

# Food Insecurity Erodes Trust

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## Abstract

This study examines the relationship between food insecurity and trust using the 2014–17 waves of the Gallup World Poll and the Food and Agriculture Organization's Food Insecurity Experience Scale. Trust improves public institutions, social capital, public health interventions, and economic development. Vertical trust is represented as an index of trust in national institutions, while horizontal trust is represented as a measure of trust in friends and family.

The findings show that food insecurity is associated with a decrease in both measures of trust. The study further document heterogeneous effects of food insecurity across economic development rankings. The results suggest a need for governments to increase food security to bolster public trust, strengthen the social contract, and enhance the effectiveness of development efforts.

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## Food Insecurity Erodes Trust\*

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## **1. Introduction**

Despite widespread consensus on the importance of trust for long-term social and economic development (e.g., Acemoglu et al., 2001), research has not examined the role of food insecurity—the inability to obtain adequate food in quantity and quality because of a lack of money or other resources—in determining perceptions of trust. Food insecurity threatens both the vertical and horizontal dimensions of trust. Horizontal trust involves trust in friends and family, while vertical trust represents trust in institutions. First, since governments administer programs that are meant to combat food insecurity, their inability to do so may have an impact on vertical trust. Food insecurity is a failure of the social contract. That is, if people obey the law and pay taxes and cooperate for the social good, they expect the state to provide certain goods and services, including food security (OECD, 2013; World Bank, 2019). Trust is critical if this process is to function. Second, food insecurity causes distress and may reduce cooperation, thereby undermining horizontal trust. Food insecurity can affect collective social functioning (Dean and Sharkey, 2011; Dean et al., 2011) through decreases in subjective well-being (Frongillo et al., 2017; 2019) and increases in feelings of deprivation and alienation, and adverse family and social interactions (Wunderlich and Norwood, 2006). On the other hand, food insecurity could motivate civic cooperation and risk-sharing in social networks to strengthen the social safety net (Townsend, 1994; Ambrus et al., 2014), thereby increasing horizontal trust among those who work together. Thus, the link between food insecurity and trust is ambiguous and warrants empirical investigation.

While the prevalence of global food insecurity declined over the last several decades, it has risen every year between 2015 and 2019 (FAO, 2020a) and has almost certainly risen disastrously during the COVID-19 pandemic (FAO, 2020b; Laborde et al., 2020; Smith and Wesselbaum, 2020) and more recently the war in Ukraine. This would have important implications on societal trust – both vertical and horizontal dimensions of trust. In 2014, the Food and Agriculture Organization’s (FAO) Voices of the Hungry project developed an experiential measure of food insecurity called the Food Insecurity Experience Scale (FIES), and contracted Gallup, Inc. to use its Gallup World Poll (GWP) to collect data in over 150 countries (Cafiero et al., 2018). The rich individual-level data in the GWP combined with asking individuals directly about their experiences and behaviors related to their access to food in the FIES module, provides an unprecedented opportunity to examine the relationship between food insecurity and trust globally.

Figure 1. Vertical and horizontal trust and food insecurity by regions and economic development (GNI per capita).

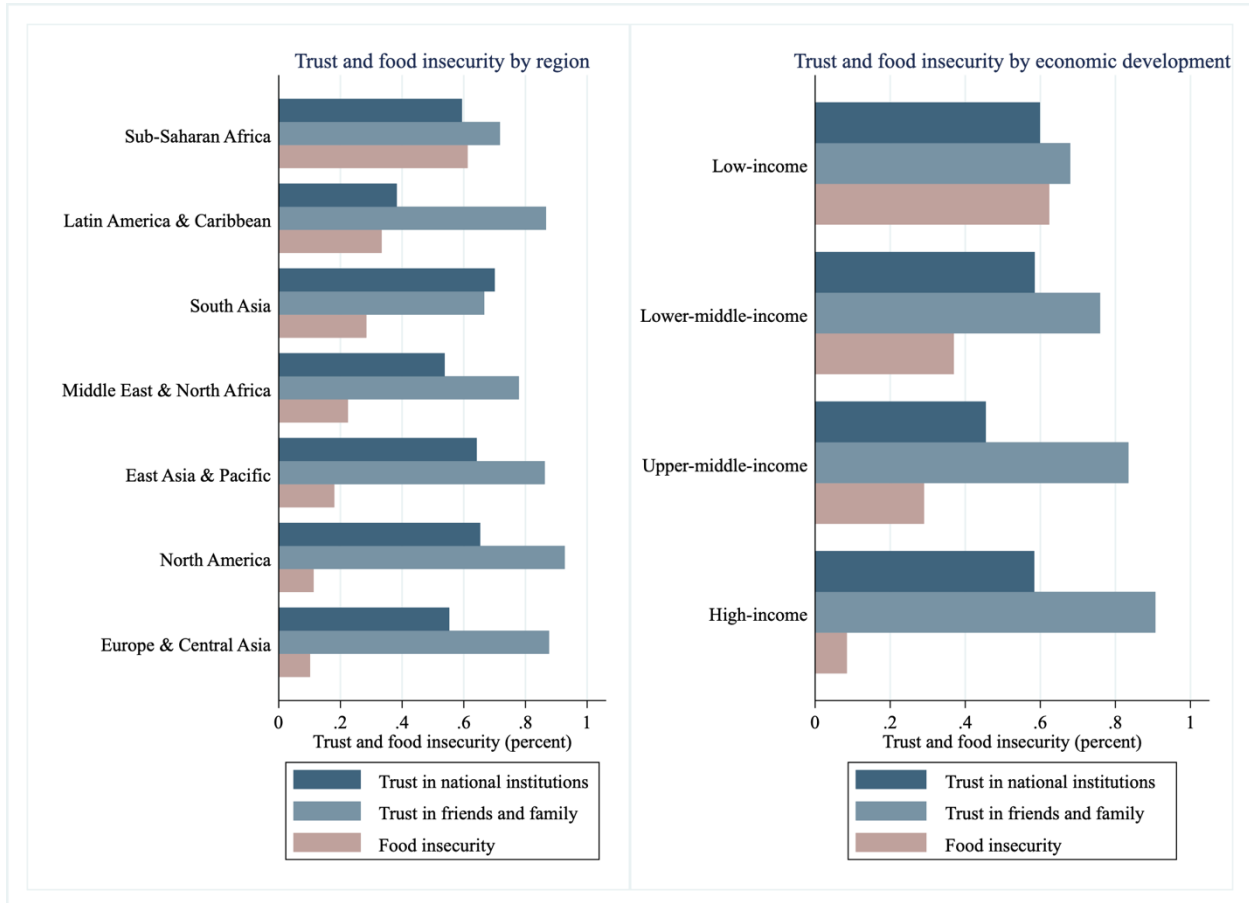


Figure Notes: Means calculated using sample-weighted individual-level data from the 2014-17 Gallup World Poll.

Food insecurity and trust perceptions vary by geographical area and economic development (GNI per capita; Figure 1). The Sub-Saharan Africa region leads the world in experiencing food insecurity (62%). South Asia leads the world in trust in national institutions (69%), followed by North America (67%); trust is lowest in Latin America and the Caribbean (37%). For trust in friends and family, North America leads the world (94%) and it is lowest in South Asia (67%). Low-income countries also have the highest proportion of respondents who trust their national institutions (57%), as well as the lowest proportion of respondents who trust their friends and family (68%).<sup>5</sup>

<sup>5</sup> We measure vertical trust in national institutions (military, judicial system and courts, national government, and electoral honesty) and horizontal trust in friends and family.

Using a series of linear regressions with country fixed effects, and data from the 2014-17 waves of the GWP/FIES, we find that food insecurity is associated with a decrease in both trust in national institutions and trust in friends and family. These findings also apply in all four World Bank income classes of countries. The association with trust in friends and family is larger than any other explanatory variable. For trust in national institutions, the associations of food insecurity increase monotonically with income ranking. For trust in friends and family, the results reveal nonlinear effects of food insecurity as national incomes rise. There are also differences in the determinants of vertical and horizontal trust. For example, rural/urban location strongly determines trust in national institutions, whereas being an immigrant matters more to trust in friends and family. As a robustness check on the possible endogeneity of food insecurity, we use non-parametric entropy matching methods to isolate the relationship between food insecurity and perceptions of trust. While the results may not be considered causal, they remain robust under alternative model specifications.

## 2. Empirical Strategy

### 2.1. Estimation Framework

The baseline model that estimates various forms of trust on our main variable of interest (food insecurity) and other control variables, is given by:

$$Trust_{i,c} = \alpha + FI_{i,c}\beta + X_{i,c}\delta + \gamma_c + \varepsilon_{i,c}, \quad (1)$$

where  $i$  and  $c$  are indices for individuals and countries;  $FI$  represents respondents' food insecurity status, where  $\beta$  represents the correlation of interest;  $X$  consists of individual- and household-level socioeconomic characteristics;  $\gamma$  contains country and year fixed effects; and  $\varepsilon_{i,c}$  represents unobserved individual heterogeneity. The country and year fixed effects remove the cross-sectional variation related to unobserved heterogeneity associated with individuals in each country for each year.

Possible endogeneity may still exist between food insecurity and trust. Food insecurity is not distributed randomly among the population. Observed and unobserved individual factors influence

food insecurity and trust-related behavior. Consequently, the estimates may be biased and inconsistent. Following recent research (Ruysen and Salomone, 2018; Smith and Floro, 2020), we address potential endogeneity issues using a matched sample of food secure and food insecure respondents with identical variable distributions. Entropy matching methods enable us to compare individuals such that, after matching, the only difference between the two subsamples is their food insecurity status. Given the strong correlation between observable and unobservable characteristics, matching on observable characteristics implies at least some matching on unobservable characteristics (Stuart et al., 2010; Ferraro and Miranda, 2014; Ruysen and Salomone, 2018). Matching produces an unbiased measure of the influence of food insecurity on trust if the entropy algorithm captures all relevant differences between individuals who are food insecure and those who are food secure (see Appendix A for more details).

## ***2.2. Data***

The data for the study draws from the 2014-17 waves of the Gallup World Poll, including FAO's FIES. The GWP collects information on individuals' labor force participation, income, educational attainment, future aspirations, subjective well-being, demographic characteristics, and country-identifiers. In most countries, the GWP interviews 1,000 individuals and is nationally representative. Researchers use a random route procedure to select sample households within each country and select the respondent randomly within each household using a Kish grid method (Gallup, 2016). Observations for respondents without valid food insecurity responses or who failed to provide valid information on one or more questions used to construct the control variables were dropped from the sample. The final sample is 387,385 individuals aged 15 years and older in 134 countries.

## ***2.3. Measures of Vertical and Horizontal Trust***

Trust is defined as holding a positive perception about the actions of an individual or an organization (OECD, 2013). Generally, trust has two components: 1) vertical (political) trust, citizens' faith in government and its institutions; and 2) horizontal (social) trust, citizens' interpersonal confidence in their social community (OECD, 2013). Trust is harder to quantify and model formally than traditional economic measures (Barrett, 1997). Despite the difficulty of

formal theoretical and empirical testing, the value of trust to social and economic progress is not diminished (Barrett, 1997).<sup>6</sup>

As a measure of vertical trust, we use GWP's *Trust in National Institutions Index* (NI index). The NI index is composed of four items measuring respondents' trust in key national institutions (Gallup, 2016). Respondents were asked whether they had "*confidence in each of the following, or not?*" with the options of "(1) How about the military? (2) How about the judicial system and courts? (3) How about the national government? and (4) How about the honesty of elections?" Responses were combined into a single index score for each individual. The index is the mean of valid items multiplied by 100, and is only calculated if respondents had two or more out of four valid scores. As a sensitivity check on the NI index, we study each of the four questions independently. We also examine the effects of food insecurity on more local public institutions (as opposed to national institutions or interpersonal levels of trust), using binary measures of trust in the local police and trust in the financial system and local banks. Further, we also use a principal component approach to reduce potential measurement error (Gillen et al., 2019).

For the horizontal dimension of trust, we use respondents' trust in friends and family. This binary measure equals one if the respondent answers positively to the question: "*If you were in trouble, do you have relatives or friends you can count on to help you whenever you need them?*" This measure allows us to test whether food insecurity influences interpersonal relationships and social capital rather than only with authority and formal institutions. People who trust friends or family are also more likely to exhibit altruistic behavior and reciprocity, boosting civic cooperation (Putnam, 2000; Uslaner, 2002; Corbacho et al., 2015).

Both GWP trust measures are translated into different languages and standardized, facilitating worldwide comparability. However, the inherent difficulties in assessing a latent trait like trust persist (Barrett, 1997; OECD, 2013). For example, the GWP's questions measuring trust in national institutions are ultimately subject to ambiguity around respondents' interpretation of the

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<sup>6</sup> Research identifies trust as one of the most crucial pillars upon which the legitimacy and sustainability of social and economic systems are built (Knack and Keefer, 1997; Alesina and La Ferrara, 2002; Barrett, 2005; OECD, 2013, Algan and Cahuc, 2010).



terms “trust” and “confidence” and respondents’ definition of government (OECD, 2013). Cultural factors and societal norms influence how individuals define public institutions, making valid cross-national comparisons of trust difficult (OECD, 2013). These issues affect all trust-related, international surveys. However, this study takes advantage of the detailed information on individual-level food insecurity provided by the FIES. This information, combined with the globally standardized trust-related questions in the GWP, make it possible for the first time to examine the direct impact of food insecurity on both dimensions of trust around the world.

#### ***2.4. Measuring Food Insecurity***

FAO created the FIES to gather consistent and comprehensive information on the prevalence and severity of global food insecurity. The GWP/FAO FIES survey module contains eight questions designed to assess the adequacy of individuals’ access to food, adapted from the long-established United States Household Food Security Survey Module (US HFSSM) and the Latin American and Caribbean Food Security Scale (ELCSA). The FIES survey questions focus on respondents’ behaviors and experiences when they have encountered difficulties in meeting their basic food needs over the past 12 months. Similar to other food insecurity surveys, the FIES questions are ranked by severity. Each question specifies that food insecurity results from a lack of money or other resources to obtain adequate food (see Appendix, Table A1).

In this analysis, we use a binary measure of individuals’ severity of food insecurity. The measure, *food insecurity*, is coded as one if an individual experienced moderate or severe food insecurity in the past 12 months; zero otherwise. This measure captures experiences ranging in severity from a reduction in food quality and variety to the reporting of physiological hunger (Nord et al., 2016; Cafiero et al., 2018).

#### ***2.5. Control Variables***

In line with the literature, we control for other determinants of trust that include individual and household characteristics. These include gender, age, and lifecycle stage (age squared), household composition, marital status, education, income, consumption, location (urban/rural), labor force status, whether or not the respondent is an immigrant, and the respondent’s religiosity. Lastly, we

control for perceptions of corruption in government, quality of infrastructure (satisfied with roads), and if the respondent has had money or property stolen in the past 12 months.<sup>7</sup>

We estimate the model with a varying mix of controls to ensure robustness and avoid using closely related control variables. We have some priors on how these controls could affect trust. For example, education correlates with respondents' expectations of government performance. If respondents' expectations rise faster than the actual performance of governments, trust could decline (Dalton, 2005; OECD, 2013). Previous research has shown married people have higher levels of institutional trust than single people (Hudson, 2006). Household composition can dictate who can participate in civic activities that build interpersonal trust and determines the financial needs of the household. Studies have shown that working people trust national institutions more than the unemployed or those out of the workforce (Mishler and Rose, 2001; Hudson, 2006). In addition, household income is positively related with trust (Leblang et al., 2022).<sup>8</sup> We use GWP's *Per Capita Income Quintile* variable, where the lowest income quintile indicates the respondent's per capita household income lies among the poorest 20% of the country's population, and the highest income quintile indicates it lies among the richest 20% of the country's population.

Citizens' dissatisfaction with public infrastructure may be an important determinant of trust (Mischler and Rose, 2001; Corbacho et al., 2015). Thus, we include the dummy variable *Satisfied with roads*, which equals one if the respondent is satisfied with the roads and highways in their area. Government corruption can determine perceptions of justice and fairness in encounters with national institutions (Corbacho et al., 2015). To control for this, we include a dummy variable for *Corruption in government* which equals one if the respondent thinks that corruption is "widespread throughout the government in this country." Similarly, since crime affects both vertical and horizontal dimensions of trust (Corbacho et al., 2015), we include the dummy variable *Money or property stolen*, which equals one if the respondent has had money or property stolen in the last 12 months.

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<sup>7</sup> Our results are robust to excluding these three variables over concerns that they could also measure some amount of trust.

<sup>8</sup> Respondents who have difficulty answering the income question are presented a set of ranges in local currency and are asked which group they fall into (Gallup, 2016). This measure also relies on multiple imputation methodology to replace missing values.

Likewise, individuals may trust those who are more similar to themselves (i.e., the same social, racial, religious or ethnic group), and may trust others they have known longer (Alesina and La Ferrara, 2002; 2005). Hence, we control for religiosity and immigration status. The country and year fixed effects capture any national-level policies or shocks, such as storms, conflict, and economic downturns, and controls for any changes in the overall trend of trust in a country.

### 3. Results

Table 1 presents the descriptive statistics for trust and food insecurity, as well as mean comparison tests examining differences across economic development rankings.<sup>9</sup> Roughly 53% of individuals trust their national institutions, and roughly 80% trust their friends and family.<sup>10</sup> About 30% of the world’s population experienced food insecurity in 2014-17. The descriptive statistics suggest there are systematic differences between trust and food insecurity depending on economic development. Respondents in low-income countries have higher likelihoods of trust in national institutions, but significantly lower trust in their friends and family. As expected, food insecurity is much more prevalent in low-income countries.

Table 1. Descriptive statistics.

	World sample	Economic development rankings (GNI per capita)			
		Low-income	Lower-middle-income	Upper-middle-income	High-income
<u>Dependent variables</u>					
Trust in national institutions	0.530 (0.367)	0.566 (0.369)	0.564*** (0.371)	0.439*** (0.370)	0.557*** (0.347)
Trust in friends and family	0.803 (0.398)	0.672 (0.469)	0.754*** (0.431)	0.832*** (0.374)	0.902*** (0.298)
<u>Food insecurity variables</u>					
Food insecurity	0.303 (0.460)	0.623 (0.485)	0.348*** (0.476)	0.277*** (0.447)	0.088*** (0.283)
Number of observations	387,385	68,925	106,018	100,397	112,045

<sup>9</sup> Descriptive statistics by regions and economic development and for all control variables are shown in Appendix B.

<sup>10</sup> Sample weights provided by Gallup are used to estimate all descriptive statistics and prevalence rates but are not used in the regression analyses.

*Notes:* Means calculated using sample-weighted individual-level data from the 2014-17 Gallup World Poll. Standard errors are in parentheses. Asterisks indicate whether the difference in means is statistically significantly different from low-income countries at the 0.01 level. Low-income countries are defined as those with a gross national income (GNI) per capita of \$995 or less, lower-middle-income countries are those with a GNI per capita of more than \$996 but less than \$3,895, and upper-middle-income countries are those with a GNI per capita of more than \$3,895 but less than \$12,055, and high-income countries are those with a GNI per capita of more than \$12,055.

The remaining results are from the regression model discussed in section 2. Table 2 examines how food insecurity affects trust in national institutions (vertical trust, column 1) and trust in friends and family (horizontal trust, column 2). The estimates presented are the average marginal effects estimated by the linear model with country and year fixed effects.

Table 2: The effect of food insecurity on vertical and horizontal trust.

Variables	Trust	
	Trust in national institutions	Trust in friends and family
Food insecurity	-0.027*** (0.004)	-0.117*** (0.005)
Female	-0.010*** (0.003)	0.013*** (0.002)
Age	-0.004*** (0.000)	-0.008*** (0.000)
Age squared	0.000*** (0.000)	0.000*** (0.000)
Number of adults	0.001 (0.001)	0.008*** (0.001)
Number of children	0.004*** (0.001)	-0.001* (0.001)
Married or Domestic partner	0.016*** (0.002)	-0.001 (0.003)
Separated Widowed or Divorced	0.001 (0.003)	-0.012*** (0.003)
Secondary education	-0.046*** (0.004)	0.056*** (0.003)
Post-secondary education	-0.039***	0.082***

Variables	Trust	
	Trust in national institutions	Trust in friends and family
	(0.005)	(0.004)
Employed Part Time	-0.014***	-0.017***
	(0.002)	(0.004)
Unemployed	0.001	-0.008*
	(0.003)	(0.004)
Out of workforce	-0.013***	-0.016***
	(0.003)	(0.004)
Second quintile household income	0.005*	0.026***
	(0.003)	(0.003)
Middle quintile household income	0.007**	0.046***
	(0.003)	(0.004)
Fourth quintile household income	0.007*	0.065***
	(0.004)	(0.004)
Richest quintile household income	0.006	0.085***
	(0.005)	(0.005)
Small town or suburb	-0.022***	0.000
	(0.004)	(0.003)
Large city	-0.047***	-0.005
	(0.005)	(0.004)
Satisfied with roads	0.112***	0.020***
	(0.003)	(0.003)
Corruption in government	-0.201***	0.004
	(0.008)	(0.003)
Money or property stolen	-0.048***	-0.017***
	(0.003)	(0.003)
Immigrant	0.000	-0.033***
	(0.007)	(0.005)
Religiosity	0.046***	0.024***
	(0.005)	(0.004)
Country and year fixed effects	<i>yes</i>	<i>yes</i>
Log likelihood	-97827.642	-166327.437
R-squared	0.282	0.124

Variables	Trust	
	Trust in national institutions	Trust in friends and family
Number of Observations	388,602	388,602
Number of Countries	134	134

*Note:* Models estimated using unweighted individual-level data from the 2014-17 Gallup World Poll. Standard errors are in parentheses and clustered by country and robust to heteroskedasticity. Reference categories are single or never married, elementary education, employed full-time, poorest quintile, rural area or farm, and the year 2014. Each model includes country and years fixed effects. \* Significance at the 0.10 level. \*\* Significance at the 0.05 level. \*\*\* Significance at the 0.01 level.

Estimates show that food insecurity is strongly associated with both vertical and horizontal trust among the sample respondents. Trust is lower as the severity of food insecurity is higher. Food insecurity is associated with a decrease in trust in national institutions by 2.7 percentage points and a decrease in trust in friends and family by 11.7 percentage points. This is a sizable effect considering that the average probabilities of trusting national institutions and friends and family are roughly 53% and 80%, respectively. The effect of food insecurity on trust in friends and family is larger than for any other explanatory variable, including government corruption, poor infrastructure, or if the respondent has been robbed. Friends and family have more direct everyday interactions with people than the national government, or other national institutions such as the judiciary, which may explain the differences in magnitudes. These results imply that alleviating food insecurity would have a spillover effect of increasing both types of trust.

Our control variables are well-behaved. For example, being an immigrant is a significant factor for trust in friends and family but is statistically insignificant for trust in institutions. Living in a city, compared to that of a rural area, is a significant factor to trust in institutions but is statistically insignificant to trust in friends and family. Column 2 shows that, controlling for other individual and household characteristics, immigrants are 3.3 percentage points less likely to trust friends and family. This suggests that, controlling for the level of food insecurity, immigrants may have access to less social capital to rely on in times of crisis, than native-born adults. Column 1 shows that, compared to living in a rural area, living in a large city is associated with a 4.7 percentage point decrease in trusting institutions. Putnam (2000) argues that rural areas have more social capital

than urban areas, and therefore those who live in small towns and rural areas have greater trust in acquaintances. Being in the richest quintile of household income, compared to being in the poorest quintile, is associated with an increase in trust in friends and family, but is insignificant to trust in institutions. This follows previous findings on the impact of inequality on trust (Uslaner, 2002; Elgar, 2010; Stephany, 2017).

Women are more likely to have trust in friends and family than men, but less likely to trust in institutions. We find that an increase in the number of children in the household is associated with an increase in trust in institutions but a decrease in trust in friends and family (although the estimate is weakly significant). High levels of education are associated with increases in trust in friends and family but associated with decreases in trust in institutions. Research shows that income and education correlate with interpersonal trust, where a successful professional experience is likely to make individuals more trusting (Knack and Keefer, 1997; Alesina and La Ferrara, 2002; Li et al., 2005; Dincer, 2011). Conversely, if education leads expectations of government performance to rise faster than actual performance, education may diminish trust (Dalton, 2005; OECD, 2013). This illustrates the advantages of examining the two dimensions of trust independently.

The likelihoods of both dimensions of trust decrease with age, but at a decreasing rate, and levels off with middle age (at roughly 40 for national institutions and 58 for friends and family). Table 2 also shows that working less than full-time and experiencing an episode of theft are both associated with decreases in both trust in institutions and trust in friends and family. While being a middle-income household, being satisfied with local infrastructure, and religiosity are all associated with increases in both trust in institutions and in friends and family.

### ***3.1. Heterogeneity by Economic Development***

The relationship between food insecurity and trust varies across rankings of economic development (Table 3). Column 1 presents the results from the total sample, while Columns 2 through 5 represent the sample decomposed into low-income, lower-middle-income, upper-middle-income countries, and high-income (as defined earlier).

Table 3. The effect of food insecurity on vertical and horizontal trust by economic development.

	World sample	Economic development rankings (GNI per capita)			
		Low-income	Lower-middle-income	Upper-middle-income	High-income
<u>Trust in national institutions</u>					
Food insecurity	-0.027*** (0.004)	-0.020*** (0.006)	-0.019*** (0.006)	-0.035*** (0.007)	-0.067*** (0.011)
<u>Trust in friends and family</u>					
Food insecurity	-0.117*** (0.005)	-0.120*** (0.009)	-0.109*** (0.008)	-0.111*** (0.012)	-0.129*** (0.009)
Controls	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>
Number of observations	388,602	69,101	106,410	100,728	112,363

*Notes:* Models estimated using unweighted individual-level data from the 2014-17 Gallup World Poll. Standard errors are in parentheses and clustered by country and robust to heteroskedasticity. Reference categories are single or never married, elementary education, employed full-time, poorest quintile, rural area or farm, and the year 2014. Each model includes country and years fixed effects. Low-income countries are defined as those with a gross national income (GNI) per capita of \$995 or less, lower-middle-income countries are those with a GNI per capita of more than \$996 but less than \$3,895, and upper-middle-income countries are those with a GNI per capita of more than \$3,895 but less than \$12,055, and high-income countries are those with a GNI per capita of more than \$12,055. \* Significance at the 0.10 level. \*\* Significance at the 0.05 level. \*\*\* Significance at the 0.01 level.

We find that each category of food insecurity is associated with a decrease in both dimensions of trust across all levels of development. For trust in national institutions, the associations increase with income ranking, ranging from a 2 percentage-point decrease for low-income countries to a 6.7 percentage-point decrease for high-income countries. This implies that food insecurity has a larger effect on trust in richer countries. For trust in friends and family, the associations are nonlinear, starting at a 12 percentage-point decrease for low-income countries, rising to 11 percentage-point decrease for lower- and upper-middle countries, but then falling back to 12.9 percentage-point decrease in high income countries.



### 3.2. Sensitivity and Robustness Checks

To address the endogeneity issues that may arise from the two-way relationship between food insecurity and trust, we perform a series of robustness and sensitivity checks to validate the results. First, we use entropy matching to create a matched sample of food-secure and food-insecure respondents (Table 4). Table C1 in Appendix C shows that entropy matching perfectly balances the distributions of all covariates.

Table 4. The effect of food insecurity on vertical and horizontal trust: Entropy-matched sample.

	World sample	Economic development rankings (GNI per capita)			
		Low-income	Lower-middle-income	Upper-middle-income	High-income
<u>Trust in national institutions</u>					
Food insecurity	-0.030*** (0.002)	-0.020*** (0.003)	-0.021*** (0.003)	-0.035*** (0.003)	-0.071*** (0.004)
<u>Trust in friends and family</u>					
Food insecurity	-0.119*** (0.002)	-0.128*** (0.005)	-0.112*** (0.004)	-0.113*** (0.004)	-0.127*** (0.005)
Controls	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>
Number of observations	388,602	69,101	106,410	100,728	112,363

*Notes:* Models estimated using entropy-weighted individual-level data from the 2014-17 Gallup World Poll. Standard errors are in parentheses. Reference categories are single or never married, elementary education, employed full-time, poorest quintile, rural area or farm, and the year 2014. Each model includes country and years fixed effects. Low-income countries are defined as those with a gross national income (GNI) per capita of \$995 or less, lower-middle-income countries are those with a GNI per capita of more than \$996 but less than \$3,895, and upper-middle-income countries are those with a GNI per capita of more than \$3,895 but less than \$12,055, and high-income countries are those with a GNI per capita of more than \$12,055. \* Significance at the 0.10 level. \*\* Significance at the 0.05 level. \*\*\* Significance at the 0.01 level.

Column 1 of Table 4 presents the results from the total sample after matching, while Columns 2 through 5 represent the matched sample decomposed into economic development rankings. Overall, the results are very similar when compared to the non-matched sample (Table 3): food insecurity in each income category is associated with a decrease in both dimensions of trust across

all levels of development. The matching results offer robust evidence that food insecurity determines both vertical and horizontal dimensions of trust.

However, while matching methods ensure findings are free of observable bias, it is still possible for unobserved factors to introduce hidden bias. Hidden bias may be caused by unobservable variables that cannot be controlled for in the matching process that simultaneously affect trust and the probability of being food insecure. To explore possible unobserved mechanisms, we examine whether measures of poor health and subject well-being mediate the results discussed above (Table C2, Appendix C). *Health problems* is a binary variable that equals one if the respondent has “any health problems that prevent you from doing any of the things people your age normally can do.” We also use GWP’s *Life Evaluation Index*, which is a categorical measure of respondents’ subjective well-being. The life evaluation index has two items where respondents were asked to place their perceived life status on two ladders that ranged from 0 to 10 corresponding to the worst and best possible life. The first ladder refers to the present and the second ladder refers to the future (i.e., about five years from the present time). The responses were categorized as *Thriving* if they scored 7 or higher on current life score and 8 or higher on future life score; *Suffering* if they scored 4 or lower on current and future life scores; and *Struggling* otherwise (Gallup, 2016).

Overall, Table C2 shows that while experiencing a health problem and poor subjective wellbeing are significant negative factors determining both dimensions of trust, the effects of food insecurity are substantively unchanged from previous results. The coefficient for health problems is statistically insignificant in the total sample but is associated with an increase in trust in national institutions for low-income countries, and a decrease in trust in national institutions in high-income countries. Experiencing a health problem is also negatively associated with trust in friends in family for each income sample. Struggling and suffering, compared to thriving, are strongly negatively associated with both dimensions of trust, across all income classes. While poor health and subjective well-being are clearly important determinants of trust, their inclusion in the model

does not mediate the effect of food insecurity. Thus, there is no evidence that the relationship between food insecurity and trust operates through poor health or subjective well-being.<sup>11</sup>

Next, to test the sensitivity of the institutions index we run the model for each of the four items that make up the index separately (trust in military, judicial and court systems, national government, and honesty of elections) and examine two additional measures of vertical trust: trust in local police and trust in the financial system and local banks (Table C3, Appendix). We find that the associations of food insecurity are stable, ranging from a decrease of 2.3 percentage points for trust in the honesty of elections to a 3.5 percentage-point decrease for trust in the military. It may also be the case that food insecurity impacts trust in local public institutions (at the meso-scale) more than national institutions.<sup>12</sup> To test this hypothesis, we examine the relationship between food insecurity and trust in the local police department and trust in financial institutions and local banks (Columns 5 and 6). We find a significant negative effect of food insecurity on both local public institutions. Interestingly, we find that the magnitude of association at the meso-scale is somewhere between that of trust in friends and family (individual-level) and trust in national institutions (5.2 percentage-point decrease for local police and a 5.7 percentage-point decrease in trust in local banks).

In sum, the sensitivity checks indicate the results are robust. The associations of food insecurity on trust in institutions and trust in friends and family remain relatively unchanged and statistically significant after using entropy matching methods. While health problems and subjective well-being are important determinants of trust, they do not mediate the effect of food insecurity. Additionally, the magnitude of this association is determined by the scale at which trust is measured. Food insecurity has a large significant effect on interpersonal levels of trust (like friends and family), somewhat less impact on local institutions (local police and local banks), and even less of an impact—but still strongly statistically significant—on national institutions (government, elections, judicial system, military). This reveals the importance of interpersonal social networks

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<sup>11</sup> To further account for potential omitted variable bias, we also conducted the Oster (2019) test and found that the delta coefficient is relatively small (<0.4) for all outcome variables, showing that food insecurity is virtually uncorrelated with unobservables. Full results are available upon request.

<sup>12</sup> Bouckaert (2012) argues that trust in government can be analyzed at the macro-level (political institutions), meso-level (policy making), and at the micro-level (people's daily lives).

to alleviating food insecurity (Smith et al., 2017a; 2017b) and the role of local decentralized governance structures.

#### **4. Conclusion**

Trust in institutions is crucial during crises like the COVID-19 pandemic since a lack of trust can impede governments' responses and slow emergency and recovery efforts (OECD, 2013; Bavel et al., 2020; Siegrist and Bearth, 2021). Interpersonal trust is a public good (Ostrom, 1997) based on people's willingness to follow norms and follow institutional health guidelines to prevent pandemics (Johnson et al., 2020). Trust in friends and family is essential for risk-sharing and social networks that protect against shocks, especially in developing countries (Townsend, 1994; Ambrus et al., 2014; Barrett et al., 2022).

Crime, corruption (Clausen et al., 2011), and inequality are well-studied trust factors, but food insecurity is not. We fill this gap in the literature using data from the 2014–2017 Gallup World Poll Survey. In a global sample of 387,385 adults from 134 countries, food insecurity is negatively associated with both vertical (trust in national institutions) and horizontal (trust in friends and family) measures of trust. The probability of trusting in national institutions is 2.7 percentage-points lower among the food insecure. The probability of trusting in friends and family is 11.7 percentage-points lower among the food insecure. The magnitude of the association of food insecurity with trust in friends and family is larger than any other explanatory variable. These relationships also vary significantly by GNI per capita country rankings. As a robustness check, we employ an entropy matching strategy to control for the possible endogeneity of food insecurity. Results remain robust and sensitivity analyses using other measures of trust support our results.

Several limitations are worth mentioning. Since the data are cross-sectional, we are unable to control for unobserved individual heterogeneity and thus some hidden bias may remain. While a robustness check confirms that food insecurity is not mediated by poor health or subjective well-being, other unobservable factors may bias the results. Thus, the estimates are correlational and only reservedly causal under strong assumptions. Additionally, the survey questions on trust could be defined more precisely. GWP respondents are asked about the confidence they have in national government, without first defining “national government.” Some respondents might equate

government with political leadership while others may equate it with the bureaucracy (OECD, 2013).

Food insecurity may act as a multiplier for the pandemic due to its negative economic and health effects (Smith and Wesselbaum, 2020). This paper suggests that food insecurity may exacerbate the pandemic by decreasing vertical and horizontal trust, delaying recovery. In Africa and South Asia, the ongoing conflict in Ukraine has worsened the already grave threat of food insecurity. It is crucial to address food insecurity not only for its immediate humanitarian benefits, but also for the deeper issues of trust, social contract, and stability that are necessary for overall development.

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## Appendix A

### Measuring Food Insecurity

In line with the US HFSSM and ELCSA, an individual's food security status is determined by summing the affirmed FIES responses. This raw score classification is not comparable across countries, however, because the same number of affirmed responses would not necessarily correspond to the same level of severity in different countries. Differences across countries in, for example, languages, livelihood arrangements, and food-related cultural norms and expectations may affect how respondents understand the FIES questions, and, in turn, may affect their responses.

The FAO therefore renders nation-specific scales comparable by creating food insecurity thresholds that partition the continuum of food insecurity into meaningful and comparable ranges of food insecurity, an FIES Global Standard Scale (FIES GSS). To ensure the measured severity of food insecurity is comparable across countries, FAO uses Item Response Theory (i.e., the Rasch model) to equate the food insecurity scales for each country to the FIES Global Standard Scale (FAO, 2016). The FAO equating procedure maintains cross-country comparability by creating two standard food insecurity thresholds: moderate food insecurity and severe food insecurity. The thresholds are adjusted to place each country's scale on the same metric as the global standard. The resulting food security prevalence rates and severity measures are then equivalent and comparable across countries (for more details, see Cafiero et al., 2016).

Individuals whose raw score equals zero are classified as food secure. Individuals with a raw score of at least one and less than the country specific FIES GSS threshold for moderate food insecurity are classified as experiencing mild food insecurity. Those who report a raw score at least equal to the FIES GSS threshold for moderate food insecurity but less than the FIES GSS threshold for severe food insecurity are deemed moderately food insecure. Those above the country specific FIES GSS threshold for severe food insecurity are classified as such. Following the SDG Target 2.1 indicator definition, the prevalence of moderate and severe food insecure individuals represents the sum of those two categories.

## Entropy Matching

Entropy balancing (EB) produces individual weights that are used to reweight the control group so that they have the same sample moments (i.e., mean and variance) as the treatment group (Hainmueller, 2012). EB gives each observation in the treatment group (food insecure) a weight equal to one and each observation in the control group (food secure) is assigned a balancing weight. The EB algorithm first imposes balance constraints on the sample moments of the control variables, and then selects a weighting scheme that minimizes a loss function, as measured by directed entropy divergence. We use the first three moments, namely the mean, variance, and skewness, to ensure the exact balancing of treatment and control groups.

EB offers several advantages over more conventional propensity score methods. First, it is more effective at balancing the treatment and control groups and never produces a worse balance. Propensity score matching on the other hand can improve balance on some covariates by decreasing balance on other covariates. Second, EB is fully nonparametric and does not rely on the functional form assumptions necessary for propensity score models. Third, EB eliminates the need for manual balance checks by researchers since the covariate moments are automatically balanced by the algorithm.

Table A1. Survey Questions: FAO Food Insecurity Experience Scale (FIES)

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Q1. During the last 12 MONTHS, was there a time when You were worried you would not have enough food to eat because of a lack of money or other resources?

Q2. Still thinking about the last 12 MONTHS, was there a time when you were unable to eat healthy and nutritious food because of a lack of money or other resources?

Q3. Was there a time when you ate only a few kinds of foods because of a lack of money or other resources?

Q4. Was there a time when you had to skip a meal because there was not enough money or other resources to get food?

Q5. Still thinking about the last 12 MONTHS, was there a time when you ate less than you thought you should because of a lack of money or other resources?

Q6. Was there a time when your household ran out of food because of a lack of money or other resources?

Q7. Was there a time when you were hungry but did not eat because there was not enough money or other resources for food?

Q8. During the last 12 MONTHS, was there a time when you went without eating for a whole day because of a lack of money or other resources?

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Source: United Nations, Food and Agriculture Organization, Voices of the Hungry project.

## Appendix B

Table B1. Correlation matrix of the trust and food insecurity variables.

Variables	Trust in national institutions	Trust in friends and family	Food insecurity
Trust in national institutions	1.000		
Trust in friends and family	0.030***	1.000	
Food insecurity	-0.045***	-0.220***	1.000

Note: Data from the 2014-17 Gallup World Poll. Asterisks indicate statistical significance of correlations at the 0.01 level.

Table B1 shows the correlations between trust in national institutions, trust in friends and family, and food insecurity. There is a relatively strong negative correlation between both trust measures and food insecurity, but the magnitude of association is much larger for trust in friends and family than for trust in national institutions.

Table B2. Descriptive statistics of control variables.

Variables	World sample	Economic development rankings (GNI per capita).			
		Low-income	Lower-middle-income	Upper-middle-income	High-income
Female	0.502 (0.500)	0.494 (0.500)	0.497 (0.500)	0.506*** (0.500)	0.508*** (0.500)
Age	39.28 (17.45)	33.32 (15.27)	36.11*** (16.11)	39.74*** (17.24)	45.51*** (18.07)
Number of adults	3.310 (1.909)	3.981 (2.376)	3.666*** (1.886)	3.214*** (1.591)	2.649*** (1.632)
Number of children	1.461 (2.115)	3.159 (3.076)	1.718*** (1.975)	1.077*** (1.557)	0.524*** (0.988)
Single	0.325 (0.468)	0.323 (0.468)	0.346*** (0.476)	0.349*** (0.477)	0.286*** (0.452)
Married or Domestic partner	0.569 (0.495)	0.587 (0.492)	0.571*** (0.495)	0.538*** (0.499)	0.585** (0.493)
Separated Widowed or Divorced	0.106 (0.307)	0.0904 (0.287)	0.0835*** (0.277)	0.114*** (0.317)	0.129*** (0.335)
Elementary education	0.390 (0.488)	0.704 (0.457)	0.469*** (0.499)	0.321*** (0.467)	0.187*** (0.390)
Secondary education	0.487 (0.500)	0.271 (0.444)	0.453*** (0.498)	0.545*** (0.498)	0.598*** (0.490)
Post-secondary education	0.123 (0.328)	0.0258 (0.158)	0.078*** (0.268)	0.134*** (0.340)	0.215*** (0.411)
Employed Full Time	0.406 (0.491)	0.356 (0.479)	0.372*** (0.483)	0.405*** (0.491)	0.468*** (0.499)



Variables	Economic development rankings (GNI per capita).				
	World sample	Low-income	Lower-middle-income	Upper-middle-income	High-income
Employed Part Time	0.146 (0.353)	0.188 (0.391)	0.145*** (0.352)	0.148*** (0.355)	0.118*** (0.323)
Unemployed	0.0840 (0.277)	0.144 (0.351)	0.0873*** (0.282)	0.0724*** (0.259)	0.0546*** (0.227)
Out of workforce	0.365 (0.481)	0.312 (0.463)	0.396*** (0.489)	0.374*** (0.484)	0.359*** (0.480)
Poorest quintile household income	0.193 (0.395)	0.192 (0.394)	0.194 (0.396)	0.195 (0.396)	0.191 (0.393)
Second quintile household income	0.199 (0.399)	0.197 (0.398)	0.198 (0.399)	0.199 (0.399)	0.199 (0.399)
Middle quintile household income	0.199 (0.399)	0.201 (0.401)	0.199 (0.399)	0.198 (0.399)	0.200 (0.400)
Fourth quintile household income	0.203 (0.402)	0.204 (0.403)	0.202 (0.401)	0.202 (0.402)	0.203 (0.402)
Richest quintile household income	0.206 (0.405)	0.206 (0.405)	0.207 (0.405)	0.205 (0.404)	0.207 (0.405)
Rural area or farm	0.267 (0.442)	0.435 (0.496)	0.336*** (0.472)	0.239*** (0.427)	0.122*** (0.328)
Small town or suburb	0.446 (0.497)	0.426 (0.495)	0.419*** (0.493)	0.403*** (0.490)	0.524*** (0.499)
Large city	0.287 (0.452)	0.139 (0.346)	0.245*** (0.430)	0.358*** (0.479)	0.353*** (0.478)
Satisfied with roads	0.523	0.350	0.536***	0.486***	0.651***

Variables	Economic development rankings (GNI per capita).				
	World sample	Low-income	Lower-middle-income	Upper-middle-income	High-income
	(0.499)	(0.477)	(0.499)	(0.500)	(0.477)
Corruption in government	0.755	0.778	0.798***	0.826***	0.636***
	(0.430)	(0.416)	(0.402)	(0.379)	(0.481)
Money or property stolen	0.166	0.248	0.173***	0.167***	0.108***
	(0.372)	(0.432)	(0.379)	(0.373)	(0.311)
Immigrant	0.0417	0.0236	0.0131***	0.030***	0.0905***
	(0.200)	(0.152)	(0.114)	(0.171)	(0.287)
Religiosity	0.729	0.937	0.881***	0.742***	0.445***
	(0.445)	(0.243)	(0.324)	(0.438)	(0.497)
Health problems	0.252	0.308	0.271***	0.247***	0.204***
	(0.434)	(0.462)	(0.444)	(0.431)	(0.403)
Thriving	0.262	0.108	0.180***	0.278***	0.414***
	(0.440)	(0.310)	(0.385)	(0.448)	(0.493)
Struggling	0.606	0.689	0.681***	0.583***	0.508***
	(0.489)	(0.463)	(0.466)	(0.493)	(0.500)
Suffering	0.132	0.204	0.139***	0.140***	0.0781***
	(0.339)	(0.403)	(0.346)	(0.347)	(0.268)
Number of observations	388,602	69,101	106,410	100,728	112,363

*Notes:* Means calculated using sample-weighted individual-level data from the 2014-17 Gallup World Poll. Standard errors are in parentheses. Asterisks indicate whether the difference in means is statistically significantly different from low-income countries.

## Appendix C

Table C1: Covariate balancing: differences in means before and after matching.

Matching variable: Food insecurity	Statistics	Before entropy matching			After entropy matching		
		Food security	Food insecurity	Mean difference	Food security	Food insecurity	Mean difference
Female	mean	0.495	0.518	0.023***	0.538	0.538	0.000
	sd	0.500	0.500		0.499	0.499	
	variance	0.250	0.250		0.249	0.249	
	skewness	0.019	-0.071		-0.154	-0.154	
	kurtosis	1.000	1.005		1.024	1.024	
Age	mean	40.319	36.887	-3.432***	37.878	37.906	0.028
	sd	17.846	16.235		16.410	16.346	
	variance	318.484	263.583		269.280	267.188	
	skewness	0.497	0.751		0.700	0.730	
	kurtosis	2.314	2.898		2.721	2.826	
Number of adults	mean	3.210	3.541	0.332***	2.961	2.953	-0.007
	sd	1.795	2.131		1.910	1.922	
	variance	3.220	4.541		3.650	3.693	
	skewness	7.004	3.920		3.181	3.109	
	kurtosis	289.656	99.949		61.453	60.259	
Number of children	mean	1.080	2.335	1.255***	2.103	2.118	0.015
	sd	1.721	2.617		2.486	2.474	
	variance	2.962	6.848		6.183	6.119	
	skewness	8.476	5.265		6.640	6.739	
	kurtosis	345.619	120.223		195.960	191.175	

Matching variable: Food insecurity	Statistics	Before entropy matching			After entropy matching		
		Food security	Food insecurity	Mean difference	Food security	Food insecurity	Mean difference
Single	mean	0.324	0.329	0.005***	0.317	0.317	0.000
	sd	0.468	0.470		0.465	0.465	
	variance	0.219	0.221		0.216	0.216	
	skewness	0.754	0.729		0.788	0.788	
	kurtosis	1.569	1.531		1.621	1.621	
Married or domestic partner	mean	0.575	0.556	-0.019***	0.541	0.541	0.000
	sd	0.494	0.497		0.498	0.498	
	variance	0.244	0.247		0.248	0.248	
	skewness	-0.304	-0.226		-0.166	-0.166	
	kurtosis	1.092	1.051		1.028	1.028	
Separated widowed or divorced	mean	0.101	0.115	0.014***	0.142	0.142	0.000
	sd	0.302	0.319		0.349	0.349	
	variance	0.091	0.102		0.122	0.122	
	skewness	2.640	2.413		2.052	2.052	
	kurtosis	7.971	6.822		5.211	5.211	
Elementary education	mean	0.301	0.596	0.295***	0.530	0.530	0.000
	sd	0.459	0.491		0.499	0.499	
	variance	0.210	0.241		0.249	0.249	
	skewness	0.868	-0.392		-0.121	-0.121	
	kurtosis	1.753	1.154		1.015	1.015	
Secondary education	mean	0.539	0.367	-0.171***	0.421	0.421	0.000
	sd	0.499	0.482		0.494	0.494	
	variance	0.249	0.232		0.244	0.244	

Matching variable: Food insecurity	Statistics	Before entropy matching			After entropy matching		
		Food security	Food insecurity	Mean difference	Food security	Food insecurity	Mean difference
Completed four years beyond hs	skewness	-0.155	0.550		0.322	0.322	
	kurtosis	1.024	1.303		1.104	1.104	
	mean	0.160	0.036	-0.124***	0.049	0.049	0.000
	sd	0.367	0.187		0.216	0.216	
	variance	0.135	0.035		0.047	0.047	
Employed full time	skewness	1.851	4.949		4.169	4.170	
	kurtosis	4.426	25.495		18.384	18.385	
	mean	0.432	0.345	-0.087***	0.350	0.350	0.000
	sd	0.495	0.475		0.477	0.477	
	variance	0.245	0.226		0.227	0.227	
Employed part time	skewness	0.275	0.652		0.630	0.630	
	kurtosis	1.076	1.425		1.397	1.397	
	mean	0.125	0.194	0.070***	0.192	0.192	0.000
	sd	0.330	0.396		0.394	0.394	
	variance	0.109	0.156		0.155	0.155	
Unemployed	skewness	2.274	1.546		1.564	1.564	
	kurtosis	6.171	3.390		3.447	3.447	
	mean	0.064	0.129	0.065***	0.129	0.129	0.000
	sd	0.245	0.335		0.335	0.335	
	variance	0.060	0.113		0.112	0.112	
Out of workforce	skewness	3.552	2.210		2.216	2.216	
	kurtosis	13.616	5.885		5.909	5.909	
Out of workforce	mean	0.379	0.331	-0.048***	0.329	0.329	0.000

Matching variable: Food insecurity	Statistics	Before entropy matching			After entropy matching		
		Food security	Food insecurity	Mean difference	Food security	Food insecurity	Mean difference
	sd	0.485	0.471		0.470	0.470	
	variance	0.235	0.222		0.221	0.221	
	skewness	0.498	0.716		0.726	0.726	
	kurtosis	1.248	1.513		1.527	1.527	
Poorest quintile household income	mean	0.155	0.281	0.126***	0.244	0.244	0.000
	sd	0.362	0.450		0.429	0.429	
	variance	0.131	0.202		0.184	0.184	
	skewness	1.907	0.974		1.194	1.194	
	kurtosis	4.636	1.949		2.426	2.426	
Second quintile household income	mean	0.182	0.236	0.054***	0.217	0.217	0.000
	sd	0.386	0.425		0.412	0.412	
	variance	0.149	0.180		0.170	0.170	
	skewness	1.646	1.243		1.376	1.376	
	kurtosis	3.711	2.545		2.892	2.892	
Middle quintile household income	mean	0.200	0.198	-0.002	0.198	0.198	0.000
	sd	0.400	0.399		0.399	0.399	
	variance	0.160	0.159		0.159	0.159	
	skewness	1.502	1.516		1.514	1.514	
	kurtosis	3.255	3.297		3.293	3.293	
Fourth quintile household income	mean	0.219	0.165	-0.054***	0.182	0.182	0.000
	sd	0.414	0.371		0.386	0.386	
	variance	0.171	0.138		0.149	0.149	
	skewness	1.358	1.806		1.652	1.652	

Matching variable: Food insecurity	Statistics	Before entropy matching			After entropy matching		
		Food security	Food insecurity	Mean difference	Food security	Food insecurity	Mean difference
	kurtosis	2.844	4.262		3.728	3.728	
Richest quintile household income	mean	0.244	0.120	-0.124***	0.160	0.160	0.000
	sd	0.429	0.325		0.366	0.366	
	variance	0.184	0.106		0.134	0.134	
	skewness	1.193	2.340		1.856	1.856	
Rural area or farm	kurtosis	2.423	6.476		4.446	4.446	
	mean	0.231	0.347	0.116***	0.335	0.335	0.000
	sd	0.422	0.476		0.472	0.472	
	variance	0.178	0.227		0.223	0.223	
	skewness	1.273	0.642		0.697	0.697	
Small town or suburb	kurtosis	2.622	1.413		1.486	1.486	
	mean	0.450	0.438	-0.013***	0.438	0.438	0.000
	sd	0.498	0.496		0.496	0.496	
	variance	0.248	0.246		0.246	0.246	
	skewness	0.200	0.251		0.249	0.249	
Large city	kurtosis	1.040	1.063		1.062	1.062	
	mean	0.318	0.215	-0.103***	0.226	0.226	0.000
	sd	0.466	0.411		0.419	0.419	
	variance	0.217	0.169		0.175	0.175	
	skewness	0.780	1.386		1.307	1.307	
Satisfied with roads	kurtosis	1.609	2.922		2.709	2.709	
	mean	0.570	0.417	-0.153***	0.419	0.419	0.000
	sd	0.495	0.493		0.493	0.493	

Matching variable: Food insecurity	Statistics	Before entropy matching			After entropy matching		
		Food security	Food insecurity	Mean difference	Food security	Food insecurity	Mean difference
Corruption in government	variance	0.245	0.243		0.243	0.243	
	skewness	-0.282	0.338		0.327	0.327	
	kurtosis	1.080	1.114		1.107	1.107	
	mean	0.732	0.808	0.077***	0.813	0.813	0.000
	sd	0.443	0.394		0.390	0.390	
	variance	0.196	0.155		0.152	0.152	
	skewness	-1.047	-1.567		-1.602	-1.602	
Money or property stolen	kurtosis	2.096	3.457		3.567	3.567	
	mean	0.128	0.254	0.126***	0.252	0.252	0.000
	sd	0.334	0.435		0.434	0.434	
	variance	0.111	0.189		0.189	0.189	
	skewness	2.230	1.132		1.140	1.140	
	kurtosis	5.974	2.281		2.299	2.299	
	mean	0.048	0.028	-0.020***	0.028	0.028	0.000
Immigrant	sd	0.213	0.164		0.166	0.166	
	variance	0.045	0.027		0.028	0.028	
	skewness	4.240	5.747		5.686	5.686	
	kurtosis	18.979	34.027		33.335	33.335	
	mean	0.667	0.869	0.202***	0.875	0.875	0.000
	sd	0.471	0.337		0.331	0.331	
	variance	0.222	0.114		0.109	0.109	
Religiosity	skewness	-0.710	-2.192		-2.268	-2.268	
	kurtosis	1.504	5.807		6.142	6.142	



Matching variable: Food insecurity	Statistics	Before entropy matching			After entropy matching		
		Food security	Food insecurity	Mean difference	Food security	Food insecurity	Mean difference
Observations	n	274,166	114,436		274,166	114,436	

*Note:* Entropy matching for food insecurity.

Table C2: The effect of food insecurity on vertical and horizontal trust: Experiential well-being and health problems.

	World sample	Economic development rankings (GNI per capita)			High-income
		Low-income	Lower-middle-income	Upper-middle-income	
<u>Trust in national institutions</u>					
Food insecurity	-0.020*** (0.003)	-0.021*** (0.006)	-0.015** (0.006)	-0.024*** (0.006)	-0.053*** (0.009)
Health problems	-0.001 (0.002)	0.019*** (0.006)	0.000 (0.004)	-0.001 (0.004)	-0.017*** (0.003)
Struggling	-0.046*** (0.003)	-0.030*** (0.008)	-0.035*** (0.006)	-0.048*** (0.006)	-0.044*** (0.004)
Suffering	-0.093*** (0.006)	-0.050*** (0.010)	-0.079*** (0.011)	-0.118*** (0.010)	-0.102*** (0.012)
<u>Trust in friends and family</u>					
Food insecurity	-0.097*** (0.005)	-0.105*** (0.009)	-0.093*** (0.008)	-0.083*** (0.010)	-0.100*** (0.008)
Health problems	-0.041*** (0.005)	-0.062*** (0.009)	-0.033** (0.012)	-0.043*** (0.007)	-0.030*** (0.005)
Struggling	-0.040*** (0.003)	-0.037*** (0.008)	-0.049*** (0.007)	-0.041*** (0.004)	-0.037*** (0.004)
Suffering	-0.163*** (0.007)	-0.142*** (0.010)	-0.161*** (0.010)	-0.182*** (0.013)	-0.171*** (0.022)
Controls	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>
Number of observations	359,330	64,228	96,609	91,115	107,378

*Notes:* Models estimated using entropy-weighted individual-level data from the 2014-17 Gallup World Poll. Standard errors are in parentheses. References categories are single or never married, elementary education, employed full-time, poorest quintile, rural area or farm, and the year 2014. Each model includes country and years fixed effects. Low-income countries are defined as those with a gross national income (GNI) per capita of \$995 or less, lower-middle-income countries are those with a GNI per capita of more than \$996 but less than \$3,895, and upper-middle-income countries are those with a GNI per capita of more than \$3,895 but less than \$12,055, and high-income countries are those with a GNI per capita of more than \$12,055. \* Significance at the 0.10 level. \*\* Significance at the 0.05 level. \*\*\* Significance at the 0.01 level.

Table C3: The effect of food insecurity on vertical and horizontal trust: Robustness checks

Variables	Robustness checks					
	Trust in national institutions				Trust in financial institutions and local	
	Trust in military	Trust in judicial system and courts	Trust in national government	Trust in honesty of elections	Trust in local police	banks
Food insecurity	-0.035*** (0.004)	-0.030*** (0.005)	-0.031*** (0.004)	-0.023*** (0.005)	-0.052*** (0.004)	-0.057*** (0.005)
Controls	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>
Country fixed effects	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>	<i>yes</i>
Log likelihood	-190971.89	-227545.45	-221680.61	-220973.53	-221942.74	-226810.97
R-squared	0.166	0.192	0.231	0.217	0.153	0.167
Number of Observations	361,535	367,510	372,799	366,142	373,915	367,258

*Note:* Models estimated using unweighted individual-level data from the 2014-17 Gallup World Poll. Standard errors are in parentheses and clustered by country and robust to heteroskedasticity. References categories are single or never married, elementary education, employed full-time, poorest quintile, rural area or farm, and the year 2014. Each model includes country and years fixed effects. \* Significance at the 0.10 level. \*\* Significance at the 0.05 level. \*\*\* Significance at the 0.01 level.