates of food insecurity. Relative prevalence rates of food insecurity are calculated by dividing the prevalence rates of food insecurity among women by the prevalence rates among men. A relative prevalence rate of one indicates that prevalence rates for men and women are the same. A relative prevalence rate greater than one indicates that the prevalence rate of food insecurity is greater for women than for men.

To investigate whether gender differences in food insecurity remain after controlling for additional covariates, Logit models are estimated for the probability of an individual experiencing food insecurity. The dependent variable takes on the value of one if the individual is food insecure and is equal to zero otherwise. The regressions control for variables commonly used in food security analyses and impact an individual's ability to access food (Smith et al., 2000; Ratcliffe et al., 2011).

To investigate how gender differences in covariates separately contribute to the gender gap in food insecurity, I employ a variation of the Blinder-Oaxaca decomposition technique that has been modified to account for the nonlinearity of the logit regressions used to estimate the probability equations (Blinder, 1973; Oaxaca, 1973; Fairlie, 1999, 2005; Fairlie and Robb, 2007).

The Blinder-Oaxaca (B-O) decomposition technique has been used in the labor economics literature to explain racial and gender differences in wages (Blinder, 1973; Oaxaca, 1973). The standard B-O decomposition of the male/female gap in the average value of an outcome variable can be expressed as:

$$\overline{Y}_M - \overline{Y}_F = (\overline{\mathbf{X}}_M - \overline{\mathbf{X}}_F)\hat{\boldsymbol{\beta}}_M + \overline{\mathbf{X}}_F(\hat{\boldsymbol{\beta}}_M - \hat{\boldsymbol{\beta}}_F) \quad (1)$$

where $\overline{Y}$ is the average value of the outcome of interest, $\overline{\mathbf{X}}_g$ is a vector of average values of observable characteristics and $\hat{\boldsymbol{\beta}}_g$ is a vector of coefficient estimates for gender g.

The first term of Eq. (1) captures the portion of the gender gap that is due to gender differences in observable characteristics. The second term of Eq. (1) captures the portion of the gender gap that is due to differences in unmeasureable or unobserved characteristics.

However, when the outcome variable is binary and is estimated using nonlinear estimation techniques, the B-O decomposition may not be appropriate. Specifically, for a nonlinear equation $Y = G(\mathbf{X}\hat{\boldsymbol{\beta}})$, $\overline{Y}$ may not equal $G(\overline{\mathbf{X}}\hat{\boldsymbol{\beta}})$. An extension of the B-O decomposition has been developed which performs the decomposition for a logit or probit model and was first described in Fairlie (1999) and expanded on in Fairlie (2005).

The decomposition for a nonlinear equation for the probability of being food insecure, $FS = G(\mathbf{X}\hat{\boldsymbol{\beta}})$, can be expressed as:

$$\bar{FS}^M - \bar{FS}^F = \left\{\sum_{i=1}^{N^M} \frac{G(\mathbf{X}_i^M\hat{\boldsymbol{\beta}}^M)}{N^M} - \sum_{i=1}^{N^F} \frac{G(\mathbf{X}_i^F\hat{\boldsymbol{\beta}}^M)}{N^F}\right\} + \left\{\sum_{i=1}^{N^F} \frac{G(\mathbf{X}_i^F\hat{\boldsymbol{\beta}}^M)}{N^F} - \sum_{i=1}^{N^F} \frac{G(\mathbf{X}_i^F\hat{\boldsymbol{\beta}}^F)}{N^F}\right\} \quad (2)$$

where $\bar{FS}$ is the average probability of being food insecure, N^g is the sample size for gender g, and $G()$ is the cumulative distribution function from the logistic distribution. Similar to Eq. (1), the first term of Eq. (2) captures the portion of the gender gap that is due to gender differences in observable characteristics. The second term of Eq. (2) captures the portion of the gender gap that is due to differences in unmeasureable or unobserved characteristics.[6]

As presented in Eq. (2), $\hat{\boldsymbol{\beta}}^M$ are used as weights for the first term of the decomposition and the female distributions of the observable variables, $\overline{\boldsymbol{X}}^F$, are used as weights for the second term. Alternatively, I could have used $\hat{\boldsymbol{\beta}}^F$ as weights for the first term of the decomposition and the male distributions of the observable variables, $\overline{\boldsymbol{X}}^M$, as weights for the second term. The two different methods often provide different estimates. I follow the approach suggested by Oaxaca and Ransom (1994) and weight the first term of the decomposition using coefficient estimates from the pooled sample of both groups. In what follows, I only discuss and present estimates from the first term of Eq. (2) and not focus on the unexplained term since it is sensitive to the set of omitted variables.

The portion of the gender gap in food insecurity due to gender differences in observable characteristics can thus be written as:

$$\sum_{i=1}^{N^M} \frac{G(\mathbf{X}_i^M\hat{\boldsymbol{\beta}}^*)}{N^M} - \sum_{i=1}^{N^F} \frac{G(\mathbf{X}_i^F\hat{\boldsymbol{\beta}}^*)}{N^F} \quad (3)$$

where $\hat{\boldsymbol{\beta}}^*$ is a vector of coefficient estimates from the pooled sample of both groups.

Eq. (3) gives the contribution of the gender gap in food insecurity due to gender differences in the full set of included variables. I also want to calculate the contribution of the gender gap in food insecurity due to gender differences in specific variables. The contribution of each variable to the gender gap in food insecurity is equal to the change in the average predicted probability from replacing the female distribution with the male distribution of that variable while holding the distributions of the other variables constant.[7]

To calculate the contribution of each variable to the gender gap using the nonlinear decomposition technique requires the sample sizes of the two groups to be the same. Therefore, I draw a random subsample of women with a sample size equal to the number of men in the sample (N^M) and randomly match it to the male sample.[8] However, the estimates obtained from this procedure depends on the randomly chosen subsample of females. Therefore, I draw 1000 random subsamples to calculate separate decomposition estimates and use the mean value of the estimates for the final results (Fairlie, 2005).

2.3. Variables

The FIES asks a series of eight questions about the individual's experience with food insecurity during the previous 12 months. Table 1 lists the eight questions of the FIES. The first question asks whether the individual worries about having enough food to consume. The subsequent questions ask about compromising on the quality and variety of foods consumed and the last few questions ask about reducing the quantity of food consumed. For each question that the respondent answers affirmative, one point is received. A raw score is calculated by

[6] Eq. (2) will hold for a logit model that includes a constant term because the average value of the dependent variable must equal the average value of the predicted probabilities in the sample.

[7] Refer to Fairlie (2005) for a more thorough discussion on how to calculate the independent contribution of each variable. Assuming only two covariates and $N^F = N^M$, the independent contribution of X_1 to the gender gap can be expressed as:

$$\frac{1}{N^F}\sum_{i=1}^{N^F} G\left(\hat{\alpha}^* + X_{1i}^M\hat{\beta}_1^* + X_{2i}^M\hat{\beta}_2^*\right) - G\left(\hat{\alpha}^* + X_{1i}^F\hat{\beta}_1^* + X_{2i}^M\hat{\beta}_2^*\right) \quad (4)$$

and the contribution of X_2 to the gender gap can be expressed as:

$$\frac{1}{N^F}\sum_{i=1}^{N^F} G\left(\hat{\alpha}^* + X_{1i}^F\hat{\beta}_1^* + X_{2i}^M\hat{\beta}_2^*\right) - G\left(\hat{\alpha}^* + X_{1i}^F\hat{\beta}_1^* + X_{2i}^F\hat{\beta}_2^*\right) \quad (5)$$

[8] The male/female samples are approximately the same however, for most regions, the sample of women is slightly larger than the sample of men. In three regions, the male sample is larger than the female sample.

Table 1
Questions in the food insecurity experience scale.

During the last 12 MONTHS, was there a time when:
1. You were worried you would run out of food because of a lack of money or other resources?
2. You were unable to eat healthy and nutritious food because of a lack of money or other resources?
3. You ate only a few kinds of foods because of a lack of money or other resources?
4. You had to skip a meal because there was not enough money or other resources to get food?
5. You ate less than you thought you should because of a lack of money or other resources?
6. Your household ran out of food because of a lack of money or other resources?
7. You were hungry but did not eat because there was not enough money or other resources for food?
8. You went without eating for a whole day because of a lack of money or other resources?

summing the number of affirmative responses. Food security status is based on the individual's raw score.[9] To ensure that the measured severity of food insecurity is comparable across countries, FAO equated the food insecurity scales of each country to a global standard and country-specific thresholds were determined from the continuous severity scale of the global standard. FAO's equating procedure ensures the same food insecurity severity level across countries. Refer to FAO (2016) for more information on the development of the FIES and how the country-specific thresholds were determined.

An individual's raw score was used to construct three binary measures of the individual's severity of food insecurity: *mild+*, *moderate+*, and *severe*. *Mild+* is coded as one if the individual's raw score is at least two; zero otherwise. This measure captures individuals that experienced mild, moderate, or severe food insecurity during the previous 12 months. A raw score cutoff of two instead of one was chosen for *mild+* to account for the fact that in most countries, women are in charge of food preparation and may have a higher propensity to report worrying about running out of food. Our results are not sensitive to the chosen cutoff of two instead of one for *mild+* food insecurity.[10] I adopt the recommended raw score cutoffs provided by the VoH project for *moderate+* and *severe* food insecurity.[11] The country-specific thresholds correspond to a severity level along the continuous severity scale of the global standard. *Moderate+* is coded as one if the individual's raw score is greater than or equal to the individual's country-specific cutoff for moderate food insecurity; zero otherwise. This measure captures individuals that experienced moderate or severe food insecurity during the previous 12 months. *Severe* is coded as one if the individual's raw score is greater than or equal to the individual's country-specific cutoff for severe food insecurity; zero otherwise. This measure captures individuals that experienced severe food insecurity during the previous 12 months.[12] National prevalence rates are calculated using sampling weights.[13]

The regressions include several variables shown to be correlated with food security status and were available in the GWP. Employment status is measured using three dummy variables: a dummy variable for if the individual is employed part time, a dummy variable for if the individual is employed fulltime, and a dummy variable for if the individual is out of the labor force. The omitted category is whether the individual is unemployed. Educational attainment is measured using two dummy variables: a dummy variable for if the individual completed secondary education but did not complete college and a dummy variable for if the individual completed at least four years of education beyond high school. The omitted category is whether the individual completed 8 years of education or less.

The regressions also control for log of household income per capita. The GWP asked each respondent to record their household monthly pretax income in local currency. For respondents who had difficulty reporting household income, they were presented with a set of income ranges and asked to report the income range that most closely represented their household income. Their income was recorded as the midpoint of the selected range. Household income was then equated across countries by converting the local currency to international dollars using the World Bank's individual consumption PPP conversion factor.

An individual's social support network has been shown to be correlated with food security (Tarasuk, 2001; Smith et al., 2017). Additionally, an individual's social support networks can provide informal insurance to help protect against adverse shocks (Banerjee and Duflo, 2007). The GWP asks two questions about the respondent's social support structure and social network. The social support question asks respondents if they had relatives or friends that would provide help in time of need. The social network question asks respondents if they were satisfied with the opportunities to meet people and make friends in the area where they live. The individual responses for each question were recoded so that positive responses were scored as one and negative responses were recoded as zero.[14] The regressions control for the respondent's social support network by including a variable that takes on the value of 0, 1, or 2 for whether the respondent answered positively to none, one, or both questions respectively.

Additional variables included in the regressions are the marital status of the individual, household size, whether the individual lives in an urban center, and age fixed effects, which are constructed by grouping age into 10-year bins. To account for differences in food insecurity levels across countries, all regressions include country fixed effects.

3. Results

3.1. Gender differences in food security

Table 2 provides summary statistics of the share of affirmative responses to each question of the FIES across the 146 countries used in the analysis.[15] This is presented for men and women separately. The table highlights the variation across countries in the experiences and behaviors individuals adopt due to insufficient resources for food. In some

[9] This is true because the FIES has been statistically validated against the assumptions of the Rasch measurement model based on Item Response Theory. Refer to FAO (2016) for a detailed discussion on how the FIES was validated and justification that an individual's raw score is a sufficient statistic for estimating an individual's true food security status.

[10] The FIES allows for different experiences to be more or less severe in a given population. Therefore, men's lower propensity to respond affirmative to worrying about running out of food should not affect an individual's food security status, which is based entirely on the individual's raw score.

[11] Country-specific raw score thresholds were not determined for *mild+* by the VoH project.

[12] For most countries, the raw score cutoff for *moderate+* food insecurity was four or five and the raw score cutoff for *severe* food insecurity was seven or eight. The use of "mild-or-moderate-or-severe" and "moderate-or-severe" is standard practice for other global indicators. For example, "overweight-or-obese" corresponds to a BMI score of 25 or above while obesity corresponds to a BMI score of 30 or above.

[13] Because the raw score cutoff for *mild+* do not correspond to a severity level along the continuous severity scale of the global standard, prevalence rates of *mild+* food insecurity cannot be compared across countries.

[14] For the social support question, response options were 'yes', 'no', 'do not know', or 'refused'. A response of 'yes' was recoded as one, all other responses were recoded as zero. For the social network question, response options were 'satisfied', 'dissatisfied', 'do not know', or 'refused'. A response of 'satisfied' was recoded as one, all other responses were recoded as zero.

[15] Although the questions are numbered in ascending order, this only represents how the questions were presented in the standard survey module. The severity of each item relative to the others may differ across countries.

Table 2
Summary statistics for FIES questions.

	Min		Median		Max	
	Female	Male	Female	Male	Female	Male
Question 1	3.36	2.63	33.45	29.00	85.66	82.33
Question 2	1.31	1.75	28.57	23.78	90.62	86.34
Question 3	2.99	2.85	30.03	26.91	90.14	86.93
Question 4	0.93	0.86	14.31	15.42	82.35	82.46
Question 5	1.80	1.22	17.38	18.26	87.38	83.52
Question 6	0.67	1.04	13.52	12.92	78.77	79.69
Question 7	0.22	0.52	10.29	10.17	84.72	78.29
Question 8	0.55	0.64	6.57	7.38	76.69	70.71

Notes: Refer to Table A.1 in the appendix for the sample of countries.

Table 3
Summary statistics for prevalence rates by gender.

	Min		Median		Max	
	Female	Male	Female	Male	Female	Male
Mild+	3.96	4.33	32.98	31.15	96.93	96.71
Moderate+	1.12	1.83	17.64	17.99	94.62	91.69
Severe	0.14	0.14	5.49	5.11	79.42	72.83

Notes: Refer to Table A.1 in the appendix for the sample of countries. Country level prevalence rates were calculated using the sample weights provided by GWP.

countries (i.e. Switzerland), fewer than 3% of sampled individuals answered affirmative to any of the food insecurity questions. In other countries, over 90% of sampled individuals experienced some aspect of food insecurity (i.e. South Sudan). For most questions, a slightly larger share of women answered affirmative to the food insecurity questions. However, Table 2 does not provide strong evidence of gender differences in food insecurity.

The FIES allows for prevalence rates of food insecurity to be calculated for each country surveyed in the GWP and therefore allows for the calculation of the total number of people that experienced food insecurity in 2014. Globally, in 2014, over 1.06 billion adults experienced *moderate+* food insecurity and over 400 million adults experienced *severe* food insecurity. Over 53% of the world's food insecure were adult women.[16] Table 3 provides descriptive statistics of prevalence rates for the three severity levels of food insecurity by gender. Table 3 depicts the variation across countries in the prevalence of *mild+*, *moderate+*, and *severe* food insecurity. The median prevalence rate of *mild+* food insecurity was slightly higher for women than for men, 33% for women compared to 31% for men. The median prevalence rates of *moderate+* and *severe* food insecurity were the same for men and women, 18% and 5% for *moderate+* and *severe* food insecurity respectively. Across the 146 countries used in the analysis, prevalence rates varied substantially.

Table 3 masks the differences in prevalence rates of food insecurity between men and women within a country. In fact, within a country, gender differences in prevalence rates were as high as 19 percentage points. For example, in Peru, 44% of the population experienced *mild+* food insecurity in 2014. However, 53% of women in Peru experienced *mild+* food insecurity in 2014 whereas 34% of men in Peru experienced *mild+* food insecurity in 2014. The prevalence rates of *moderate+* and *severe* food insecurity in Pakistan was 39 and 15% respectively. However, Pakistani women were 19 percentage points more likely than men to experience *moderate+* food insecurity and 11 percentage points more likely than men to experience *severe* food insecurity.

Figs. 1–3 depict relative prevalence rates of *mild+*, *moderate+* and *severe* food insecurity, respectively, for women versus men for each of the 146 countries. The figures group countries into five categories. Category 1 represents countries where the relative prevalence rate was less than 0.95. In these countries, prevalence rates of food insecurity among men exceeded prevalence rates among women. Category 2 represents countries where the relative prevalence rate was between 0.95 and 1.05. In these countries, gender inequality in food insecurity only marginally existed or was non-existent. Category 3 consists of countries where the relative prevalence rate was between 1.05 and 1.25. Category 4 consists of countries where the relative prevalence rate was between 1.25 and 1.50. Category 5 consists of countries where the relative prevalence rate exceeded 1.50. Countries grouped into categories 3, 4, and 5 exhibited gender inequality; prevalence rates of food insecurity among women exceeded prevalence rates among men. Additionally, countries grouped into category 1 exhibited gender inequality where the prevalence rate of food insecurity for men exceeded the prevalence rate for women.

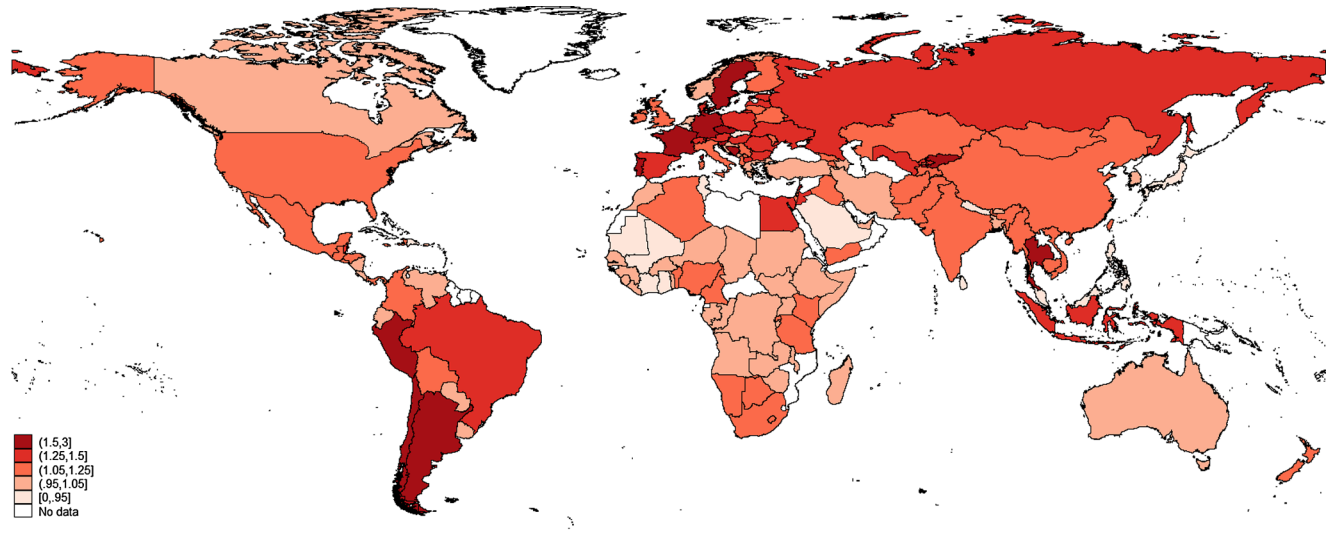
Many countries in the poorest regions, namely Sub-Saharan Africa (SSA), the Middle East and North Africa, and South Asia, have relative prevalence rates of approximately one for *mild+* and *moderate+* food insecurity. Gender inequality in food insecurity in the poorest regions occurs primarily in *severe* food insecurity, i.e. the developing countries of SSA, South Asia, Latin America/Caribbean, and Southeast Asia. The richer countries are more likely to exhibit gender inequality in *mild+* and *moderate+* food insecurity. For the European Union, the risk of experiencing *mild+* or *moderate+* food insecurity among women was 1.28 times as high as the risk of experiencing *mild+* or *moderate+* food insecurity among men. In most of the richer countries, less than two percent of the population exhibit *severe* food insecurity. Therefore, gender inequality in *severe* food insecurity among the rich countries displayed in Fig. 3 could be driven by small sample sizes, i.e. Canada.

Table 4 reports differences in unweighted means of food insecurity between women and men by region.[17] Columns 1–3 provide differences in means for *mild+* food insecurity. Columns 4–6 provide differences in means for *moderate+* food insecurity. Columns 7–9 provide differences in means for *severe* food insecurity. Significant gender differences in *mild+* food insecurity exist in the European regions, Southeast Asia, LAC, Middle East and North Africa, and SSA. Women in SSA were 1.6 percentage points more likely than men to experience *mild+* food insecurity. The difference is statistically significant, however, the difference may not be economically significant given that 67% of individuals in SSA experienced *mild+* food insecurity. In the EU, 16% of the population experienced *mild+* food insecurity; women were 4.7 percentage points more likely than men to experience *mild+* food insecurity. A difference that is large in magnitude and of economic significance. Similarly, the Commonwealth of Independent States (CIS) exhibited the largest gender difference in food insecurity; women were 5.3 percentage points more likely than men to experience *mild+* food insecurity.

Most of the regions that exhibited significant gender differences in *mild+* food insecurity also exhibited significant gender differences in *moderate+* food insecurity. Although the European regions exhibited larger gender gaps in *mild+* food insecurity than the poorer regions, the European regions had smaller gender gaps in *moderate+* food insecurity. Gender differences in *moderate+* food insecurity ranged between 2.0 and 3.1 percentage points. Significant gender differences for *severe* food insecurity only existed for South Asia and SSA. In South Asia, women were 2.0 percentage points more likely than men to experience *severe* food insecurity. In SSA, women were 2.7 percentage points more likely than men to experience *severe* food insecurity.

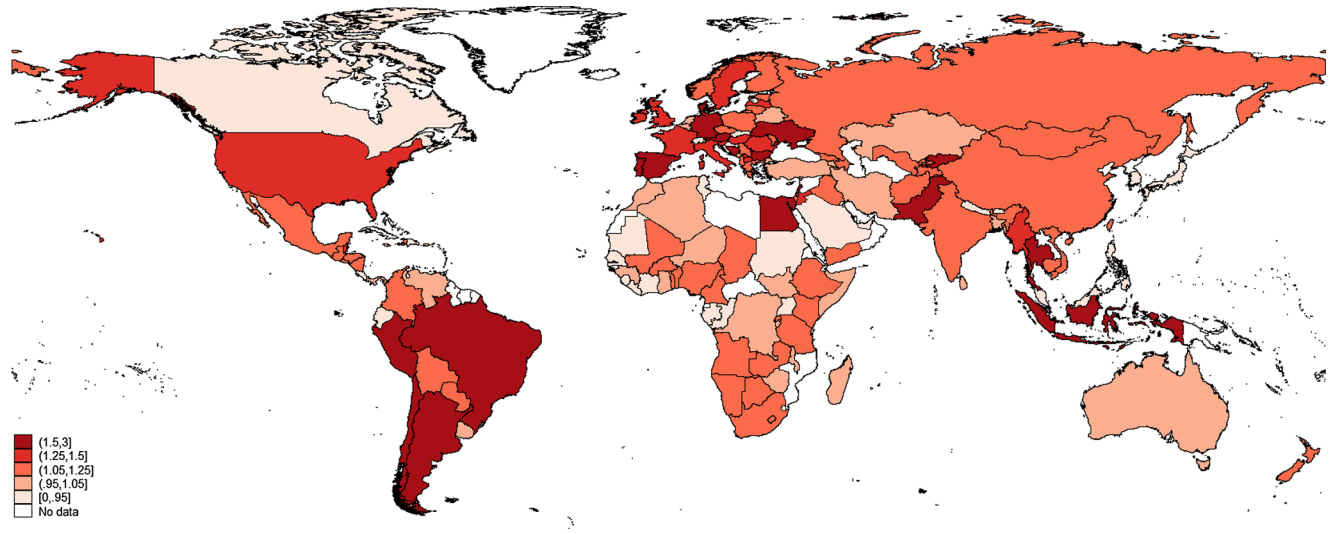
[16] The number of food insecure was calculated by multiplying the gender specific prevalence rates of food insecurity by the gender specific population totals for each country to obtain the total number of food insecure adults. Gender specific adult population totals were obtained from the United Nations Population Division.

[17] Refer to Table A.1 in the appendix for a list of countries that make up each region.



Source: Author's own calculation using the Gallup World Poll

Fig. 1. Relative prevalence rates of *Mild+* food insecurity for women vs. men, 2014.



Source: Author's own calculation using the Gallup World Poll

Fig. 2. Relative prevalence rates of *Moderate+* food insecurity for women vs. men, 2014.

3.2. Correlates of food insecurity

The figures and tables presented in the previous subsection show that gender differences in food insecurity exist. In this subsection, I formally investigate the correlates of food insecurity experienced at the individual level and explore whether gender differences in food insecurity remain after controlling for additional covariates.

Table 5 presents the logit results for estimating the probability of experiencing food insecurity. Average marginal effects from the logit are presented. The dependent variables in columns (1), (2), and (3) are dummy variables that take on the value of one if the individual experienced *mild+*, *moderate+*, or *severe* food insecurity respectively, and is equal to zero otherwise. Although the results in Table 5 do not identify causal relationships, the results provide interesting information on the correlates of food insecurity. The results are consistent with results reported in Smith et al. (2017). As expected, individuals that are employed, either full time or part time, and individuals that are out of the labor market, are less likely than individuals that are unemployed to experience food insecurity. The probability of experiencing food insecurity decreases with educational attainment. The results highlight the strong correlation between educational attainment and food security. The coefficient on the college education variable is more than twice as large as the coefficient on the secondary education variable. Household income is also negatively correlated with food insecurity. Individuals that are married are less likely than individuals that are single to experience food insecurity. The probability of experiencing food insecurity decreases with each additional household member. However, the point estimate is small in magnitude. I find that young adults between the ages of 15 and 24 are less likely than adults between the ages of 55 and 65 to experience food insecurity. This could be attributable to the younger cohort still living in their parents' home and not having to be responsible for food resources. I also find that individuals that report having a social support network are less likely to experience food insecurity.

If the gender gap in food insecurity observed in Figs. 1–3 and Table 4 was attributable to gender differences in educational attainment, employment, income, or social networks, the coefficient on the gender dummy in Table 5 would no longer be significant. However, after controlling for educational attainment, employment, income, social networks and other variables, women continue to have a higher

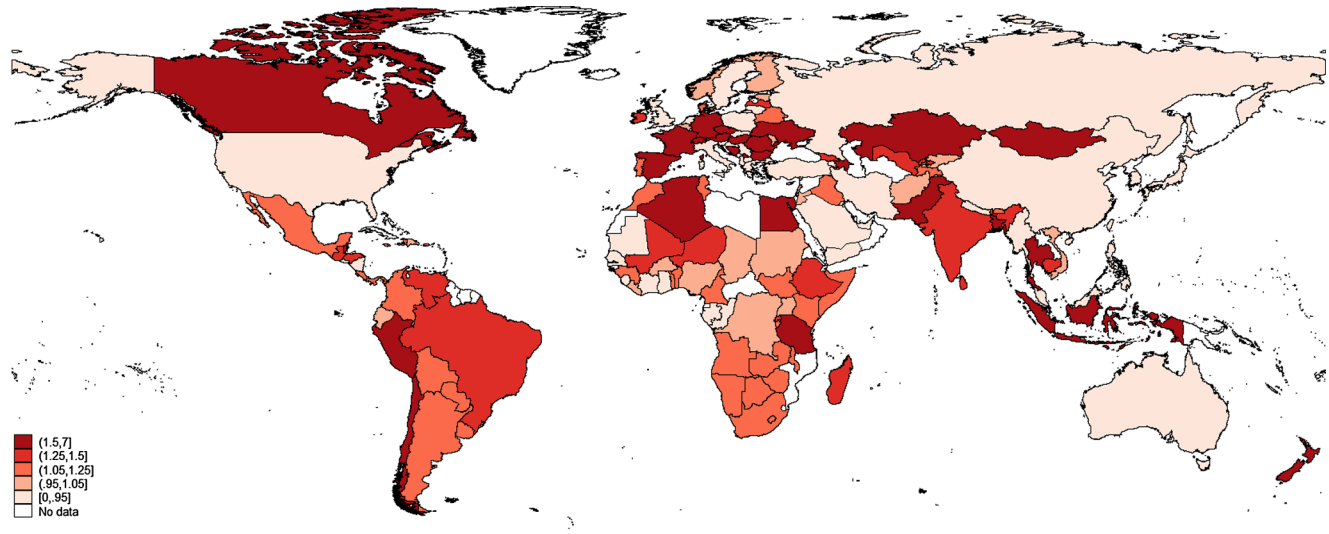


Fig. 3. Relative prevalence rates of *Severe* food insecurity for women vs. men, 2014.

Table 4
Difference in unweighted means of food insecurity between women and men by region.

	Mild+ Food Insecurity			*Moderate*+ Food Insecurity			*Severe* Food Insecurity		
	Men (1)	Women (2)	Difference (3)	Men (4)	Women (5)	Difference (6)	Men (7)	Women (8)	Difference (9)
European Union	13.3	18.1	−4.7***	7.3	9.3	−2.0***	1.8	1.9	−0.1
			(0.5)			(0.3)			(0.2)
Europe-Other	20.9	24.7	−3.8***	11.3	13.5	−2.2**	3.6	3.4	0.1
			(0.9)			(0.7)			(0.4)
Commonwealth of Independent States	25.2	30.5	−5.3***	10.3	11.9	−1.6**	2.2	2.3	0.0
			(0.9)			(0.6)			(0.3)
Australia-New Zealand	9.0	11.4	−2.3	6.5	8.3	−1.9	1.5	2.7	−1.1
			(1.4)			(1.2)			(0.7)
Southeast Asia	33.9	36.6	−2.7*	21.2	23.1	−1.9	7.3	8.2	−0.9
			(1.2)			(1.0)			(0.7)
South Asia	38.6	40.6	−2.0	24.0	27.1	−3.1**	9.7	11.5	−1.9**
			(1.0)			(0.9)			(0.7)
East Asia	14.7	15.3	−0.6	6.4	6.7	−0.3	1.9	1.5	0.4
			(1.0)			(0.7)			(0.4)
Latin America and the Caribbean	42.0	45.4	−3.4***	29.8	32.4	−2.6***	10.1	10.7	−0.7
			(0.7)			(0.7)			(0.5)
Northern America	11.6	12.9	−1.4	7.9	8.4	−0.6	1.8	2.5	−0.7
			(1.5)			(1.3)			(0.7)
Middle East and North Africa	30.9	34.5	−3.6***	20.8	23.2	−2.5***	6.6	7.2	−0.6
			(0.8)			(0.7)			(0.5)
Sub-Saharan Africa	66.2	67.8	−1.6**	51.2	53.3	−2.1***	25.0	27.6	−2.7***
			(0.5)			(0.6)			(0.5)

Significance levels: ∗: 10% ∗∗: 5% ∗ ∗ ∗: 1%.

probability of experiencing *mild*+ and *moderate*+ food insecurity. Thus, gender differences in the variables included in the logit regression do not fully account for the observed gender differences in *mild*+ and *moderate*+ food insecurity. However, for *severe* food insecurity, gender differences in the observable characteristics accounted for the observed gender gap in the probability of experiencing *severe* food insecurity.

Although Table 5 shows a statistically significant positive coefficient on the female dummy for the *mild*+ and *moderate*+ food insecurity regressions, the magnitudes are relatively small. This is partly because the coefficient estimate captures the average gender gap in food insecurity across all countries. It is possible that some regions have larger gender differences in food insecurity while others may have smaller gender differences in food insecurity. Tables 6–8 present results for *mild*+, *moderate*+, and *severe* food insecurity, respectively, by region. For *mild*+ food insecurity, gender differences in food insecurity remained in the European Union (EU), Europe-Other, the Commonwealth of Independent States, Australia/New Zealand, and Latin America/Caribbean. Women were between 1.7 and 4.2 percentage points more likely than men with similar characteristics to experience *mild*+ food insecurity. For *moderate*+ food insecurity, gender differences in food insecurity remained in Australia/New Zealand and South Asia. Women in Australia/New Zealand were 2.2 percentage points more likely than men to experience *moderate*+ food insecurity. Women in South Asia were 3.2 percentage points more likely than men in South Asia with similar characteristics to experience *moderate*+ food insecurity. For *severe* food insecurity, gender differences in food insecurity remained only in South Asia. Women were 2.0 percentage points more likely than men with similar characteristics to experience *severe* food insecurity.

Table 5
Logit regression results: probability of experiencing food insecurity - all countries.

	Mild+ (1)	*Moderate+* (2)	*Severe* (3)
Female	0.014***	0.005*	−0.000
	(0.003)	(0.003)	(0.002)
Age (15–24)	−0.051***	−0.041***	−0.023***
	(0.008)	(0.006)	(0.003)
Age (25–34)	0.016**	0.006	−0.004
	(0.006)	(0.006)	(0.003)
Age (35–44)	0.031***	0.016***	0.004
	(0.006)	(0.005)	(0.003)
Age (45–54)	0.027***	0.018***	0.005*
	(0.005)	(0.005)	(0.003)
Fulltime Employed	−0.092***	−0.075***	−0.037***
	(0.007)	(0.006)	(0.004)
Parttime Employed	−0.070***	−0.064***	−0.034***
	(0.008)	(0.006)	(0.004)
Not in Laborforce	−0.094***	−0.078***	−0.037***
	(0.006)	(0.005)	(0.004)
Urban	−0.004	−0.002	−0.002
	(0.006)	(0.005)	(0.004)
Completed Secondary	−0.076***	−0.068***	−0.039***
	(0.005)	(0.004)	(0.002)
College	−0.172***	−0.152***	−0.082***
	(0.007)	(0.006)	(0.005)
Log Income	−0.081***	−0.064***	−0.028***
	(0.004)	(0.004)	(0.003)
Married	−0.041***	−0.036***	−0.022***
	(0.005)	(0.004)	(0.002)
Household Size	−0.006***	−0.005***	−0.003***
	(0.001)	(0.001)	(0.001)
Social Support	−0.083***	−0.069***	−0.037***
	(0.003)	(0.003)	(0.002)
N	132,983	132,983	132,983
Country Fixed Effects	Yes	Yes	Yes

Significance levels: *: 10% **: 5% * * *: 1%.
Notes: Average marginal effects are reported. Robust standard errors, adjusted for clustering by country, are in parenthesis.

3.2.1. Potential reporting bias

The analysis found that for most regions, after controlling for factors correlated with gender and food security status, significant gender differences in *moderate+* and *severe* food insecurity disappeared. However, for four regions (the regions in Europe and Latin America), gender differences in *mild+* food insecurity remained after controlling for characteristics of the individual that were believed to be correlated with gender and food security status. A possible explanation for why gender differences exist for mild levels of food insecurity but not for more severe levels of food insecurity could be due to differences in men's and women's willingness to answer affirmative to the less severe food insecurity experiences, such as worrying about having enough food.[18] Differences in men's and women's willingness to answer affirmative to the less severe food insecurity questions could be due to women's greater role in ensuring and preparing household food resources and therefore potentially be more aware of food security problems before they become more severe. Another explanation could be men's reluctance to report less severe experiences because of shame, pride, or other reasons to want to discount the severity of food hardship.

Random underreporting of food insecurity should not bias the regression estimates, however, if underreporting of food insecurity is systematically different between men and women, then regression estimates could be biased. It is not possible to directly test the degree of underreporting. However, I can indirectly test for a gender bias in underreporting by restricting the sample to the subset of individuals that were classified as moderate or severe food insecure. Because food insecurity status is determined by an individual's raw score, I can investigate if men that were classified as moderately or severely food insecure were less likely to respond affirmative to the least severe food insecure questions relative to women that were classified as moderately or severely food insecure. The rationale for this is that, on average, a respondent should answer affirmatively to all questions that refer to experiences that are less severe to their current food insecurity status (FAO, 2016). The assumption is that because gender differences in food insecurity do not exist for moderate and severe food insecurity, gender differences in the least severe questions on food security should not exist for the subset of respondents that were classified as *moderate+* food insecure. Therefore, the relationship between gender and responses to questions 1–3 on the experiential scale among the *moderate+* food insecure should reflect the relationship between reporting behavior and gender.

Table 9 reports estimates from a Logit probability model of the probability of answering questions 1, 2, and 3 affirmatively conditional on experiencing *moderate+* food insecurity. For Europe-Other and the Commonwealth of Independent States, there were no significant gender differences in answering affirmatively to the least severe food insecurity experiences. This provides some evidence that the results presented in Table 6 for Europe-Other and the Commonwealth of Independent States are not biased due to underreporting of food insecurity experiences by male respondents. However, for the European Union and Latin America/Carribean, I cannot rule out the possibility of gender differences in reporting biases.

3.3. What determines gender differences in food insecurity

The analysis conducted in the previous subsection showed that household income, employment status, educational attainment, and social networks are significant correlates of food insecurity. In some regions, even after controlling for these covariates, significant gender differences in food insecurity remained. Possible explanations for this gender gap in food insecurity include differences in how food resources are allocated between men and women or because of differences in men's and women's willingness to report their experiences with food insecurity. The available data does not allow me to investigate unobserved factors that can explain gender differences in food insecurity, therefore, in this subsection I explore how gender differences in income, employment status, educational attainment, and social networks separately contribute to the gender gap in food insecurity.

Table 10 presents the results from the nonlinear decomposition technique for the female/male gap in food insecurity. The nonlinear decomposition technique is run separately for the regions that exhibit a gender gap in food insecurity (refer to Table 4). The decomposition was performed for the most severe level of food insecurity where a gender gap exists. Therefore, the decomposition technique was performed for Southeast Asia for *mild+* food insecurity, for the European Union, Europe-Other, CIS, Australia/New Zealand, LAC, and Middle East/North Africa for *moderate+* food insecurity, and for South Asia and SSA for *severe* food insecurity. Rows 1 and 2 report the prevalence rates of food insecurity for men and women respectively. Row 3 reports the unconditional difference in rates between men and women. The last two rows report how much of the gender gap is explained by gender differences in all of the included variables, i.e. how much of the gender gap would be reduced if women had the same distribution of included covariates as men. The remaining rows present the individual contributions from gender differences in the independent variables to the gender gap. The standard errors are reported in parentheses.

[18] The FIES was not tested for differential item response between men and women. If women and men assign different levels of severity to a given food security experience, then comparisons of prevalence rates in food security between men and women can be less informative.

Table 6
Logit regression results: probability of experiencing *Mild+* food insecurity by region.

	EU (1)	Europe-Other (2)	CIS (3)	Australia/ New Zealand (4)	SE Asia (5)	South Asia (6)	East Asia (7)	LAC (8)	North America (9)	Middle East/North Africa (10)	SSA (11)
Female	0.024***	0.017**	0.042***	0.024***	0.021	0.011	−0.003	0.019**	−0.000	0.010	−0.006
	(0.005)	(0.008)	(0.009)	(0.005)	(0.020)	(0.015)	(0.004)	(0.009)	(0.001)	(0.011)	(0.006)
Age (15–24)	−0.034	−0.101***	−0.131***	0.082***	−0.015	−0.010	0.008	−0.099***	0.034	−0.037	−0.026**
	(0.022)	(0.021)	(0.019)	(0.015)	(0.027)	(0.012)	(0.021)	(0.018)	(0.038)	(0.025)	(0.011)
Age (25–34)	0.050***	−0.026	−0.015	0.126***	0.041	0.016	0.058***	−0.006	0.109***	0.031	0.010
	(0.013)	(0.019)	(0.017)	(0.005)	(0.037)	(0.012)	(0.022)	(0.016)	(0.009)	(0.020)	(0.011)
Age (35–44)	0.053***	0.024**	−0.006	0.111***	0.038*	0.028***	0.042***	0.024*	0.078***	0.033	0.020*
	(0.012)	(0.011)	(0.022)	(0.036)	(0.022)	(0.008)	(0.011)	(0.015)	(0.024)	(0.021)	(0.011)
Age (45–54)	0.044***	0.016	0.011	0.106***	0.015	0.018	0.041***	0.034**	0.071***	0.021	0.005
	(0.009)	(0.016)	(0.015)	(0.027)	(0.022)	(0.011)	(0.010)	(0.014)	(0.009)	(0.020)	(0.013)
Fulltime Employed	−0.112***	−0.065***	−0.084***	−0.106***	−0.067**	−0.095***	−0.073***	−0.133***	−0.127***	−0.092***	−0.058***
	(0.010)	(0.022)	(0.027)	(0.008)	(0.030)	(0.020)	(0.023)	(0.018)	(0.035)	(0.016)	(0.015)
Parttime Employed	−0.074***	−0.065***	−0.059*	−0.096***	−0.069*	−0.122*	−0.015	−0.098***	−0.133***	−0.081***	−0.035**
	(0.011)	(0.016)	(0.032)	(0.017)	(0.040)	(0.065)	(0.016)	(0.014)	(0.025)	(0.014)	(0.015)
Not in Laborforce	−0.087***	−0.070***	−0.069***	−0.095***	−0.112***	−0.136***	−0.060**	−0.140***	−0.085***	−0.099***	−0.065***
	(0.010)	(0.017)	(0.021)	(0.037)	(0.041)	(0.020)	(0.027)	(0.017)	(0.014)	(0.013)	(0.014)
Urban	0.022***	0.006	0.010	0.006***	−0.031***	−0.060**	0.003	−0.005	−0.011	−0.001	−0.027
	(0.007)	(0.014)	(0.015)	(0.002)	(0.008)	(0.026)	(0.011)	(0.012)	(0.031)	(0.013)	(0.019)
Completed Secondary	−0.047***	−0.052***	−0.029	0.020	−0.110***	−0.136***	−0.037**	−0.086***	0.013	−0.086***	−0.091***
	(0.008)	(0.011)	(0.018)	(0.030)	(0.010)	(0.011)	(0.018)	(0.011)	(0.070)	(0.012)	(0.010)
College	−0.116***	−0.141***	−0.134***	−0.044***	−0.215***	−0.247***	−0.082***	−0.186***	−0.055	−0.189***	−0.205***
	(0.013)	(0.017)	(0.018)	(0.006)	(0.020)	(0.032)	(0.024)	(0.023)	(0.107)	(0.019)	(0.016)
Log Income	−0.079***	−0.097***	−0.099***	−0.060***	−0.074***	−0.102***	−0.073***	−0.098***	−0.030***	−0.124***	−0.063***
	(0.010)	(0.014)	(0.013)	(0.018)	(0.012)	(0.022)	(0.009)	(0.012)	(0.001)	(0.009)	(0.007)
Married	−0.058***	−0.039***	−0.028**	−0.026***	−0.019	0.006	−0.049***	−0.030*	−0.112***	0.001	−0.043***
	(0.006)	(0.014)	(0.013)	(0.005)	(0.015)	(0.008)	(0.017)	(0.017)	(0.004)	(0.009)	(0.007)
Household Size	−0.012**	−0.014***	−0.023***	−0.003*	−0.007*	−0.014***	−0.015***	−0.007**	0.006***	−0.010***	−0.001
	(0.005)	(0.005)	(0.005)	(0.002)	(0.004)	(0.004)	(0.006)	(0.003)	(0.000)	(0.002)	(0.002)
Social Support	−0.077***	−0.086***	−0.082***	−0.070***	−0.090***	−0.076***	−0.077***	−0.095***	−0.080***	−0.092***	−0.072***
	(0.005)	(0.009)	(0.011)	(0.002)	(0.013)	(0.009)	(0.011)	(0.008)	(0.017)	(0.009)	(0.006)
N	25,882	8626	11,107	1893	6828	8685	4687	18,684	1896	12,594	31,411
Nom. of Food Insecure	4131	1982	3157	197	2425	3441	705	8204	232	4113	21,039
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Significance levels: *: 10% **: 5% * * *: 1%.
Notes: Average marginal effects are reported. Robust standard errors, adjusted for clustering by country, are in parenthesis.

Table 7
Logit regression results: probability of experiencing *Moderate+* food insecurity by region.

	EU (1)	Europe-Other (2)	CIS (3)	Australia/ New Zealand (4)	SE Asia (5)	South Asia (6)	East Asia (7)	LAC (8)	North America (9)	Middle East/North Africa (10)	SSA (11)
Female	0.006*	0.005	0.005	0.022***	0.011	0.032*	−0.002	0.015	−0.009	0.004	−0.006
	(0.004)	(0.006)	(0.006)	(0.007)	(0.018)	(0.019)	(0.003)	(0.009)	(0.012)	(0.013)	(0.006)
Age (15–24)	−0.020	−0.058***	−0.065***	0.074***	−0.034	−0.015	0.003	−0.096***	0.010	−0.025	−0.049***
	(0.013)	(0.020)	(0.011)	(0.008)	(0.034)	(0.014)	(0.022)	(0.016)	(0.035)	(0.024)	(0.015)
Age (25–34)	0.034***	−0.011	−0.007	0.093***	0.006	0.004	0.027	−0.014	0.066***	0.019	−0.018
	(0.009)	(0.015)	(0.012)	(0.004)	(0.037)	(0.011)	(0.020)	(0.015)	(0.020)	(0.022)	(0.012)
Age (35–44)	0.042***	0.013	−0.006	0.081***	0.008	0.008	0.003	0.011	0.047	0.023	−0.011
	(0.007)	(0.012)	(0.017)	(0.018)	(0.026)	(0.011)	(0.016)	(0.011)	(0.029)	(0.018)	(0.014)
Age (45–54)	0.035***	0.008	0.020***	0.085***	−0.010	0.005	0.013	0.015	0.052	0.013	−0.006
	(0.005)	(0.009)	(0.007)	(0.002)	(0.017)	(0.018)	(0.010)	(0.011)	(0.039)	(0.016)	(0.014)
Fulltime Employed	−0.071***	−0.056***	−0.055**	−0.058***	−0.051***	−0.059***	−0.046***	−0.114***	−0.095***	−0.074***	−0.066***
	(0.008)	(0.014)	(0.023)	(0.005)	(0.012)	(0.017)	(0.018)	(0.016)	(0.007)	(0.015)	(0.015)
Parttime Employed	−0.048***	−0.049***	−0.048**	−0.063***	−0.066***	−0.091*	−0.025**	−0.091***	−0.096***	−0.071***	−0.050***
	(0.007)	(0.013)	(0.021)	(0.013)	(0.017)	(0.053)	(0.010)	(0.014)	(0.016)	(0.011)	(0.015)
Not in Laborforce	−0.052***	−0.054***	−0.036*	−0.060**	−0.088***	−0.108***	−0.042**	−0.128***	−0.057***	−0.080***	−0.070***
	(0.008)	(0.008)	(0.021)	(0.027)	(0.017)	(0.017)	(0.019)	(0.016)	(0.011)	(0.014)	(0.013)
Urban	0.014***	0.012	0.015	0.009***	−0.012**	−0.048	0.009	−0.007	−0.013	−0.002	−0.022
	(0.005)	(0.008)	(0.012)	(0.001)	(0.005)	(0.030)	(0.013)	(0.013)	(0.014)	(0.012)	(0.019)
Completed Secondary	−0.032***	−0.047***	−0.027*	0.023**	−0.086***	−0.131***	−0.017*	−0.083***	0.033**	−0.066***	−0.097***
	(0.006)	(0.006)	(0.015)	(0.012)	(0.010)	(0.014)	(0.010)	(0.011)	(0.013)	(0.011)	(0.009)
College	−0.073***	−0.111***	−0.077***	−0.028***	−0.175***	−0.212***	−0.052***	−0.189***	−0.021	−0.152***	−0.223***
	(0.008)	(0.018)	(0.019)	(0.004)	(0.010)	(0.041)	(0.017)	(0.021)	(0.041)	(0.019)	(0.014)
Log Income	−0.046***	−0.058***	−0.064***	−0.046***	−0.060***	−0.086***	−0.039***	−0.086***	−0.023***	−0.100***	−0.069***
	(0.007)	(0.008)	(0.011)	(0.014)	(0.013)	(0.019)	(0.007)	(0.010)	(0.003)	(0.008)	(0.008)
Married	−0.038***	−0.022***	−0.022**	−0.022**	−0.019	−0.007	−0.032***	−0.044***	−0.085***	0.005	−0.043***
	(0.005)	(0.005)	(0.009)	(0.010)	(0.014)	(0.010)	(0.006)	(0.014)	(0.002)	(0.010)	(0.010)
Household Size	−0.007***	−0.008***	−0.014***	−0.003	−0.001	−0.011***	−0.006	−0.007**	0.004**	−0.009***	−0.003
	(0.002)	(0.003)	(0.004)	(0.005)	(0.003)	(0.003)	(0.005)	(0.003)	(0.002)	(0.002)	(0.002)
Social Support	−0.049***	−0.063***	−0.043***	−0.060***	−0.062***	−0.057***	−0.047***	−0.079***	−0.058***	−0.079***	−0.086***
	(0.004)	(0.006)	(0.008)	(0.000)	(0.011)	(0.009)	(0.005)	(0.006)	(0.007)	(0.008)	(0.007)
N	25,882	8626	11,107	1893	6828	8685	4687	18,684	1896	12,594	31,411
Nom. of Food Insecure	2167	1078	1256	143	1525	2222	307	5844	154	2764	16,406
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Significance levels: *: 10% **: 5% * * *: 1%.
Notes: Average marginal effects are reported. Robust standard errors, adjusted for clustering by country, are in parenthesis.

Table 8
Logit regression results: probability of experiencing *Severe* food insecurity by region.

	EU (1)	Europe-Other (2)	CIS (3)	Australia/ New Zealand (4)	SE Asia (5)	South Asia (6)	East Asia (7)	LAC (8)	North America (9)	Middle East/North Africa (10)	SSA (11)
Female	−0.002	−0.005	−0.005**	0.014	0.004	0.020*	−0.005*	0.001	0.001	−0.000	0.001
	(0.002)	(0.003)	(0.002)	(0.010)	(0.011)	(0.011)	(0.003)	(0.006)	(0.004)	(0.005)	(0.005)
Age (15–24)	−0.003	−0.028***	−0.027***	0.031**	−0.033***	−0.026***	−0.002	−0.034***	−0.034***	−0.013	−0.050***
	(0.005)	(0.004)	(0.005)	(0.014)	(0.009)	(0.008)	(0.006)	(0.010)	(0.003)	(0.016)	(0.009)
Age (25–34)	0.010***	−0.004	−0.003	0.016***	−0.002	−0.005	0.002	−0.006	0.013	0.006	−0.029***
	(0.003)	(0.007)	(0.004)	(0.003)	(0.016)	(0.010)	(0.006)	(0.008)	(0.013)	(0.011)	(0.009)
Age (35–44)	0.014***	0.002	0.004	0.025	−0.003	−0.004	0.006	0.010	0.020	0.000	−0.013
	(0.002)	(0.008)	(0.003)	(0.016)	(0.014)	(0.007)	(0.004)	(0.007)	(0.013)	(0.008)	(0.013)
Age (45–54)	0.013***	0.004	0.004	0.033**	−0.016**	−0.001	0.006*	0.011	−0.017	0.001	−0.009
	(0.002)	(0.004)	(0.004)	(0.014)	(0.008)	(0.009)	(0.003)	(0.008)	(0.014)	(0.007)	(0.011)
Fulltime Employed	−0.021***	−0.028***	−0.012**	−0.026***	−0.042***	−0.025***	−0.013*	−0.051***	−0.005	−0.023**	−0.060***
	(0.003)	(0.006)	(0.005)	(0.004)	(0.011)	(0.007)	(0.007)	(0.007)	(0.009)	(0.010)	(0.012)
Parttime Employed	−0.013***	−0.033***	−0.011*	−0.029***	−0.049***	−0.062***	−0.012**	−0.038***	−0.005	−0.026***	−0.051***
	(0.003)	(0.010)	(0.006)	(0.001)	(0.011)	(0.023)	(0.006)	(0.008)	(0.017)	(0.008)	(0.013)
Not in Laborforce	−0.014***	−0.025***	−0.001	−0.016	−0.065***	−0.049***	−0.011	−0.054***	−0.010	−0.027**	−0.055***
	(0.003)	(0.007)	(0.007)	(0.010)	(0.010)	(0.003)	(0.007)	(0.009)	(0.008)	(0.012)	(0.012)
Urban	0.002	0.005	0.006	0.011	0.002	−0.025	0.002	0.007	−0.006	0.006	−0.021
	(0.002)	(0.006)	(0.005)	(0.012)	(0.004)	(0.016)	(0.007)	(0.010)	(0.011)	(0.005)	(0.017)
Completed Secondary	−0.013***	−0.010***	−0.014***	0.012	−0.038***	−0.065***	0.003	−0.050***	0.030	−0.036***	−0.075***
	(0.002)	(0.002)	(0.004)	(0.008)	(0.003)	(0.011)	(0.006)	(0.006)	(0.026)	(0.007)	(0.007)
College	−0.022***	−0.033***	−0.030***	−0.013	−0.085***	−0.128***	−0.005	−0.093***	0.012	−0.073***	−0.147***
	(0.003)	(0.011)	(0.005)	(0.011)	(0.009)	(0.014)	(0.007)	(0.013)	(0.041)	(0.014)	(0.020)
Log Income	−0.012***	−0.020***	−0.012***	−0.014***	−0.026***	−0.049***	−0.013***	−0.037***	−0.011***	−0.035***	−0.047***
	(0.001)	(0.002)	(0.003)	(0.004)	(0.006)	(0.012)	(0.003)	(0.005)	(0.000)	(0.004)	(0.007)
Married	−0.012***	−0.015***	−0.008**	−0.007	−0.016**	−0.009	−0.013**	−0.034***	−0.020**	−0.003	−0.036***
	(0.002)	(0.004)	(0.004)	(0.004)	(0.008)	(0.007)	(0.006)	(0.005)	(0.010)	(0.006)	(0.008)
Household Size	−0.003***	−0.002*	−0.001	−0.002	−0.001*	−0.005**	−0.002	−0.005***	−0.000	−0.002***	−0.005***
	(0.001)	(0.001)	(0.001)	(0.003)	(0.000)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)
Social Support	−0.015***	−0.024***	−0.016***	−0.029***	−0.031***	−0.029***	−0.015***	−0.032***	−0.024***	−0.040***	−0.071***
	(0.001)	(0.001)	(0.005)	(0.001)	(0.008)	(0.008)	(0.003)	(0.005)	(0.002)	(0.006)	(0.007)
N	25,882	8626	11,107	1893	6828	8685	4687	18,684	1896	12,594	31,411
Nom. of Food Insecure	478	301	250	42	536	922	78	1949	40	865	8252
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Significance levels: *: 10% **: 5% * * *: 1%.
Notes: Average marginal effects are reported. Robust standard errors, adjusted for clustering by country, are in parenthesis.

Table 9
Reporting bias results.

	EU			Europe-Other			Commonwealth			Latin America/Caribbean		
	(Q1)	(Q2)	(Q3)	(Q1)	(Q2)	(Q3)	(Q1)	(Q2)	(Q3)	(Q1)	(Q2)	(Q3)
Female	0.030***	0.025**	0.007	0.017	−0.013	−0.009	−0.005	0.017	0.012	0.020***	0.024***	0.015**
	(0.011)	(0.013)	(0.011)	(0.024)	(0.022)	(0.006)	(0.013)	(0.015)	(0.019)	(0.005)	(0.007)	(0.006)
Age (15–24)	−0.070***	−0.054**	−0.012	−0.028	−0.052	−0.053**	−0.129***	−0.067**	−0.060**	−0.025**	−0.062***	−0.041***
	(0.026)	(0.025)	(0.017)	(0.030)	(0.033)	(0.021)	(0.041)	(0.030)	(0.028)	(0.010)	(0.012)	(0.011)
Age (25–34)	−0.030	0.003	−0.020	0.027	−0.033	−0.006	−0.048	−0.060	−0.032	−0.002	−0.030**	−0.011
	(0.020)	(0.020)	(0.019)	(0.024)	(0.027)	(0.019)	(0.036)	(0.039)	(0.026)	(0.010)	(0.015)	(0.014)
Age (35–44)	0.016	0.009	0.009	0.063***	−0.006	−0.022	−0.029	−0.009	−0.002	0.009	−0.016	−0.009
	(0.017)	(0.018)	(0.017)	(0.016)	(0.027)	(0.021)	(0.040)	(0.021)	(0.020)	(0.008)	(0.011)	(0.009)
Age (45–54)	−0.004	0.016	−0.001	0.038***	−0.016	−0.043***	−0.072**	−0.023	−0.021	0.007	−0.006	0.001
	(0.018)	(0.019)	(0.016)	(0.012)	(0.041)	(0.010)	(0.032)	(0.020)	(0.033)	(0.009)	(0.015)	(0.014)
Fulltime Employed	−0.038	−0.007	−0.013	−0.141***	−0.019	−0.008	−0.091*	0.042*	−0.075	−0.006	−0.016	−0.020
	(0.023)	(0.024)	(0.021)	(0.046)	(0.034)	(0.010)	(0.049)	(0.025)	(0.054)	(0.011)	(0.011)	(0.014)
Parttime Employed	−0.080***	−0.002	0.017	−0.136***	−0.055	0.011	−0.104*	0.006	−0.049	−0.008	−0.030***	−0.021*
	(0.026)	(0.023)	(0.027)	(0.039)	(0.036)	(0.020)	(0.062)	(0.040)	(0.044)	(0.019)	(0.009)	(0.013)
Not in Laborforce	−0.052*	0.017	0.002	−0.115***	−0.001	0.014*	−0.084	0.016	−0.039	−0.022	−0.022*	−0.025*
	(0.027)	(0.022)	(0.021)	(0.038)	(0.042)	(0.008)	(0.060)	(0.038)	(0.051)	(0.014)	(0.012)	(0.014)
Urban	0.004	0.005	0.005	−0.012	0.029	−0.008	0.047	−0.008	−0.030	0.003	−0.007	−0.001
	(0.013)	(0.012)	(0.011)	(0.017)	(0.020)	(0.008)	(0.029)	(0.026)	(0.024)	(0.006)	(0.009)	(0.008)
Completed Secondary	−0.010	−0.062**	−0.044***	0.007	0.007	0.032***	0.017	−0.008	0.014	−0.002	−0.007	0.002
	(0.015)	(0.027)	(0.014)	(0.017)	(0.028)	(0.012)	(0.019)	(0.027)	(0.033)	(0.008)	(0.007)	(0.007)
College	−0.034*	−0.070**	−0.036*	−0.026	−0.048	−0.000	−0.016	0.039	0.014	−0.007	−0.032**	−0.009
	(0.019)	(0.031)	(0.019)	(0.017)	(0.036)	(0.020)	(0.030)	(0.033)	(0.037)	(0.020)	(0.014)	(0.011)
Log Income	−0.012*	−0.005	−0.008	−0.000	−0.013	0.008	0.000	−0.032*	−0.005	−0.013***	−0.005	−0.010***
	(0.007)	(0.007)	(0.007)	(0.008)	(0.024)	(0.011)	(0.011)	(0.018)	(0.011)	(0.005)	(0.003)	(0.003)
Married	0.028**	−0.011	0.002	−0.040**	0.008	0.027**	−0.015	−0.026	−0.019	−0.003	0.010	−0.008
	(0.013)	(0.020)	(0.010)	(0.017)	(0.016)	(0.013)	(0.018)	(0.025)	(0.020)	(0.008)	(0.009)	(0.005)
Household Size	0.007	−0.003	−0.009**	0.004	0.003	0.004	−0.001	−0.001	−0.005	−0.000	−0.001	−0.003
	(0.006)	(0.004)	(0.004)	(0.003)	(0.010)	(0.005)	(0.003)	(0.005)	(0.003)	(0.001)	(0.002)	(0.002)
Social Support	−0.001	−0.021	−0.017*	−0.029*	−0.009	0.010*	−0.020	−0.010	0.000	0.002	−0.004	−0.000
	(0.009)	(0.013)	(0.009)	(0.016)	(0.014)	(0.006)	(0.016)	(0.020)	(0.017)	(0.008)	(0.008)	(0.008)
N	2167	2167	2167	1078	1078	1078	1256	1256	1256	5844	5844	5844
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Significance levels: *: 10% **: 5% * * *: 1%.
Notes: Sample is restricted to the subset of individuals that reporting being *moderate+* food insecure. Average marginal effects are reported. Robust standard errors, adjusted for clustering by country, are in parenthesis. All regressions are Logit probability models.

As shown in the table, for 7 of the 9 regions, gender differences in the included variables explained between 23% and 97% of the observed gender gap in food insecurity. For SSA, all of the observed gender gap could be explained by gender differences in the included variables. For the Middle East/North Africa and Europe-Other, gender differences in the included variables accounted for 80% of the gender gap in food insecurity. For the EU and CIS, gender differences in the covariates contributed 65% to the gender gap. In LAC and in Southeast Asia, gender differences in the included variables explained 42 and 23%, respectively, to the gender gap. For Austrailia/New Zealand and South Asia, the positive total reported for the combined contribution of all included variables suggests that the gender gap should be smaller or reversed given women's observed distribution of the included covariates. Specifically, the decomposition suggests that the gender gap would increase if women had the same covariate distribution as men.

Gender differences in household income contributed the most to the gender gap in most regions. The importance of income to the gender gap is robust across all regions. In Europe-Other, LAC, and SSA, gender differences in household income contributed over 35% to the gender gap in food insecurity. In the Middle East/North Africa, gender differences in income accounted for over 70% of the observed gender gap in food insecurity. Lower educational attainment among women relative to men also contributed significantly to the gender gap, accounting for 5–45% of the observed gender gap in food insecurity.

Gender differences in employment status possessed mixed effects across regions. In the EU, CIS, and SSA, differences among men and women in employment status accounted for 3–12% of the gender gap. Employment differences were only significant for the EU. However, in SE Asia, Australia/New Zealand, the Middle East/North Africa, and South Asia, the estimate for employment status was positive. Specifically, gender differences in the employment distribution reduced the gender gap in food insecurity. Women are more likely to be out of the workforce and results from the logit suggests that individuals out of the workforce are less likely to experience food insecurity. The positive coefficient on the combined employment categories account for the positive estimate reported for the total contribution of all included variables to the gender gap for Austrailia/New Zealand and South Asia.

In all regions, except CIS and SSA, gender differences in social support networks contribute significantly to the gender gap. Between 7% and 20% of the gender gap come from differences in social support networks. The significance of gender differences in social support networks to the gender gap is observed in developing regions like the Middle East/North Africa and LAC, and in the developed regions of the EU and Australia/New Zealand.

The results suggest that lower educational attainment, lower household income, and fewer social networks among women relative to men contribute the most to the gender gap in food insecurity. However, in some regions, namely South Asia and Australia/New Zealand, gender differences in observable characteristics fail to account for the observed gender differences in food insecurity. Potential explanations include the failure to include in the regressions the factors that account for the gender gap in food insecurity in these regions (omitted variables) or discrimination against women. Both contributions would be captured in the second term of Eq. (2), the portion of the gender gap that is due to differences in unmeasureable or unobserved characteristics, however, it would be impossible to isolate the two potential explanations.

Table 10
Non-linear decompositions of the female/male gap in food insecurity.

	Mild +	*Moderate +*						*Severe*	
	Southeast Asia	EU	Europe-Other	CIS	Australia/ New Zealand	LAC	Middle East/North Africa	South Asia	SSA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Prevalence Rate Among Men	0.3394	0.0729	0.1129	0.1032	0.0645	0.4197	0.2076	0.0967	0.2496
Prevalence Rate Among Women	0.3660	0.0926	0.1352	0.1195	0.0832	0.4535	0.2322	0.1154	0.2763
Female/Male Gap	−0.0265	−0.0197	−0.0224	−0.0163	−0.0187	−0.0338	−0.0245	−0.0187	−0.0266
Contributions from Gender Differences in:									
Age Categories	−0.001	0.001	−0.002	−0.002*	0.004	−0.002***	−0.001	0.000	0.001***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.000)	(0.001)	(0.000)	(0.000)
Employment Categories	0.008*	−0.002*	0.000	−0.002	0.002	−0.000	0.004	0.009**	−0.001
	(0.003)	(0.001)	(0.002)	(0.001)	(0.003)	(0.003)	(0.007)	(0.003)	(0.001)
Education Categories	−0.009***	−0.001*	−0.009***	−0.000	0.003	−0.002***	−0.011***	−0.007***	−0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.000)	(0.002)	(0.001)	(0.001)
Urban	0.000	−0.000	0.000	−0.000	0.000	0.000	−0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Log Income	−0.003	−0.005**	−0.011***	−0.004	−0.001	−0.014***	−0.018***	−0.002	−0.010***
	(0.002)	(0.002)	(0.003)	(0.004)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)
Married	−0.001	−0.002***	−0.001**	−0.001	−0.001	−0.001	−0.000	−0.000	−0.000*
	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
HHsize	−0.000	−0.001	−0.001	−0.001	−0.001	0.001*	−0.004***	−0.001	0.000
	(0.000)	(0.001)	(0.001)	(0.003)	(0.002)	(0.000)	(0.001)	(0.001)	(0.000)
Social Support	−0.002***	−0.003***	−0.003***	−0.000	−0.003**	−0.003***	−0.005***	−0.001*	−0.000
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)
Country	0.001	−0.000	0.010***	0.000	0.000*	0.008***	0.014***	0.002	−0.009***
	(0.003)	(0.001)	(0.002)	(0.002)	(0.000)	(0.001)	(0.002)	(0.002)	(0.001)
All Include Variables	−0.0061	−0.0129	−0.0173	−0.0107	0.0028	−0.0144	−0.0203	0.0014	−0.0258
	23.02%	65.48%	77.23%	65.64%	−14.97%	42.60%	82.86%	−7.49%	96.99%

Significance levels: ∗: 10% ∗∗: 5% ∗ ∗ ∗: 1%.
Notes: The decompositions are based on the regressions used in Tables 6–8 and use coefficient estimates from both genders. Estimates are mean values of the decomposition using 1000 random sub-samples. Standard errors are reported in parentheses.

Table 11
Non-linear decompositions of the female/male gap in food insecurity: male coefficients.

	Mild +	*Moderate +*						*Severe*	
	Southeast Asia	EU	Europe-Other	CIS	Australia/ New Zealand	LAC	Middle East/North Africa	South Asia	SSA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Prevalence Rate Among Men	0.3394	0.0729	0.1129	0.1032	0.0645	0.4197	0.2076	0.0967	0.2496
Prevalence Rate Among Women	0.3660	0.0926	0.1352	0.1195	0.0832	0.4535	0.2322	0.1154	0.2763
Female/Male Gap	−0.0265	−0.0197	−0.0224	−0.0163	−0.0187	−0.0338	−0.0245	−0.0187	−0.0266
Contributions from Gender Differences in:									
Age Categories	−0.000	0.001	−0.002	−0.002	0.005	−0.002***	−0.000	0.001	0.001*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.014)	(0.001)	(0.001)	(0.001)	(0.000)
Employment Categories	0.005	−0.003*	0.002	−0.004*	0.000	0.003	0.004	0.008	−0.001
	(0.005)	(0.001)	(0.002)	(0.002)	(0.014)	(0.002)	(0.009)	(0.005)	(0.001)
Education Categories	−0.010***	−0.001	−0.008***	−0.001	0.002	−0.002**	−0.011***	−0.005***	−0.007***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.005)	(0.001)	(0.002)	(0.001)	(0.001)
Urban	0.000	−0.000	−0.000	−0.000	−0.000	0.000	0.000	0.000	0.000
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)
Log Income	−0.003	−0.005*	−0.012***	−0.004	−0.001	−0.014***	−0.019***	−0.002	−0.010***
	(0.002)	(0.002)	(0.003)	(0.005)	(0.005)	(0.002)	(0.004)	(0.002)	(0.002)
Married	−0.001	−0.002***	−0.001	−0.000	−0.001	−0.001	0.000	0.000	−0.000
	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
HHsize	−0.000	−0.001	−0.001	−0.002	−0.001	0.001**	−0.004***	−0.001	0.000
	(0.000)	(0.001)	(0.001)	(0.004)	(0.001)	(0.000)	(0.001)	(0.002)	(0.000)
Social Support	−0.002***	−0.003***	−0.002	−0.000	−0.001	−0.004***	−0.005***	−0.002***	−0.000
	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)	(0.000)	(0.001)	(0.000)	(0.000)
Country	0.004	0.001	0.011***	−0.000	−0.000	0.008***	0.018***	0.002	−0.009***
	(0.003)	(0.001)	(0.003)	(0.003)	(0.000)	(0.001)	(0.004)	(0.002)	(0.001)
All Include Variables	−0.0074	−0.0134	−0.0136	−0.0140	0.0034	−0.0103	−0.0160	0.0027	−0.0253
	27.92%	68.02%	60.71%	85.89%	−18.18%	30.47%	65.31%	−14.44%	95.11%

Significance levels: ∗: 10% ∗∗: 5% ∗ ∗ ∗: 1%.
Notes: The decompositions use coefficient estimates from the male sample. The decompositions are based on the regressions used in Tables 6–8. Estimates are mean values of the decomposition using 1000 random sub-samples. Standard errors are reported in parentheses.

Table 12
Non-linear decompositions of the female/male gap in food insecurity: female coefficients.

	Mild+	*Moderate+*						*Severe*	
	Southeast Asia	EU	Europe-Other	CIS	Australia/ New Zealand	LAC	Middle East/North Africa	South Asia	SSA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Prevalence Rate Among Men	0.3394	0.0729	0.1129	0.1032	0.0645	0.4197	0.2076	0.0967	0.2496
Prevalence Rate Among Women	0.3660	0.0926	0.1352	0.1195	0.0832	0.4535	0.2322	0.1154	0.2763
Female/Male Gap	−0.0265	−0.0197	−0.0224	−0.0163	−0.0187	−0.0338	−0.0245	−0.0187	−0.0266
Contributions from Gender Differences in:									
Age Categories	−0.001	0.001	−0.002	−0.002	0.005	−0.002***	−0.001	−0.001	0.001***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.005)	(0.001)	(0.001)	(0.001)	(0.000)
Employment Categories	0.010*	−0.002*	−0.002	−0.001	0.003	−0.002	0.005	0.013	−0.001
	(0.004)	(0.001)	(0.002)	(0.002)	(0.002)	(0.004)	(0.010)	(0.007)	(0.001)
Education Categories	−0.010***	−0.001	−0.010***	−0.000	0.003*	−0.002***	−0.011***	−0.010***	−0.009***
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
Urban	0.000	−0.000	0.000	−0.000	0.000	0.000	−0.000	0.000	0.001
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Log Income	−0.003	−0.005**	−0.011***	−0.004	−0.003	−0.015***	−0.017***	−0.001	−0.009***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Married	−0.000	−0.003***	−0.001	−0.002*	−0.001	−0.001*	0.000	−0.000	−0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.000)	(0.001)	(0.000)
HHsize	−0.000	−0.001	−0.001	−0.001	−0.001	0.001	−0.004**	−0.001	0.000
	(0.000)	(0.001)	(0.001)	(0.002)	(0.003)	(0.000)	(0.001)	(0.001)	(0.000)
Social Support	−0.002***	−0.003***	−0.003***	−0.000	−0.004*	−0.003***	−0.005***	−0.002	−0.000
	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)	(0.000)	(0.001)	(0.001)	(0.000)
Country	0.002	−0.000	0.009***	0.001	0.001*	0.008***	0.008***	0.002	−0.009***
	(0.003)	(0.001)	(0.002)	(0.002)	(0.000)	(0.001)	(0.002)	(0.002)	(0.001)
All Include Variables	−0.0036	−0.0135	−0.0210	−0.0096	0.0035	−0.0175	−0.0253	0.0002	−0.0268
	13.58%	68.53%	93.75%	58.90%	−18.72%	51.78%	103.27%	−1.07%	100.75%

Significance levels: ∗: 10% ∗∗: 5% ∗ ∗ ∗: 1%.
Notes: The decompositions use coefficient estimates from the female sample. The decompositions are based on the regressions used in Tables 6–8. Estimates are mean values of the decomposition using 1000 random sub-samples. Standard errors are reported in parentheses.

The choice of coefficients used in the decompositions depend on what assumption is made about the nondiscriminatory structure of the outcome that is being estimated. Oaxaca (1973) estimated the wage decomposition using the male and female coefficients separately, and suggested that the true nondiscriminatory wage structure would be bracketed by the two estimates. In this analysis I adopted the recommendation of Oaxaca and Ransom (1994) and used the coefficient estimates from the pooled sample of both groups. As noted previously, results from the decompositions can be sensitive to the choice of coefficients used in the decomposition. Tables 11 and 12 present the estimates using the male and female coefficient estimates, respectively. Although the amount of the gender gap explained by the included variables varies depending on which coefficient estimates are used in the decomposition, the estimates of the contributions of gender differences in household income, educational attainment, and social support networks are consistently estimated across all specifications for all regions.

4. Policy implications

There has been extensive research on the role women play in ensuring food and nutrition security of other household members. For example, Smith and Haddad (2000) found that improvements in women's education contributed to 43% of the reduction in child malnutrition that took place from 1970 to 1995. Sraboni et al. (2014) show that households that have an empowered female spouse have higher calorie availability and dietary diversity. While a substantial amount of the literature has been devoted to the role women play in ensuring the food security of the household and other household members, relatively little attention has been paid to their own food security situation. In this paper, I investigated food insecurity among women relative to men using an experience-based measure of food insecurity for 146 countries.

Recent research has highlighted the failure of household measures of food insecurity to identify individuals within the household who are food insecure (Brown et al., 2017; D'Souza and Tandon, 2015). Data that can be used to identify vulnerable sub-populations can be useful in informing targeting decisions for food aid and nutrition-based programs. The individual measure of food insecurity used in this paper showed that gender differences in food insecurity existed for both developed and developing countries. Gender differences in the prevalence of food insecurity varied between one and six percentage points.

Many countries in the poorest regions, namely Sub-Saharan Africa (SSA), the Middle East and North Africa, and South Asia, exhibited relative prevalence rates of approximately one for *mild+* and *moderate+* food insecurity. This can be partly attributable to the high rates of food insecurity in these countries, such that everyone, regardless of gender, experience mild or moderate levels of food insecurity. For example, in SSA, over 50% of the population experienced *moderate+* food insecurity in 2014. Gender inequality in food insecurity in the poorest regions occurred primarily in *severe* food insecurity, i.e. the developing countries of SSA, South Asia, Latin America/Caribbean, and Southeast Asia. Richer countries were more likely to exhibit gender inequality in *mild+* and *moderate+* food insecurity.

For most regions, differences in household income, educational attainment, employment status and social support networks explained between 23% and 97% of the observed gender gap in food insecurity. While additional analysis is needed to better understand why gender differences in food insecurity exist, the analysis does suggest that policies aimed at employment and education for women and girls may have important implications for food insecurity. Gender differences in social support networks explained between 7% and 20% of the observed gender gap in food insecurity. Although policies to strengthen social support networks may be more difficult to implement than policies aimed at education or employment, the analysis does highlight the importance of social support networks. Social networks can serve as informal insurance or provide women with more bargaining power

within the household. Programs that target marginalized groups may also have substantial impacts on addressing food insecurity, however the limited amount of information on social networks available in the GWP makes it impossible to explore in more detail the importance of social networks to the gender gap in food insecurity.

Additional analysis is needed to better understand why gender differences in food insecurity exist. This paper only investigated observable characteristics and while I provide evidence that much of the gender gap in food insecurity is due to gender differences in other observable characteristics, a nontrivial share of the gender gap in food insecurity is unexplained. Possible explanations for the gender gap in food insecurity that could not be explained by observable characteristics include differences in how food resources are allocated between men and women within the household or because of differences in men's and women's willingness to report their experiences with food insecurity. I provided some evidence that reporting biases between men and women did not account for the observed gender differences in food insecurity. Differences in how food resources are allocated could be due to discrimination within the household or because of efficiency gains in allocating additional food resources to men.

Appendix A

See Table A.1.

Table A.1
List of countries used in the analysis.

European Union: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Sweden, United Kingdom. **Other Europe:** Albania, Bosnia and Herzegovina, Macedonia, Montenegro, Norway, Serbia, Switzerland. **Commonwealth of Independent States:** Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Republic of Moldova, Russian Federation, Tajikistan, Ukraine, Uzbekistan. **Australia-New Zealand:** Australia, New Zealand. **Southeast Asia:** Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam. **South Asia:** Afghanistan, Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka. **East Asia:** China, Hong Kong, Japan, Mongolia, South Korea, Taiwan. **Latin America and the Caribbean:** Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Uruguay, Venezuela. **Northern America:** Canada, United States of America. **Middle East and North Africa:** Algeria, Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Morocco, Palestine, Saudi Arabia, Tunisia, Turkey, United Arab Emirates, Yemen. **Sub-Saharan Africa:** Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Chad, Democratic Republic of the Congo, Congo, Ethiopia, Gabon, Ghana, Guinea, Cote d'Ivôire, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, United Republic of Tanzania, Togo, Uganda, Zambia, Zimbabwe

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