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Featured Article

Map the Meal Gap: Exploring Food Insecurity at the Local Level

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Abstract *The burgeoning food insecurity literature in the United States has provided a portrait of the causes and consequences of food insecurity. One underexplored aspect is the spatial diversity in food insecurity across the United States. In response, Feeding America has been releasing annual county-level food insecurity estimates since 2010. In this article, we describe the methods underlying these estimates, followed by answers to the following: What are the state-level determinants of food insecurity? What is the distribution of food insecurity across counties in the United States? How do the county-level food insecurity estimates generated in* Map the Meal Gap *compare with other sources?*

Key words: Food insecurity, Hunger, Poverty.

JEL codes: D12, I1, I3.

Food insecurity is a serious challenge facing millions of Americans. In 2012, 49 million persons in the United States lived in households classified as food insecure (Coleman-Jensen, Nord, and Singh 2013). These rates have soared to unprecedented levels, having increased by more than one-third since 2007. The prevalence of food insecurity is of great concern to policymakers and program administrators, a concern heightened by its many demonstrated negative health consequences. (See Gundersen, Kreider, and Pepper 2011 for a list of relevant studies.) The alleviation of food insecurity is the central goal of the Supplemental Nutrition Assistance Program (SNAP), the largest food assistance program in the United States. Along with SNAP, food assistance is provided through Feeding America's network of member food banks and other federal programs. Due in large part to food insecurity's status as one of the most important and high-profile nutrition-related public health issues in the United States today, a vast body of literature has emerged on the topic. (For a recent review, see Gundersen 2013.)

A challenge facing Feeding America's network of food banks and other organizations is how best to target scarce resources to areas most-in-need. Although some exploratory findings on sub-state spatial diversities in food security exist, including the Food Research and Action Center (FRAC)'s food hardship report and the California Health Interview Survey, these data do not provide county-level information across the United States based on the standardized Core Food Security Module developed by the USDA. In response to the dearth of local-level measures of need, Feeding America began releasing estimates of food insecurity at the county level for all counties in the United States in 2010 through a large-scale effort titled *Map the Meal Gap*.[1] In this article, we concentrate on the county-level food insecurity estimates. Briefly, these estimates were derived using a two-step process. First, the relationships between various factors (e.g., the unemployment rate) and food insecurity were estimated at the state level. These relationships were developed using data primarily from post − 2001 December Supplements from the Current Population Survey (CPS). Second, using the coefficients estimated in the first step and the same variables defined at the county level, estimates of the extent of food insecurity for all counties were established. This imputation method primarily used county-level information from the American Community Survey (ACS). This approach was then repeated for income categories, which parallel eligibility criteria for SNAP. A similar approach was used to define food insecurity in households with children. Both the overall and child population estimates were greeted with a great deal of attention from the media, policymakers, and program administrators. In addition, *Map the Meal Gap* is being used as a new tool by Feeding America's member food banks for targeting programs, tailoring food distribution programs, and framing strategic planning and goals.

In this article, we consider three key questions that are central to the development of *Map the Meal Gap*: What are the state-level determinants of food insecurity (full population and households with children)? What is the distribution of estimated food insecurity rates across counties in the United States? How do the county-level food insecurity estimates generated in *Map the Meal Gap* compare with those from other sources?

Methods

We demonstrate how we estimate food insecurity rates at the county level. Before doing so, we briefly define food insecurity and how it is measured in the United States.

The Core Food Security Module (CFSM) was established in 1996 as a means of establishing the food insecurity status of a household.[2] The measure is based on a set of eighteen questions for households with children and ten questions for households without children. Examples of questions include: "I worried whether our food would run out before we got money to buy more," (the least severe item); "Did you or the other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food?"; "Were you ever hungry but did not eat because you couldn't afford enough food?"; and "Did a child in the

[1] *The work also included estimates of the food budget shortfall reported by food-insecure households (i.e., the "meal gap") and estimates of county-level meal costs. We do not cover these in this article.*
[2] *It underwent some changes after 1996 but has remained unchanged since 2001.*

household ever not eat for a full day because you couldn't afford enough food?" (the most severe item for households with children). (A complete list of questions can be found in Coleman-Jensen, Nord, and Singh 2013.) Each question is qualified by the stipulation that the outcomes are due to financial issues.

Households are then delineated into official food insecurity categories (as defined by the USDA) based on responses from the CFSM. This is under the assumption that the number of affirmative responses reflects the level of food hardship experienced by the family. The following thresholds have been established: (i) food security (all household members had access at all times to enough food for an active, healthy life); (ii) low food security (at least some household members were uncertain of having enough food because they had insufficient money and other resources for food); and (iii) very low food security (one or more household members were hungry, at least some time during the year, because they could not afford enough food). A household is said to be food insecure if it falls into the second or third category.[3]

For *Map the Meal Gap*, we begin by establishing the extent of food insecurity for each state for each year from 2001 to 2012. The set of questions used to identify whether someone is food insecure (i.e., living in a food-insecure household) are defined at the household level. Our state-level measures of food insecurity are defined at the person level, where persons are defined as food insecure if they live in a food-insecure household. This is consistent with how the measures of food insecurity at the person level are delineated in the official USDA report (see, e.g., Coleman-Jense, Nord, and Singh 2013, Table 1A). Although some work has examined state-level variation in food insecurity (see, e.g., Edwards, Weber, and Bernell 2007; Ryu and Slottje 1999; Tapogna et al. 2004), this work is the first to use the approach described in this article and for the purposes of generating community-level estimates for needs assessment and planning.

With these state-level food insecurity rates, we estimate the following model:

$$\begin{aligned} FI_{st} = {} & \alpha + \beta_{UN} UN_{st} + \beta_{POV} POV_{st} + \beta_{MI} MI_{st} + \beta_{HISP} HISP_{st} \\ & + \beta_{BLACK} BLACK_{st} + \beta_{OWN} OWN_{st} + \mu_t + \upsilon_s + \varepsilon_{st} \end{aligned} \quad (1)$$

where s is a state, t is year, UN is the unemployment rate, POV is the poverty rate, MI is median income, HISP is the percentage Hispanic, BLACK is the percentage black, OWN is the percentage of persons living in owned (rather than rented) housing units, μ_t is a year fixed effect, υ_s is a state fixed effect, and ε_{st} is an error term.[4] This model is estimated using state-level population weights based on the CPS December Supplement household weight.

Our estimates of the proportion of children in food-insecure households also use equation (1), except that poverty, median income, percentage Hispanic, percentage black, and homeownership are all defined for households with children. The unemployment rate, however, continues to be defined for all persons because unemployment rates defined for households with children are not available in the ACS.

[3]*In* Map the Meal Gap *analyses, we provide estimates based on food insecurity. Although the methods could also be used to calculate estimates of very low food security, we do not do so at this time.*
[4]*Before* Map the Meal Gap *2013, the homeownership variable was not included in the models.*

Table 1 Estimates of the Impact of Various Factors on Food Insecurity at the State Level, Using CPS Data, 2001–2012

Variable	Coefficient (S.E.) All persons	Coefficient (S.E.) Children
Poverty rate	0.186**	0.301**
	(0.055)	(0.072)
Unemployment rate	0.506**	0.600**
	(0.108)	(0.208)
Median income	−0.002	−0.002
	(0.002)	(0.004)
Percentage Hispanic	−0.071	−0.000
	(0.069)	(0.070)
Percentage black	0.094	−0.131
	(0.071)	(0.077)
Percentage homeownership	−0.106*	−0.056
	(0.042)	(0.055)
2002 (year fixed effect)	0.000	−0.003
	(0.003)	(0.007)
2003 (year fixed effect)	0.003	−0.000
	(0.004)	(0.009)
2004 (year fixed effect)	0.013**	0.008
	(0.004)	(0.008)
2005 (year fixed effect)	0.008*	−0.006
	(0.004)	(0.008)
2006 (year fixed effect)	0.012**	−0.001
	(0.003)	(0.007)
2007 (year fixed effect)	0.017**	0.005
	(0.004)	(0.008)
2008 (year fixed effect)	0.040**	0.044**
	(0.004)	(0.008)
2009 (year fixed effect)	0.025**	0.027*
	(0.006)	(0.012)
2010 (year fixed effect)	0.020**	−0.000
	(0.006)	(0.013)
2011 (year fixed effect)	0.020**	−0.003
	(0.006)	(0.012)
2012 (year fixed effect)	0.021**	0.003
	(0.005)	(0.011)
Constant	0.142**	0.154**
	(0.034)	(0.048)

*$p < 0.05$; **$p < 0.01$.

Our choice of variables was first guided by the literature on the determinants of food insecurity; we included variables that have been found to influence the probability of someone being food insecure. A vast literature has shown in studies using cross-sectional data that the following factors are associated with food insecurity: lack of financial management skills (Gundersen and Garasky 2012), a household head who is American Indian (Gundersen 2008), being at high risk of homelessness (Gundersen et al. 2003), not receiving child support (Garasky and Stewart 2007), having a noncustodial father who does not visit regularly (Garasky and Stewart 2007), lack of access to social capital (Martin et al. 2004), summertime (Nord and

Ronig 2006), being in a state with higher-than-average unemployment rates (Bartfeld and Dunifon 2006), facing high food prices (Gregory and Coleman-Jensen 2013), and having a cigarette smoker in the home (Cutler-Triggs et al. 2008). In studies using panel datasets, the following dynamic factors have been associated with being at higher risk of food insecurity: negative income shocks, lack of assets, changes in household composition, and becoming unemployed (Gundersen and Gruber 2001; Guo 2011; Leete and Bania 2010; Ribar and Hamrick 2003); declines in mental health status and limited financial buffers (Heflin, Corcoran, and Siefert 2007; Heflin and Butler 2013); and declines in general health, declines in the number of adults, increases in the number of children, and increases in domestic violence (Heflin and Butler 2013). In addition, the work of Coleman-Jensen, Nord, and Singh (2013) has shown that those with lower incomes, blacks, Hispanics, and nonhomeowners all have higher rates of food insecurity than those not falling into these categories. Ideally, we would like to include a wide array of these variables. However, we are constrained with our methods to only include those that are available both in the CPS and at the county level in the ACS and Bureau of Labor Statistics. One potential drawback to this approach is that we are unable to reflect local-level efforts to reduce food insecurity (Morton et al. 2005).

Of course, the variables we use do not portray everything that could potentially affect food insecurity rates, including some of the factors mentioned above. In response, we include the variables for state and year fixed effects, which allow us to control for all other observed and unobserved influences on food insecurity.

We use the coefficient estimates from step 1 plus information on the same variables defined at the county level to generate estimated food insecurity rates for individuals defined at the county level. This can be expressed in the following equation:

$$\begin{aligned} FI^{*}_{cs} = \widehat{\alpha} + \widehat{\beta_{UN}} UN_{cs} + \widehat{\beta_{POV}} POV_{cs} + \widehat{\beta_{MI}} MI_{cs} + \widehat{\beta_{HISP}} HISP_{cs} \\ + \widehat{\beta_{BLACK}} BLACK_{cs} + \widehat{\beta_{OWN}} OWN_{cs} + \widehat{\mu_{T}} + \widehat{v_{s}} \end{aligned} \quad (2)$$

where c denotes a county and T denotes the year from which the county-level variables are defined. From our estimation of equation (2), we calculate both food insecurity rates and the number of food-insecure persons in a county. The latter is defined as FI^{*}_{cs} *N_{cs} where N is the number of persons. A similar method is used for children in food-insecure households.[5]

Data

The information at the state level (i.e., the information used to estimate equations (1)) is derived from the CFSM in the December Supplement of the

[5] *In* Map the Meal Gap, *we further derive food insecurity estimates by income categories. For all individuals, we consider breakdowns for less than the state-specific gross-income SNAP threshold, between the SNAP threshold and 185% of the poverty line (when the threshold is less than that level), and greater than 185% of the poverty line (or, if it is higher, the SNAP threshold). For all children in food-insecure households, food insecurity estimates for less than and greater than 185% of the poverty line are derived. This cutoff is chosen because it is the cutoff for eligibility for reduced-price meals through the National School Lunch Program and for eligibility for the Special Supplemental Nutrition Program for Women, Infants, and Children. We do not cover these results here.*

CPS for the years 2001–2012. Although the CFSM has been on the CPS since 1996, it was previously on months other than December. To avoid issues of seasonality and changes in various other aspects of survey design (e.g., the screening questions), only the data for years from 2001 onward are used.

The CPS is a nationally representative survey conducted by the Census Bureau for the Bureau of Labor Statistics, providing employment, income, and poverty statistics. In December of each year, fifty thousand households respond to a series of questions, including the CFSM and questions about food spending and the use of government and community food assistance programs. Households are selected to be representative of civilian households at the state and national levels; thus information on individuals living in group quarters, including nursing homes or assisted living facilities, is not included. Using information on all persons in the CPS from which we had information on (i) income and (ii) food insecurity status, we aggregated information up to the state level for each year to estimate equation (1).[6] We did so in a similar manner when looking at children, although the unemployment rate is the same for both samples.

For information at the county level (i.e., the information used to estimate equation (2)), we used information from the 2008–2012 five-year ACS estimates. The ACS is a sample survey of 3 million addresses administered by the Census Bureau. In order to provide estimates for areas with small populations, this sample was accumulated over a 5-year period. Information about unemployment at the county level was taken from information from the Bureau of Labor Statistics' labor force data by county, 2012 annual averages. In 2012, all counties provided by the Census Bureau were included in the analysis.

Results

We consider two broad sets of results. We first discuss the determinants of food insecurity for the full population of persons and for children living in food-insecure households. We then present the distribution of food insecurity rates within each state.

Determinants of Food Insecurity at the State Level

The results of the estimation of equation (1) can be found in column 1 of table 1 for the full population and in column 2 for children. We emphasize four findings from the results for all persons. First, as expected, the effects of unemployment and poverty are especially strong, with unemployment having a slightly stronger impact. Evaluated at mean levels, a 1% increase in the unemployment rate leads to a 0.24% increase in food insecurity, whereas a 1% increase in the poverty rate leads to a 0.20% increase in food insecurity. Second, the proportion of a state's population that is Hispanic or black and median income have no statistically significant effect on the food insecurity rate. This is primarily because of the small changes that occur over time at the state level in these variables. Third, states with higher

[6]*In the CPS, approximately 15% of households in any given year do not report their incomes on the December Supplement. These households are not included when the state-level aggregations are created because, as noted, we also have breakdowns based on income status and two of the variables in our model—poverty rates and median incomes—rely on income reports.*

proportions of homeowners have lower rates of food insecurity. The effect is strong: evaluated at mean levels for the full population, a 1% decrease in the proportion of a state's population that are homeowners leads to a 0.46% increase in food insecurity. Fourth, at least as reflected in the variables used to predict food insecurity in our models, the substantial rise in food insecurity from 2008 through 2012 was unexpected. This can be seen in the distinctly larger coefficients on the year fixed effects in these years, with an especially pronounced increase in 2008.[7] Of potential interest, however, is that the statistically significantly positive year fixed effects began in 2004.

The results for children are shown in column 2 of table 1. In our discussion here, we first concentrate on how the results compare with those for all individuals. First, as with all individuals, the effects of poverty and unemployment are statistically significant and substantial. Second, in contrast with the full population, the effect of child poverty rates, as measured by elasticities, is stronger than unemployment. Using the averages for all years, elasticity with respect to the poverty rate is 0.26, and the elasticity with respect to the unemployment rate is 0.19. Second, although the effect of homeownership is, as expected, negative, it is statistically insignificant. Third, with the exception of 2008, the year fixed effects are statistically insignificant. One interpretation is that the observed factors, including state fixed effects, explain more of the variation in the food insecurity estimates for children in food-insecure households in comparison with those for the full population.

Food Insecurity Estimates at the County Level

We now turn to a discussion of the geographic differences in food insecurity across the United States. In column 1 of table 2, we display the food insecurity estimates for all individuals for each state within our estimates. State-level food insecurity estimates vary from a low of 7.7% in North Dakota to a high of 22.3% in Mississippi.[8]

The dispersion among counties is, by definition, even more pronounced. This can be seen by a comparison of columns 2 and 3 where, for each state, we list the highest and lowest food insecurity estimates. The food insecurity estimates range from 3.9% in Slope County, North Dakota, to 32.8% in Humphreys County, Mississippi. Another point regarding dispersion of food insecurity estimates found in comparing columns 2 and 3 is that the county with the highest food insecurity estimate in some states still has a lower food insecurity estimate than the county with the lowest food insecurity estimate in other states. To give the first example of this comparison seen in the table, the highest rate for a county in Connecticut (14.4% in New Haven County) is still lower than the lowest rate for a county in Arizona (15.3% in Pinal County).

In column 4, we further illustrate the geographic dispersion in food insecurity estimates across counties, this time by looking within states.[9] The two states with the widest gaps are Louisiana (East Carroll Parish, 29.8%;

[7] *The omitted year is 2001.*

[8] *These estimates are based on the state-level estimates generated through* Map the Meal Gap *rather than the actual annual food insecurity estimates that can be derived from the CPS.*

[9] *Within-state comparisons are useful for many reasons. One technical reason emerging from our estimation strategy is that food insecurity rates are normalized to some extent by the inclusion of the state fixed effects.*

Table 2 Differences in *Map the Meal Gap* Food Insecurity Estimates by State and by Counties within States, 2012

State	Average food insecurity rate (%)	Highest county food insecurity rate (%)	Lowest county food insecurity rate (%)	Difference
AK	14.0	24.6	11.4	13.2
AL	18.6	29.5	10.5	19.0
AR	19.4	29.1	13.6	15.5
AZ	17.8	25.7	15.3	10.5
CA	16.2	22.7	11.4	11.3
CO	14.6	17.5	9.9	7.6
CT	13.9	14.4	10.5	3.9
DC	14.5	14.0	14.0	0.0
DE	13.0	12.8	10.7	2.1
FL	17.9	23.2	12.6	10.7
GA	18.9	28.1	8.4	19.7
HI	14.2	20.6	12.9	7.8
IA	12.7	15.2	9.2	6.0
ID	15.8	20.9	12.1	8.8
IL	14.2	21.7	7.6	14.0
IN	15.7	19.2	9.8	9.4
KS	14.8	19.2	7.7	11.5
KY	16.7	23.2	9.7	13.5
LA	16.9	29.8	7.2	22.6
MA	11.9	16.7	8.5	8.2
MD	13.1	22.6	7.1	15.6
ME	15.5	17.6	12.9	4.7
MI	16.8	21.3	10.0	11.3
MN	10.7	32.8	14.1	18.7
MO	17.1	14.0	6.8	7.2
MS	22.3	25.6	11.2	14.5
MT	14.6	19.8	9.9	9.9
NC	18.6	26.4	12.2	14.2
ND	7.7	17.6	3.9	13.7
NE	13.4	17.1	9.1	7.9
NH	10.9	12.5	8.8	3.8
NJ	13.0	19.2	7.1	12.0
NM	18.6	22.9	11.8	11.1
NV	16.8	17.8	9.2	8.6
NY	14.1	21.8	6.1	15.7
OH	17.2	19.9	9.4	10.5
OK	17.2	20.5	11.4	9.0
OR	16.7	18.2	11.1	7.1
PA	14.3	22.1	9.5	12.7
RI	14.7	16.7	11.6	5.1
SC	18.0	29.4	12.4	16.9
SD	12.3	25.6	8.6	17.0
TN	17.1	22.4	8.9	13.5
TX	18.3	23.7	9.8	13.9
UT	15.5	20.0	11.6	8.4
VA	12.1	26.0	5.2	20.8
VT	13.4	14.2	10.9	3.3
WA	15.0	19.6	12.5	7.2
WI	12.6	18.1	7.9	10.1
WV	15.0	19.4	10.3	9.1
WY	13.0	17.1	9.3	7.8

Cameron Parish, 7.2%) and Virginia (Emporia City County, 26.0%; Loudoun County, 5.2%). The smallest gap is in Delaware: 2.1%.

We briefly consider the distribution of food insecurity estimates for children living in food-insecure households.[10] These rates have always been substantially higher than those of the general population. The results, which are akin to those in table 2, are shown in table 3. State-level food insecurity estimates vary from a low of 10.6% in North Dakota to a high of 29.2% in New Mexico. As seen in a comparison of columns 2 and 3, the food insecurity estimates for children range from 6.0% (Bowman County, North Dakota) to 40.8% (Zavala County, Texas). As with food insecurity estimates for the full population, the highest county food insecurity estimate in some states is lower than the lowest food insecurity estimate experienced in other states. For example, the highest food insecurity estimates for children in Delaware (20.2% in Sussex County) is lower than the lowest rate in Arizona (24.6% in Maricopa County).

In column 4, we further illustrate the geographic dispersion in food insecurity estimates for children living in food-insecure households across counties, this time by looking within states. The state with the widest gap is South Dakota (Shannon County, 38.4%; Sully County, 12.3%). The smallest gap occurs again in Delaware: 4.8%.

Comparisons with Other Sub-State Food Security Analyses

We compare our findings with other estimates of food hardship at the sub-state level. We first present estimated *Map the Meal Gap (MMG)* county-level food insecurity estimates with observed CPS food insecurity rates, averaged over the 2008–2012 time period at the county level, in table 4. (We average over this time period to generate an increased sample size and to make the estimates more comparable with the five-year averages we use from the ACS.) We restrict the comparison to counties where the number of unweighted observations in the CPS for the four-year time period is at least four hundred households. Across the twenty-nine counties in table 4, the average (unweighted) difference between the two rates is very small: 0.03 percentage points higher in the *Map the Meal Gap*. This average does mask some notable differences between the *Map the Meal Gap* and CPS. For example, Bexar County, Texas, has an *Map the Meal Gap* estimate of 15.9% and a CPS value of 22.1%. Conversely, Alleghany County, Pennsylvania, has an *Map the Meal Gap* estimate of 20.1% and a CPS value of 13.1%. Although there is some variation, twenty-four of the twenty-nine counties have *Map the Meal Gap* and CPS values that are within 3 percentage points of each other.

We also consider comparisons of *Map the Meal Gap* food insecurity estimates with the FRAC's food hardship rates. Beginning in 2010, FRAC released their first report on food hardship at the state, large Metropolitan Statistical Areas (MSA), and congressional district levels. Food hardship is estimated from a Gallup poll question: "Have there been times in the past twelve months when you did not have enough money to buy food that you or your family needed?" Comparisons between the *Map the Meal Gap* food insecurity estimates and the FRAC food hardship rates are displayed in

[10] *These estimates are for "children in food-insecure households" rather than "food-insecure children".*

Table 3 Differences in *Map the Meal Gap* Food Insecurity Estimates for Children Living in Food-Insecure Households by State and by Counties within States, 2012

State	Average food insecurity rate (%)	Highest county food insecurity rate (%)	Lowest county food insecurity rate (%)	Difference
AK	19.6	34.9	15.3	19.6
AL	25.8	32.4	18.5	13.9
AR	27.7	34.7	19.6	15.1
AZ	28.2	40.0	24.6	15.4
CA	26.3	38.8	17.1	21.8
CO	21.3	33.1	14.6	18.5
CT	19.6	21.4	15.3	6.1
DC	28.0	27.5	27.5	0.0
DE	18.3	20.2	15.4	4.8
FL	27.6	34.0	20.5	13.5
GA	28.1	38.8	20.4	18.4
HI	23.9	26.9	21.1	5.8
IA	19.3	23.9	15.2	8.7
ID	21.6	27.2	15.6	11.5
IL	21.6	31.6	14.8	16.8
IN	21.8	28.5	14.3	14.2
KS	22.5	32.5	16.0	16.5
KY	21.6	34.7	13.2	21.4
LA	23.4	35.5	16.9	18.6
MA	16.6	20.6	11.2	9.5
MD	19.3	26.0	13.2	12.8
ME	24.1	28.1	20.3	7.8
MI	22.3	29.9	15.1	14.8
MN	16.1	30.9	15.1	15.8
MO	22.0	26.9	12.1	14.8
MS	28.7	32.9	19.3	13.6
MT	22.0	31.1	15.0	16.1
NC	26.7	34.4	20.2	14.3
ND	10.6	28.9	6.0	22.9
NE	20.7	30.2	15.1	15.0
NH	16.2	19.4	12.2	7.2
NJ	18.5	23.6	13.1	10.5
NM	29.2	39.7	16.1	23.6
NV	28.1	33.3	19.1	14.2
NY	21.8	29.6	13.8	15.8
OH	25.2	32.4	16.5	15.9
OK	25.6	33.3	19.5	13.8
OR	27.3	33.5	21.2	12.3
PA	20.6	25.7	14.6	11.1
RI	21.3	23.7	15.8	8.0
SC	26.4	33.2	19.9	13.3
SD	18.5	38.4	12.3	26.1
TN	24.7	33.2	16.5	16.7
TX	27.4	40.8	18.5	22.3
UT	20.7	29.1	16.0	13.1
VA	16.2	30.2	10.5	19.8
VT	19.8	22.0	16.4	5.5
WA	23.4	30.6	19.2	11.4
WI	20.7	32.2	15.3	16.9
WV	21.7	28.1	16.1	12.0
WY	19.2	25.6	13.2	12.4

Table 4 Comparison of 2012 *Map the Meal Gap* County Food Insecurity Estimates and 2009–2012 CPS County Food Insecurity Rates

State	County	CPS food insecurity rate (%)	MMG food insecurity estimate (%)	Difference
AZ	Maricopa	14.0	15.7	−1.7
CA	Alameda	13.6	15.6	−2.0
CA	Los Angeles	19.2	16.3	2.9
CA	Orange	13.8	12.2	1.6
CA	Sacramento	19.7	17.1	2.6
CO	Denver	22.4	17.3	5.1
DC	District of Columbia	13.5	14.0	−0.5
DE	New Castle	11.6	12.0	−0.4
FL	Broward	18.9	15.6	3.3
FL	Miami-Dade	16.5	15.3	1.2
HI	Honolulu	15.6	12.9	2.7
IA	Polk	15.0	12.7	2.3
KY	Jefferson	18.2	17.2	1.0
MD	Prince Georges	17.5	15.2	2.3
MI	Oakland	12.5	13.7	−1.2
MI	Wayne	19.2	21.3	−2.1
MO	St. Louis	13.7	15.6	−1.9
ND	Cass	8.4	9.4	−1.0
NM	Bernalillo	15.2	16.6	−1.4
NV	Clark	15.7	15.7	0.0
NY	Kings	13.1	20.1	−7.0
NY	New York	14.5	16.2	−1.7
NY	Queens	13.4	14.0	−0.6
OH	Cuyahoga	16.6	18.7	−2.1
OH	Franklin	18.4	17.7	0.7
PA	Allegheny	7.6	14.0	−6.4
TX	Bexar	22.1	15.9	6.2
VA	Fairfax	6.4	6.7	−0.3
WA	King	11.5	14.0	−2.5

table 5 for the seventeen counties for which the MSA overlaps with the county. The FRAC food hardship rates are, on average, 3.1 percentage points higher than the *Map the Meal Gap* estimates. Because the food hardship measure is not synonymous with food insecurity and has a lower threshold, it is to be expected that the results from the food hardship measure are higher, on average, than the results from the food insecurity measure. The orderings are quite similar, however. For example, among the seventeen compared counties, Kern County, California, has the highest food hardship rate and the second highest *Map the Meal Gap* food insecurity rate. Similarly, Lancaster County, Pennsylvania, has the lowest food hardship rate and the second lowest *Map the Meal Gap* food insecurity rate.

Conclusion

Food insecurity rates have soared to unprecedented levels in recent years, becoming one of the most important and high-profile nutrition-related

Table 5 Comparison of *Map the Meal Gap* County Food Insecurity Estimates and FRAC Food Hardship Rates for Metropolitan Statistical Areas Equivalent to One County, 2012

State	County	Equivalent Metropolitan Statistical Area	FRAC food hardship rate (%)	MMG food insecurity estimate (%)	Difference
AZ	Pima	Tucson	18.3	16.0	2.3
CA	Fresno	Fresno	22.4	18.9	3.5
CA	Kern	Bakersfield	26.7	17.1	9.6
CA	San Diego	San Diego–Carlsbad–San Marcos	15.4	14.6	0.8
CA	Sonoma	Santa Rosa–Petaluma	17.0	13.4	3.6
CA	Ventura	Oxnard–Thousand Oaks–Ventura	16.2	11.6	4.6
CT	Fairfield	Bridgeport–Stamford–Norwalk	12.3	11.7	0.6
CT	New Haven	New Haven–Milford	15.7	14.4	1.3
FL	Brevard	Palm Bay–Melbourne–Titusville	18.7	15.2	3.5
FL	Lee	Cape Coral–Fort Myers	19.0	14.8	4.2
FL	Polk	Lakeland–Winter Haven	22.0	16.7	5.3
HI	Honolulu	Honolulu	12.2	12.9	−0.7
MA	Worcester	Worcester	16.6	10.4	6.2
NV	Clark	Las Vegas–Paradise	22.2	15.7	6.5
PA	Lancaster	Lancaster	9.8	11.4	−1.6
PA	York	York–Hanover	12.8	11.7	1.1
WA	Spokane	Spokane	17.5	15.4	2.1

public health issues in the United States. However, before *Map the Meal Gap*, our understanding of the spatial diversity in food insecurity rates across the United States was limited. The findings presented here on *Map the Meal Gap* document the geographic diversity in food insecurity rates by detailing estimates of food insecurity rates for all counties in the United States.

Although we reviewed the geographic variations in food insecurity estimates in light of income, poverty, and racial and ethnic composition of communities, we encourage others to also examine how county-level food insecurity data can be paired with other indicators, such as health data, housing cost pressures, and other measures of economic status. It is also our hope that *Map the Meal Gap* equips food banks, partner agencies, policymakers, business leaders, community activists, and concerned citizens with the tools needed to better understand the dynamics of food insecurity at the county level and to use this information to better inform discussions about how to respond to the need locally.

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