FEEDING AMERICA®

Map the Meal Gap 2018

A Report on County and Congressional District Food Insecurity and County Food Cost in the United States in 2016

CONTENTS

FOREWORD

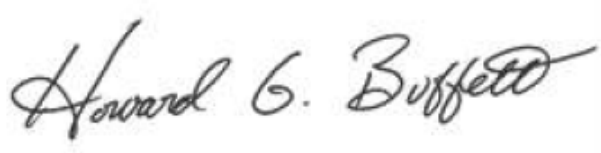
Hunger in the United States is often hidden but remains pervasive. More than 41 million Americans struggle with hunger—a number that is essentially unchanged from last year and is higher than before the last recession began in late 2007.

One cannot tackle big challenges like hunger without first identifying and quantifying them. The Howard G. Buffett Foundation is proud to be the Founding Sponsor of Feeding America's signature *Map the Meal Gap* study. Now in its eighth year, *Map the Meal Gap* is an annual analysis of food insecurity down to the county and congressional district level that serves as a powerful tool to advocate for hunger relief and educate Americans about the reality of hunger in our country.

Findings from *Map the Meal Gap 2018* confirm that people face hunger in every county and congressional district in America. The study also finds wide disparities in local food insecurity and food prices across the country. And while there are signs of improvement in the U.S. economy, food insecurity among Americans remains prevalent, disproportionately high and concentrated in many communities.

The Feeding America nationwide network of food banks and its partners use *Map the Meal Gap* in their strategic planning and goal-setting as they work to address current hunger needs and work to end hunger across America. The annual study has also become a tool for legislators, academics and community organizations as they develop policies, research and programs across a number of related social and economic issues.

We believe that clearly defining the face of hunger in the United States is an essential first step toward a more food-secure future.



Howard G. Buffett
Chairman and CEO
The Howard G. Buffett Foundation

USING DATA AND EVIDENCE TO SET A BOLD STRATEGIC DIRECTION

In order to end hunger in America, we must first deeply understand the problem. For nearly 25 years, Feeding America has been a leader in developing and conducting innovative research about food insecurity in America, its prevalence, and the impact it has on the people we serve. The data and understanding we derive from our studies allow us to make informed decisions about programs and policies that help feed people facing hunger today, while setting the course of our efforts to end hunger tomorrow by improving long-term food security.

One of the most instrumental studies in supporting this important and daunting work is *Map the Meal Gap*. Since 2011, *Map the Meal Gap* provides insight into the number of food-insecure individuals in every state, county and congressional district across the United States. This critical knowledge enables us to dynamically integrate research and practice and develop effective, evidence-based programmatic solutions to food insecurity.

We are grateful for the vision and partnership of the Howard G. Buffett Foundation, a founding sponsor of this study, which has enabled Feeding America to be at the leading edge of research and evidence, driving policy and programmatic change at national and local levels. The ongoing, generous commitment from all our *Map the Meal Gap 2018* funders and supporters, including the Howard G. Buffett Foundation, Conagra Brands Foundation and Nielsen, has provided Feeding America with the foundation we need to build our bold organizational direction.

We thank all our advisors and thought partners who contributed to the development of the analysis and insights that constitute *Map the Meal Gap*.

Carol Medlin, PhD, MPA
Chief Program Officer

Erin McDonald, PhD, MPP
Vice President, Research

ABOUT FEEDING AMERICA

Feeding America® is the largest hunger-relief organization in the Unites States. Through a network of 200 food banks and 60,000 food pantries and meal programs, we provide meals to more than 46 million people each year. Feeding America also supports programs that prevent food waste and improve food security among the people we serve; educates the public about the problem of hunger; and advocates for legislation that protects people from going hungry.

GLOSSARY

AGENCY

A charitable organization that provides food supplied by a food bank directly to people in need through various types of programs, like food pantries.

AMERICAN COMMUNITY SURVEY (ACS)

A U.S. Census Bureau survey based on a sample of 3 million addresses. ACS data are used to produce *Map the Meal Gap* estimates. In order to provide valid estimates for areas with small populations, the county-level ACS data used in *Map the Meal Gap* were averaged over a five-year period.

AVERAGE MEAL COST

The national average dollar amount food-secure people report spending per week on food, as estimated in the Current Population Survey (CPS), divided by 21 (assuming three meals eaten per day). This number is then adjusted by the cost-of-food index (see below).

CHARITABLE FOOD PROVIDERS

Charitable feeding programs like food pantries, meal programs, kitchens and shelters, whose services are provided to people in times of need.

CHILD FOOD INSECURITY

The household-level economic and social condition of limited or uncertain access to adequate food, as reported for households with children under age 18; it is assessed in the Current Population Survey (CPS) and represented in U.S. Department of Agriculture (USDA) food-security reports.

CHILD FOOD-INSECURITY RATE

The percentage of children living in households in the U.S. that experienced food insecurity at some point during the year. The child food-insecurity estimates in this study are derived from the same questions used by the USDA to identify food insecurity in households with children at the national level.

COST-OF-FOOD INDEX

A measure that uses food price data provided by Nielsen to estimate the relative cost of food in each county. The index consists of county multipliers that reflect the cost (after taxes) of purchasing the equivalent of a USDA Thrifty Food Plan (TFP) market basket relative to the national average. These multipliers are then used to generate local estimates of the national food budget shortfall and average meal cost.

CURRENT POPULATION SURVEY (CPS)

A nationally-representative survey conducted by the U.S. Census Bureau for the Bureau of Labor Statistics (BLS) providing employment, income, food insecurity and poverty statistics. Selected households are representative of civilian households at the state and national levels.

The CPS does not include individuals living in group quarters, including nursing homes or assisted living facilities.

FOOD BANK

A charitable organization that solicits, receives, inventories and distributes donated food and grocery products pursuant to industry and appropriate regulatory standards. The products are distributed to charitable social-service agencies, which provide groceries and meals directly to people in need through various charitable feeding programs. Some food banks also distribute food directly to individuals in need.

FOOD BUDGET SHORTFALL

The amount of money per week food-insecure people report needing to meet their food needs, as assessed in the Current Population Survey. This amount is annualized for the purposes of this study.

FOOD INSECURITY

The household-level economic and social condition of limited or uncertain access to adequate food. It is assessed in the Current Population Survey and represented in USDA food-security reports.

FOOD-INSECURITY RATE

The percentage of the population that experienced food insecurity at some point during the year.

HIGH FOOD-INSECURITY COUNTIES

The top 10% of counties with the highest food-insecurity (or child food-insecurity) rates as compared with rates across all counties in the United States.

INCOME ELIGIBILITY THRESHOLD FOR FEDERAL NUTRITION PROGRAMS

A dollar amount tied to the federal poverty line that determines whether a household is income-eligible for federal nutrition programs like the Supplemental Nutrition Assistance Program (SNAP) or the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). Income eligibility is one aspect of eligibility, which varies by state and include other tests based on assets and net income.

MEAL GAP

The equivalent of the food budget shortfall in meals. In order to arrive at the meal gap, the food budget shortfall in a specified area is divided by the average cost per meal in that area.

METRO-MICRO AREAS

County-based geographic categories defined by the Office of Management and Budget (OMB). Metropolitan (metro) areas have a core urban area of 50,000 or more residents while micropolitan (micro) areas have a core urban area between 10,000 and 50,000. Metro and micro areas consist of one or more counties and include the counties containing both the core urban area, as well as any adjacent counties that have a high degree of social and economic

integration with the urban core. Here we use counties categorized as part of nonmetro areas to broadly define “rural” counties although we analyze food insecurity in micro counties as well.

NONMETRO/RURAL COUNTIES

Counties that are categorized as part of nonmetro areas by the Office of Management and Budget (OMB) and used here to define “rural” counties. Nonmetro counties are located outside the boundaries of metropolitan (metro) areas and are widely used to study conditions in “rural” America. They can be subdivided into micropolitan (micro) and all remaining counties (neither metro nor micro), and further subdivided using USDA ERS Rural-Urban Continuum Codes (RUCCs).

PERCENT OF POVERTY LINE

A multiple of the federally established poverty guideline, which varies based on household size. These percentages are used to set income eligibility thresholds for federal nutrition programs, such as SNAP.

PERSISTENT-POVERTY COUNTY

A term used by the USDA Economic Research Service (ERS) to refer to counties where at least 20 percent of the population has been living in poverty over the last 30 years.

RURAL-URBAN CONTINUUM CODES

A classification scheme used by the USDA that subdivides metro counties into three categories by the population size of their metro area, and nonmetro counties into six categories by degree of urbanization and adjacency to a metro area. Here we use RUCCs to analyze food insecurity across and within metro and nonmetro counties.

SUPPLEMENTAL NUTRITION ASSISTANCE PROGRAM (SNAP)

Formerly known as the Food Stamp Program, SNAP is the largest of the federal nutrition programs and provides qualified recipients with resources, in the form of an electronic payment card, to buy groceries.

ABOUT MAP THE MEAL GAP

We believe that addressing the problem of hunger requires a thorough understanding of the problem. For the eighth consecutive year, Feeding America has undertaken the *Map the Meal Gap* analysis to continue learning about how the face of food insecurity can vary at the local level. By better understanding variations in local need, communities can develop more targeted strategies to better reach people struggling with hunger.

Although Feeding America continually seeks to meet the needs of food-insecure people, quantifying the need for food within a community can be challenging. In September 2017, the United States Department of Agriculture (USDA) Economic Research Service released its most recent food insecurity report, indicating that more than 41 million people in the United States live in food-insecure households, of whom 13 million are children (Coleman-Jensen et al., 2017a). While the magnitude of the problem is clear, national and even state estimates of food insecurity can mask the variation that exists at the local level.

Prior to the inaugural *Map the Meal Gap* release in March 2011, Feeding America used national and state-level USDA food-insecurity data to estimate the need. However, the 200 Feeding America member food banks that comprise the network are rooted in their local communities and need specific information at the ground level in order to be responsive to unique local conditions. Many food banks used poverty rates as an indicator of local food needs because it was one of few variables available at the county level. However, national data reveal that about 58% of people struggling with hunger earn incomes above the federal poverty level and 61% of people living in poor households are food secure (Coleman-Jensen et al., 2017b). Measuring need based on local poverty rates alone provides an incomplete illustration of a community's potential need for food assistance. Better community-level food-insecurity data are a valuable and unique resource for informing and engaging community members, leaders and partners in our mission to end hunger through a quantifiable and data-driven approach. In order to do this, *Map the Meal Gap* generates four types of community-level data: overall food-insecurity estimates, child food-insecurity estimates, average meal costs and food budget shortfalls.

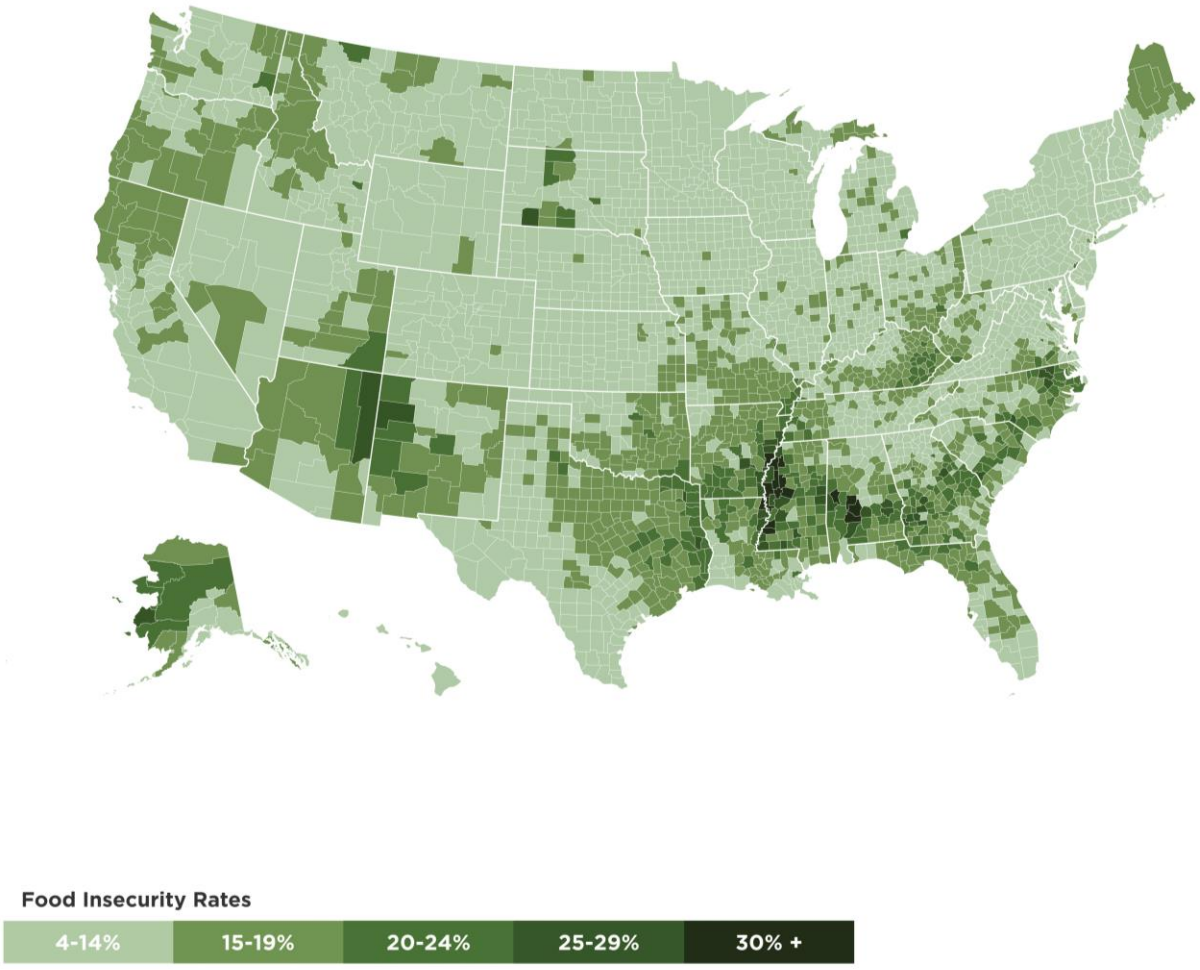
METHODOLOGY OVERVIEW & RESEARCH GOALS

The following provides additional information on the methodology for this study. A more detailed technical brief can be found on page 48.

FOOD-INSECURITY ESTIMATES

Before producing county-level estimates, we assess the state-level relationship between food insecurity and associated factors using Current Population Survey (CPS) data supplemented with data from the Bureau of Labor Statistics (BLS). The specific variables used are: unemployment, poverty, homeownership, and other demographic variables that are publicly available at both the county and state level. County-level estimates are derived from the state-level relationships that exist between these variables and food insecurity. Food-insecurity estimates at the county level may vary more from year to year than state or national estimates due to smaller geographies, particularly in counties with very small populations. For that reason, we take efforts to guard against unexpected fluctuations that can occur in these counties by using five-year averages from the American Community Survey (ACS). However, unemployment is based on a one-year average estimate for each county as reported by the BLS. Estimates are sorted by income categories associated with eligibility for federal nutrition programs, such as the Supplemental Nutrition Assistance Program (SNAP), using ACS data on population and income at the county level.

ESTIMATING FOOD INSECURITY AT THE COUNTY LEVEL, 2016



Using the annual USDA Food Security Survey, we model the relationship between food insecurity and other variables at the state level and, using information for these variables at the county level, we establish food-insecurity rates by county.

The food-insecurity model demonstrates the relationship between food insecurity and several indicators including unemployment and poverty.

As expected, after controlling for other factors, higher unemployment and poverty rates are associated with higher rates of food insecurity. A one percentage-point increase in the unemployment rate leads to a 0.5 percentage-point increase in the overall food-insecurity rate, while a one percentage-point increase in poverty leads to a 0.26 percentage-point increase in food insecurity.

An interactive map and that illustrates data from *Map the Meal Gap* can be found online at map.feedingamerica.org.

WHAT ABOUT UNDEREMPLOYMENT?

Underemployment occurs when a person is in the labor force, but is not obtaining sufficient hours or wages to make a living. This includes people who work less than full-time but would be working full-time if possible, and people who are in jobs not commensurate with their training or financial needs. Although unemployment continues to be associated with food insecurity, underemployment is another important condition that can lead to a strained household food budget. Currently, uniform BLS data on underemployment are not available at the county level; as a result, underemployment cannot be included in the *Map the Meal Gap* model estimating county-level food insecurity.

CHILD FOOD INSECURITY ESTIMATES

Children are particularly vulnerable to the economic challenges facing families today. Although food insecurity is harmful to any individual, it can be especially devastating to children, due to their critical stage of development and the potential for long-term consequences. Feeding America has replicated the food-insecurity model used for the general population to reflect the need among children (see page 35 for results).

Similar to the calculations used to derive food-insecurity estimates for the overall population, CPS data are used to assess the relationship between state-level child food insecurity and associated variables (e.g. unemployment rates, child poverty rates, homeownership rates for families with children, etc.) that are publicly available at the county, congressional district, and state levels through the CPS, BLS and ACS.

Child food-insecurity estimates are sorted by the income categories used to identify eligibility for federal child nutrition programs (above and below 185% of the poverty line) such as the National School Lunch Program (NSLP), the School Breakfast Program (SBP) and the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) in order to estimate how many food-insecure children are eligible and ineligible for federal child nutrition programs.

WHAT ABOUT SENIOR FOOD INSECURITY?

Nationally, we know that 8% (5.4 million) of seniors (age 60 and older) are food insecure, with rates as high as 15.6% in Louisiana (Ziliak & Gundersen, 2017). We also know that the aging population has unique socioeconomic circumstances that may increase their need for food assistance and the need among community partners for local-level senior food-insecurity estimates. The *Map the Meal Gap* model, however, cannot currently produce local estimates of food insecurity among seniors. This is because key variables such as unemployment and homeownership are not as applicable to this demographic. And the sample size of seniors at the county level is often too small to allow for estimates as reliable as those for children and the general population.

FOOD PRICE VARIATION

In order to compare food prices across the country, a relative price index was developed by Nielsen, on behalf of Feeding America.[1] Nielsen analyzed nationwide sales data from Universal Product Code (UPC)-coded food items and assigned each UPC-coded food item to one of the 26 food categories in the USDA's Thrifty Food Plan (TFP).[2] These categories, representing major food groups, were weighted within the TFP market basket based on pounds purchased per week by age and gender. The market basket total was then translated into a county-specific multiplier (normalized to a mean value of 1) so that food prices can be compared across geographies. This multiplier can be applied to any dollar amount to estimate the relative local price of the item in question.

FOOD BUDGET SHORTFALL AND NATIONAL AVERAGE MEAL COST

The CPS asks respondents how much additional money they would need to buy enough food for their household (this follows questions regarding weekly food expenditures but precedes food-insecurity questions). On average, in 2016, food-insecure individuals reported needing an additional $16.90 per person per week, a decrease of 4% from $17.60[3] in 2015. This amount is the average weekly food budget shortfall that food-insecure people experience.

To arrive at an annualized food budget shortfall experienced by all food-insecure people, this value is first multiplied by the number of food-insecure persons. Because USDA analyses of CPS data reveal that food-insecure households are not food insecure every day of the year, but typically experience food insecurity for about seven months per year, 7/12 is used as a multiplier to arrive at the total estimated annual food budget shortfall across all food-insecure individuals. (Coleman-Jensen et al., 2017a).

In recognition that food costs are not the same across the nation, the average food budget shortfall was also adjusted using the county multiplier from the local cost-of-food index, with 1 representing the national cost-of-food index.

To help equate the dollar amount of the food budget shortfall to meals, it is translated into an estimated meal shortfall, or "meal gap," using an average meal cost. The national cost-per-meal was derived from CPS data about how much the respondent's household spends on food in a

[1] In cases of counties with populations smaller than 20,000, Nielsen imputed a price based on data collected from all surrounding counties.
[2] The USDA TFP market basket is used to understand the relative differences in major food categories in a standardized way. It is not intended to evaluate the appropriate mix of food that people might purchase.
[3] In 2016 inflation-adjusted dollars. The weekly food budget shortfall per food-insecure person in 2015 was $17.38 in 2015 dollars.

week. We only include food costs reported by food-secure households to ensure that the result reflects the cost of an adequate diet. According to CPS data, we find that food-secure individuals spend an average of $63 per week, which, when divided by 21 (based on the assumption of three meals per day, seven days per week), amounts to an average meal cost of $3.00.

As with the food budget shortfall, the average meal cost of $3.00 is adjusted to reflect differences in food prices across counties by using the cost-of-food index described previously in the Food Price Variation section. This local cost of a meal can then be used to translate the local food budget shortfall into an estimated number of additional meals needed. Estimates of meal costs and meal gaps are not intended to be definitive measures; however, the concept of a “meal” provides communities with a context for the scope of need.

Although food prices are one of many cost pressures that people face in meeting their basic needs (housing, utilities and medical expenses are other critical components), the ability to reflect differences in food costs across the country provides insight into the scope of the problems facing people who are food insecure and struggling to make ends meet.

OVERALL FOOD INSECURITY: RESULTS AND DISCUSSION

Map the Meal Gap estimates the number of food-insecure individuals and children in every county and congressional district in the United States. The study also estimates the share of the food-insecure population who likely qualify for federal nutrition assistance programs, like SNAP.

TRENDS IN COUNTY FOOD INSECURITY

This section reviews findings from the eighth year that Feeding America has conducted *Map the Meal Gap*. To identify any notable shifts, food-insecurity estimates for 2016 (the focus of this year's study) are compared to those in each of the prior four years.

Nationally, the food-insecurity rate stayed roughly the same, decreasing slightly from 13.4% in 2015 to 12.9% in 2016. (Coleman-Jensen et al., 2017a).[4] Unemployment and poverty, two economic variables associated with food insecurity, decreased (see Table 01).

TABLE 01: AVERAGE ECONOMIC INDICATORS BY COUNTY TYPE

County Type	Food Insecurity		Unemployment[i]		Poverty[ii]		Homeownership[iii]		Median Income[iv]	
	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
Top 10% by Food Insecurity	22.9%	22.4%	7.9%	7.3%	27.4%	27.5%	65.2%	65.6%	$34,288	$34,031
All Counties	14.1%	13.7%	5.5%	5.3%	16.7%	16.4%	71.4%	71.2%	$47,421	$47,973
All Individuals	13.4%	12.9%	5.3%	4.9%	14.7%	14.0%	63.0%	63.1%	$56,479	$57,617

[i] Bureau of Labor Statistics. (2017).
[ii] United States Department of Agriculture, Economic Research Service. (2017).
[ii] United States Department of Agriculture, Economic Research Service. (2017).
[iv] United States Census Bureau (2017). Income and poverty in the United States: 2016. Washington, D.C.: Semega, J.L, Fontenot, K.R., & Kollar, M.A.

At the county level, we find that food-insecurity rates in 2016 range from a high of nearly 36% in Jefferson County, Mississippi to a low of 4% in Loudoun County, Virginia and Manassas Park City, Virginia. The average county food-insecurity rates in 2015 and 2016 are approximately the same at 14%. Just over one percent (N=38) of all 3,142 counties in the U.S. experienced a statistically significant change between 2015 and 2016, with most (82%) experiencing a decrease. When 2016 estimates are compared to those from prior years, however, there are more counties with a statistically significant difference in their food-insecurity rate. Rates are significantly different for 10% (N=316) of all counties since 2014, 27% (N=834) since 2013, and 20% (N=631) since 2012.

Like food insecurity, poverty and unemployment decreased slightly (see Table 01). The average unemployment rate across counties decreased from 5.5% to 5.3%, as did the average poverty rate (16.4% in 2016, compared to 16.7% in 2015). Across all counties, homeownership fell slightly from 2015 to 2016. Although the average median income across counties edged

[4] The food-security module asks individuals about the prior 12 months, although it is plausible that individuals' responses may be most affected by their recent experience.

upwards from $47,421 in 2015 to $47,973 in 2016, as it did nationally, counties with the highest rates of food insecurity witnessed an average median income *decline* in real terms, from $34,288 in 2015 to $34,031 in 2016, suggesting a widening gap between the most disadvantaged counties in the United States and the rest of the country.[5]

The following sections explore current (2016) county-level findings in greater detail. Any statistically significant differences are noted.

COUNTIES WITH THE HIGHEST RATES OF FOOD INSECURITY

Of the 3,142 counties in the United States, we looked at the top 10% (N=316) whose food-insecurity rates are the highest in the nation.[6]

Although the average food-insecurity rate across U.S. counties remains at roughly 14%, the average rate for these 316 "high food-insecurity rate" counties is 22%. In other words, within these highest risk counties, more than 1 in 5 residents struggle with hunger.

GEOGRAPHY

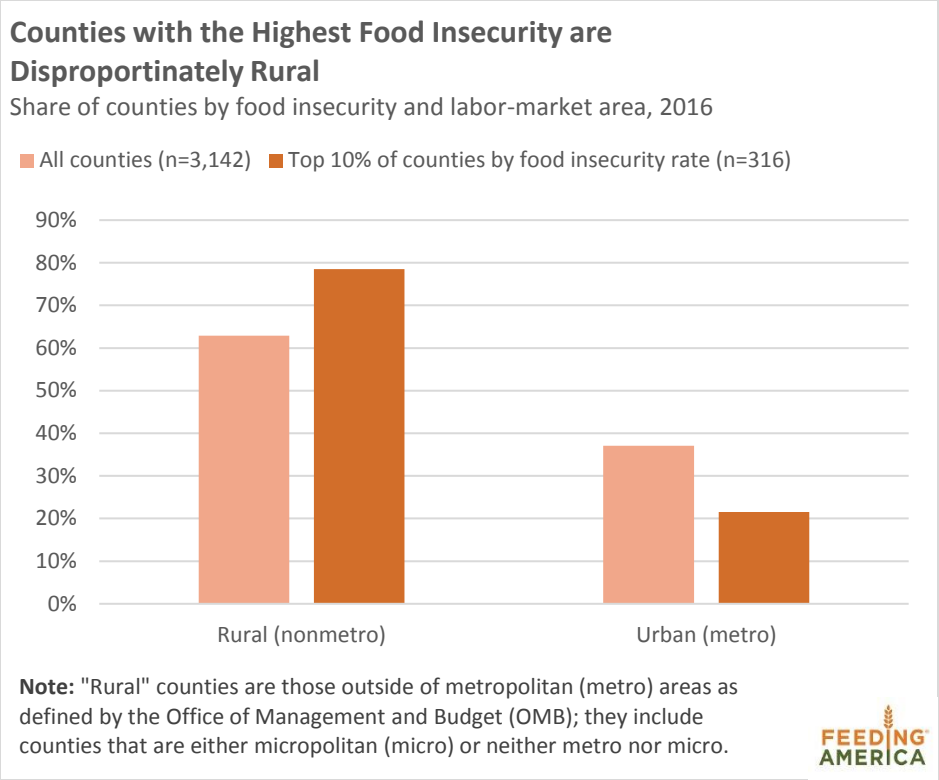
To understand geographical variation across these counties, we analyzed them using the U.S. Office of Management and Budget (OMB) categories of metropolitan (metro) and micropolitan (micro) areas. We also considered less populous and more remote counties associated with neither metro nor micro areas. Most counties, whether metro or nonmetro, micro or other, contain a combination of urban and rural populations. For the purposes of this study, we define "rural" counties as those that fall within the broader category of nonmetro counties. In other words, rural (nonmetro) counties are located outside the boundaries of more populous metro areas, and may be part of smaller micro areas or even less populated and more remote geographic areas.

Consistent with 2015 findings, high food-insecurity counties are more likely to be rural compared to the average U.S. county (see Table 02). While rural counties make up 63% of all counties, they represent 79% of counties with the highest rates of food insecurity.

TABLE 02: HIGH FOOD-INSECURITY RATE COUNTIES BY GEOGRAPHIC AREAS, 2016

County Type	High Food-Insecurity Rate Counties	All Counties
Metropolitan	21.5%	37.1%
Micropolitan (Rural)	24.4%	20.4%
Neither (Rural)	54.1%	42.5%
Total	**100%**	**100%**

[5] Median income data for 2015 have been adjusted for inflation to 2016 values.
[6] All 3,142 counties defined by the U.S. Census Bureau were included in the analysis of 2016 data.



The share of remote rural counties not associated with micropolitan or metropolitan areas has increased in 2016 (54% in 2016 versus 51% in 2015). Conversely, the proportion of high food-insecurity metro counties as of 2016 is lower when compared to all counties (22% versus 37%), and lower than in 2015 (22% in 2016 versus 24% in 2015).

TABLE 03: HIGH FOOD-INSECURITY RATE COUNTIES BY U.S. CENSUS REGIONS AND DIVISIONS, 2016

U.S. Census Division (Region)	Counties (#)	Counties (%)
South Atlantic (South)	101	32%
East South Central (South)	92	29%
West South Central (South)	89	28%
Mountain (West)	13	4%
West North Central (Midwest)	11	3%
Pacific (West)	6	2%
East North Central (Midwest)	3	1%
Middle Atlantic (Northeast)	1	0%
New England (Northeast)	0	0%
Total	**316**	**100%**

High food-insecurity rate counties are located in eight of the nine U.S. Census Bureau geographic divisions (see Table 03).[7] The South, which encompasses the South Atlantic, East South Central, and West South Central divisions, contains 89% of the high food-insecurity rate

[7] U.S. Census Bureau Geographic Divisions: South Atlantic (DE, DC, FL, GA, MD, NC, SC, VA and WV), East South Central (AL, KY, MS and TN), West South Central (AR, LA, OK and TX), Mountain (AZ, CO ID, MT, NV, NM, UT and WY), West North Central (IA, KS, MN, MO, NE, ND and SD), Pacific (AK, CA, HI, OR and WA), East North Central (IL, IN, MI, OH and WI), Middle Atlantic (NJ, NY and PA), and New England (CT, ME, MA, NH, RI and VT).

counties. Although New England is not represented among the distribution of high food-insecurity rate counties, this area includes some of the most populous counties in the U.S. and thus, some of the largest numbers of food-insecure individuals.

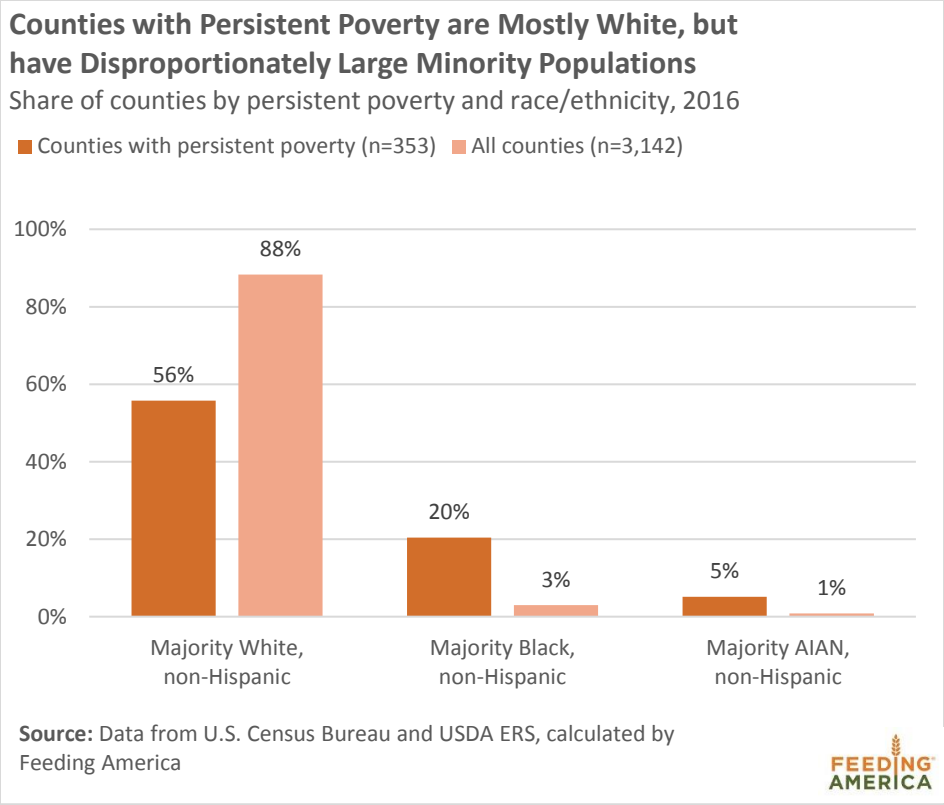
UNEMPLOYMENT, POVERTY, MEDIAN INCOME AND HOMEOWNERSHIP

By definition, high food-insecurity rate counties are more economically disadvantaged than the average U.S. county and the U.S. population as a whole, as seen in Table 01 on page 17. The average annual unemployment rate among high food-insecurity counties was more than 7%, compared to 5% across all counties, with the county-equivalent Kusilvak Census Area, Alaska having the highest unemployment rate at 21%. The average poverty rate across these counties was also high, averaging 28% compared to 16% for all counties, and as high as 54% in Oglala Lakota County, South Dakota. Not surprisingly, the average median household income in this group was lower than the national average: $34,031 versus $47,973 for all counties. The lowest median income in the group was $18,972 in McCreary County, Kentucky, less than half of the average of all counties. Homeownership rates were also lower in these counties at an average of 66% compared to 71% for all counties.

PERSISTENT-POVERTY COUNTIES

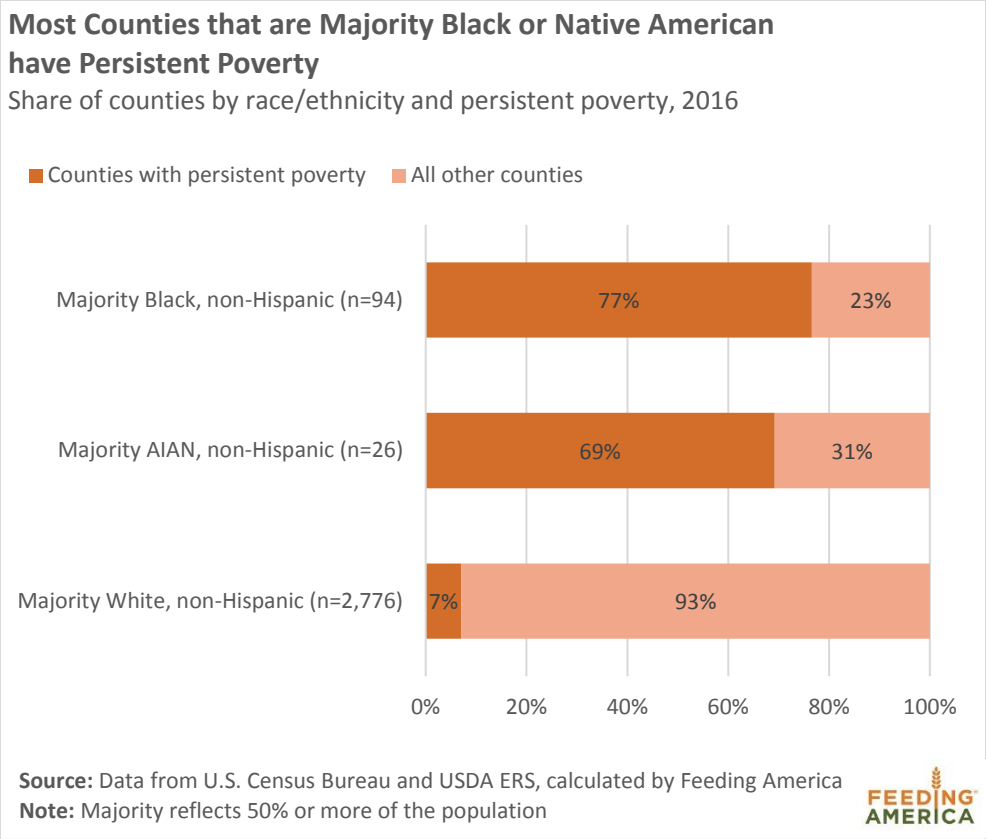
The USDA Economic Research Service (ERS) developed the term persistent poverty to track counties with consistently high percentages of people living below the poverty line. A county is considered a persistent-poverty county if at least 20% of its population has been living in poverty over the last 30 years (USDA ERS, 2017). Based on the most recent USDA data, there are 353 of these counties, 85% of which are rural. There is great overlap between these counties and those that fall into the top 10% for food insecurity; nearly two-thirds (64%) of the “high food-insecurity rate” counties are also persistent-poverty counties. This confluence of long-standing poverty and heightened food insecurity underscores that low-income people living in these areas have been facing a number of interrelated problems that require complex, long-term solutions.

Some racial and ethnic minority groups in the U.S., such as African Americans and American Indians, are disproportionately at risk for food insecurity, especially in these counties that have consistently struggled with poverty (Coleman-Jensen, Gregory, & Singh, 2016). In addition to having above-average food-insecurity rates, persistent-poverty counties include a disproportionate share of counties with majority non-white populations, highlighting the deep and pervasive nature of the systemic challenges faced by many minority communities.

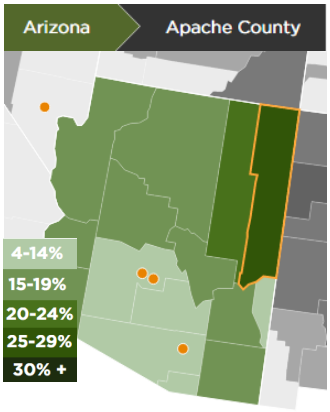


For example, while majority African-American counties form only 3% (N=94) of the 3,142 counties in the U.S., 96% (N=90) of them are high food-insecurity rate counties and 77% are persistent-poverty counties.[8] With an average poverty rate of 29%, majority-African-American counties disproportionately experience poverty when compared to both high food-insecurity rate counties (28%) and the average county (16%). One such disadvantaged community is Jefferson County, Mississippi, where 86% of residents are African American. With a poverty rate of 40%, Jefferson County also has the highest food-insecurity rate in the U.S. at more than 36%.

[8] This analysis was completed for all non-Hispanic African Americans.



Similarly, more than two-thirds (69%) of majority-Native American counties are persistent-poverty counties, with an average poverty rate of 37%. Even though majority-Native American counties represent less than 1% of all counties in the U.S. (N=26), most of them (54%) also fall into the high food-insecurity rate category.[9] Although a relatively small percentage of the total U.S. population identifies as Native American, county-level analysis helps bring to light the obstacles faced by reservation communities (Gordon & Oddo, 2012; Gundersen, 2008).



For example, Apache County, Arizona, which includes parts of the Navajo Nation, Zuni and Fort Apache reservations, is designated as a persistent-poverty county with a poverty rate more than double the national average (36% versus 16%) and a food-insecurity rate of 26%.

FURTHER EXPLORATION OF COUNTIES

The following section analyzes county food insecurity by other dimensions, including low prevalence, large numbers of people, as well as rurality and region.

[9] This analysis was completed for all non-Hispanic Native Americans.

LOW FOOD-INSECURITY RATES

Nearly half (N=23) of the 50 counties with the lowest food-insecurity rates are found in North Dakota. This is consistent with the state's low unemployment rate and below-average poverty rate. In these 23 North Dakota counties, the estimated number of food-insecure individuals ranges from 40 to 5,400, and the food-insecurity rate ranges from 4% to 6%; nationally, the number of food-insecure individuals ranges from 10 to 1,147,010 and the food-insecurity rate ranges from to 4% to 36%.

Highlighting the critical difference between food-insecurity rates and number of food-insecure people, Suffolk County, New York is one of the 50 counties with the lowest food-insecurity rates, at just under 6%; however, there are still nearly 83,000 people who are food insecure in this county. It is important to note, as shown in Table 04, that in more populous areas, low food-insecurity rates do not necessarily translate into low numbers of food-insecure people.

HIGHEST NUMBERS OF FOOD-INSECURE INDIVIDUALS

While food-insecurity rates help illustrate the prevalence of need, populous counties with relatively low food-insecurity rates are home to some of the largest numbers of food-insecure people (see Table 04).

TABLE 04: COUNTIES WITH THE HIGHEST NUMBER OF FOOD-INSECURE INDIVIDUALS, 2016

State	County (metro area)	Food Insecurity (#)	Food Insecurity (%)
NY	New York (five boroughs, collectively)	**1,215,440**	14.4%
CA	Los Angeles	**1,147,010**	11.4%
TX	Harris (Houston)	**738,140**	16.6%
IL	Cook (Chicago)	**659,990**	12.6%
AZ	Maricopa (Phoenix)	**585,330**	14.3%
TX	Dallas	**442,920**	17.6%
CA	San Diego	**379,130**	11.7%
MI	Wayne (Detroit)	**366,690**	20.7%
PA	Philadelphia County	**327,320**	21.0%
TX	Tarrant County (Fort Worth)	**323,840**	16.6%

Among the 50 counties with the highest *number* of food-insecure people, the average food-insecurity rate is 15%, slightly exceeding the average across all counties. Although average poverty (17%) is higher, and homeownership (55%) rates in these counties are lower than the average across all counties, their average unemployment rate is roughly equivalent to the national average at 5%.

While most of the 50 counties with the largest numbers of food-insecure people encompass the entirety of large cities, there are some exceptions. Oakland County, Michigan (144,800 food-insecure individuals) includes the suburbs northwest of Detroit, and DeKalb County, Georgia (139,290 food-insecure individuals) includes parts of Atlanta, but also suburbs to the east of the city, illustrating that the issue of hunger is not isolated to large metropolitan areas.

FOOD INSECURITY IN RURAL AMERICA

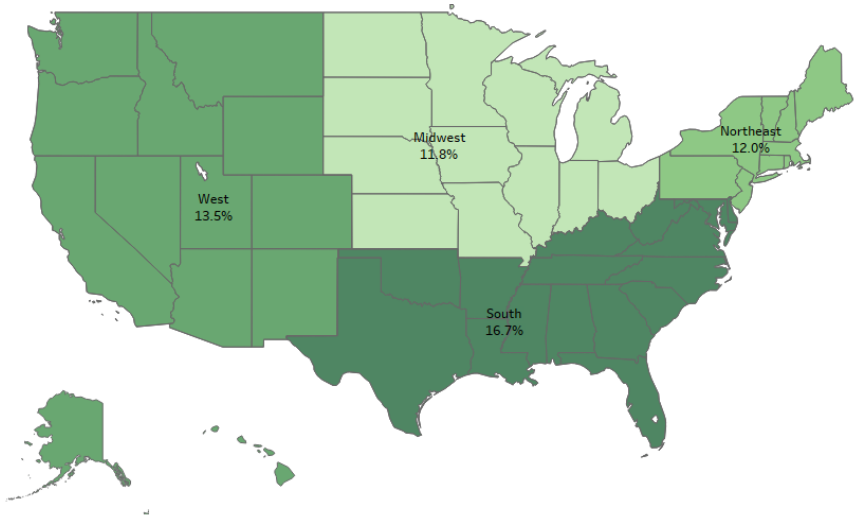
There are multiple ways to define an area as rural or urban. Here, we use two related measures to define a county's geography that highlight the ways need varies across rural and urban counties. First, we use the U.S. Office of Management and Budget (OMB) definitions of metropolitan (metro) and nonmetropolitan (nonmetro) to define urban and rural counties, respectively.[10] Across rural (nonmetro) counties, the average food-insecurity rate is 14%, which is about the same as the average rate across all counties, but higher than the average among more urban (metro) counties (13%). Although rural counties make up 63% of all counties, they account for 68% of counties with higher-than-average food-insecurity rates and 79% of the "high-food-insecurity rate" counties discussed on page 18.

We also examine rural and urban county food insecurity by U.S. Census regions, which further reveals patterns in the geography of food insecurity. For instance, rural counties in the South have some of the highest rates of food insecurity in the country while urban counties in the Northeast have some of the lowest. In fact, rural counties in the South have the highest average food-insecurity rate in the country (17%) when compared to regional averages from rural counties in the West (14%), Northeast (12%) and Midwest (12%) regions. See Table 05.

TABLE 05: County Food-Insecurity Rates by Geographic Area, 2016

County	National	South	West	Midwest	Northeast
Urban (metro)	13.0%	14.2%	12.6%	11.7%	10.8%
Rural (nonmetro)	14.1%	16.7%	13.5%	11.8%	12.0%
All counties	**13.7%**	**15.6%**	**13.2%**	**11.8%**	**11.3%**

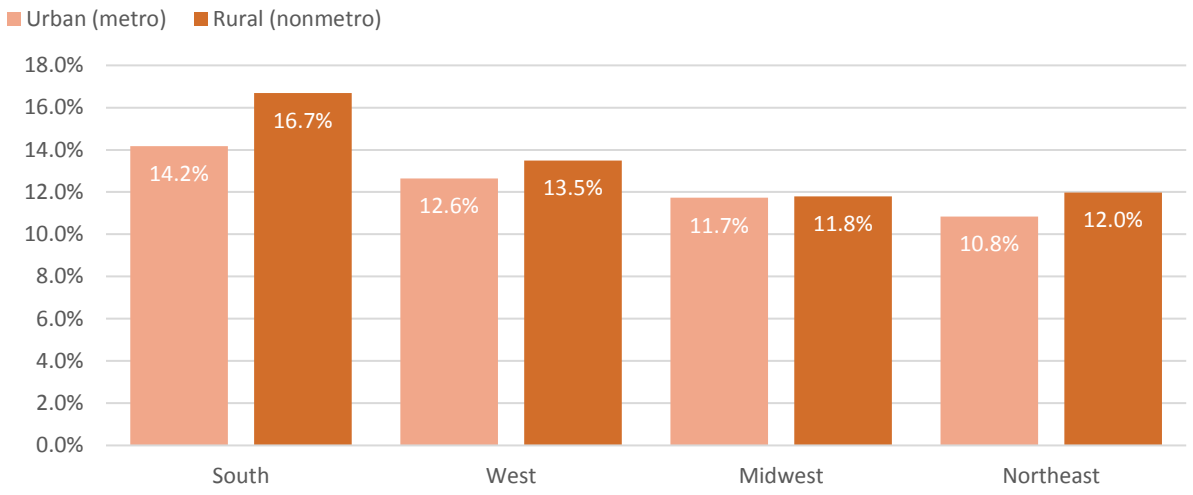
AVERAGE FOOD-INSECURITY RATE AMONG RURAL COUNTIES PER CENSUS REGION



[10] In prior analyses, we defined "rural" counties as those outside the boundaries of both metro and micro areas. However, using the broader nonmetro category to define rural counties, as we do this year, is a common research practice and consistent with how the USDA defines rural areas in its annual analysis of food insecurity.

County Food Insecurity Highest in the Rural South

Average county food insecurity rates by region and labor-market area, 2016



Source: Food insecurity data from *Map the Meal Gap 2018*.
Note: Averages are unweighted; rural counties are defined as those in nonmetropolitan areas per the Office of Management and Budget (OMB).

In the South region, some of the most food-insecure counties are those with small towns far from big cities. One such county is Leflore County, Mississippi, which has a food-insecurity rate of 32% and contains the town of Greenwood, population of 15,000. The nearest city to Greenwood is Jackson, Mississippi, nearly 100 miles away. Conversely, urban counties in the Northeast have some of the lowest rates of food insecurity in the country. Among urban counties across Census regions, the lowest average county food-insecurity rates are in the Northeast (11%), followed by the Midwest (12%), West (13%), and South (14%).

The variation in county food-insecurity rates becomes even more apparent using the USDA classification scheme known as Rural-Urban Continuum Codes (RUCCs). Using this classification, metro counties are subdivided into three categories based on the population size of their metro area; nonmetro counties are subdivided into six categories based on their degree of urbanization and adjacency to a metro area. Using these definitions, rural counties in the South with populations of 20,000 or more that are not adjacent to a major metro area have relatively high rates of food insecurity (18% on average). Conversely, urban counties in the Northeast with populations of 1 million or more tend to have much lower rates of food insecurity (10% on average).

Analyzing food insecurity by geography highlights that individuals' need for food may vary across rural and urban communities, as well as by national region. As practitioners and policymakers seek to address food insecurity across the United States, they should strive to include areas that are more difficult to reach, and where communities may have insufficient infrastructure and resources needed to help meet the needs of their food-insecure neighbors.

FOOD INSECURITY AND INCOME

Estimating food-insecurity rates by level of income can provide important insight into the potential strategies that can be used to address hunger.

Federal nutrition programs like SNAP use various income thresholds to determine a family or individual's eligibility for that program. These income thresholds are tied to multiples (e.g., 100%, 135%, 185%) of the federal poverty line. The poverty guidelines, which vary by household size, reflect a minimum amount of money that a family needs to purchase basic necessities.

WHAT IS THE FEDERAL POVERTY LINE?

The poverty thresholds were established in 1963 based on research that indicated the average family spent about one-third of its annual income on food. The official poverty level was set by multiplying food costs by three for a "bare bones" subsistence meal plan (Blank & Greenberg, 2008). Although the figures are updated annually to account for inflation, they have otherwise remained unchanged, despite the fact that modern family budgets are divided very differently than they were more than 50 years ago (Blank & Greenberg, 2008). Now, household budgets include myriad expenses that have increased relative to food prices or were virtually non-existent when the official poverty measure was created.

SNAP AND OTHER FEDERAL NUTRITION PROGRAMS

Federal food assistance programs such as the Supplemental Nutrition Assistance Program (SNAP), the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and school meals, including the School Breakfast Program (SBP) and the National School Lunch Program (NSLP) determine eligibility thresholds by multiplying the official poverty line by 130% or 185% to provide a rough proxy for need beyond the scope of the official poverty level (see Table 06). SNAP eligibility thresholds are state-specific and range from 130% to 200% of poverty, while WIC and reduced-price school meals are typically only available to children in households with incomes below 185% of poverty.

For example, the poverty guideline for a family of four in the lower 48 states is a pre-tax income of $25,100 (HHS, 2018). To determine the federal income limit for SNAP eligibility, one would multiply $25,100 by 130% to arrive at $32,630. This means that, among other eligibility criteria, in many states, a family of four earning more than $33,000 is unlikely to qualify for SNAP.[11]

[11] The SNAP gross income eligibility level varies across states, ranging from 130 to 200 percent of the federal poverty level. The SNAP net income eligibility level must fall at or below 100 percent of the federal poverty level.

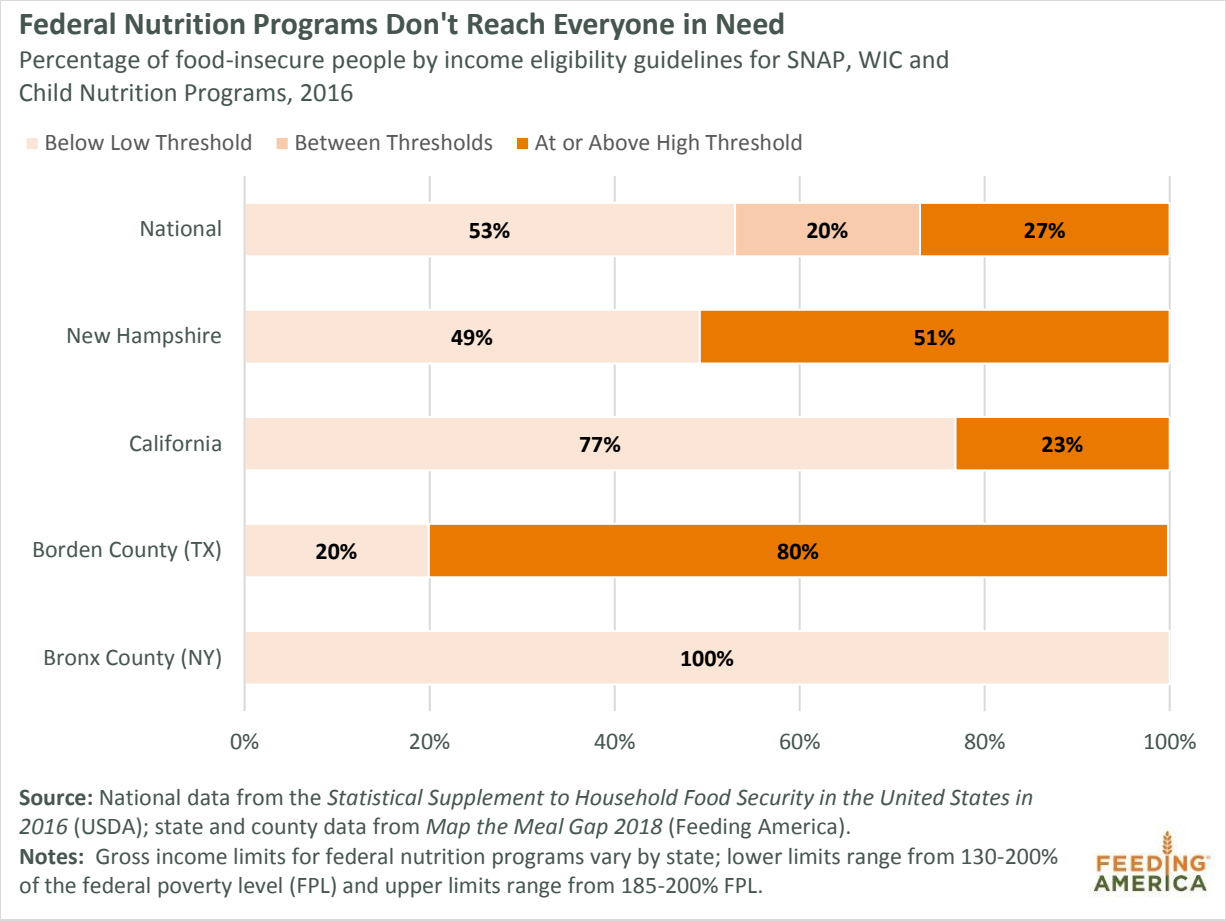
TABLE 06: SNAP Income Eligibility by Household Size for the 48 Contiguous States and D.C., 2018		
Household Size	Poverty Guideline	SNAP Income Limit
1	$12,140	$15,782
2	$16,460	$21,398
3	$20,780	$27,014
4	$25,100	$32,630

Source: U.S. Department of Health and Human Services, U.S. Department of Agriculture
Note: Gross income limits for SNAP vary by state, ranging from 130-200% of poverty

Because of the common use of these federal nutrition program thresholds, the *Map the Meal Gap* analysis estimates how many food-insecure people's incomes fall within each income bracket. First, we estimate the percentage of food-insecure individuals whose incomes fall at or below the SNAP eligibility level (130% of poverty or the state threshold, if higher). Then, we estimate the percentage of those whose incomes are too high to be eligible for SNAP yet are within the threshold for other major federal nutrition programs (between 130 and 185% of poverty or the state threshold). Finally, we estimate the percentage of incomes that are too high to be eligible for any government food assistance (above 185% of poverty or the state threshold). Areas with a high percentage of food-insecure individuals eligible for SNAP (based on gross income) might benefit from increased awareness, outreach and application assistance for enrollment in SNAP. Looking across income eligibility estimates provides context for determining what federal and state programs are available to food-insecure people and what gaps are left to be addressed by charitable food assistance like food banks. Understanding the overlap between food insecurity and federal nutrition program eligibility provides local agencies with the level of information needed to tailor programs to meet local need.

ELIGIBILITY FOR FEDERAL NUTRITION PROGRAMS

Federal nutrition programs are the first line of defense against hunger, but not everyone who is food insecure receives adequate support or even qualifies for federal assistance. In every state except New Hampshire, and in most counties, a majority (50% or more) of people estimated to be food insecure are likely to qualify for some form of federal nutrition assistance. Many states, however, contain a mix of counties wherein some contain a majority food-insecure population that are eligible for SNAP while others have a majority food-insecure population that is likely ineligible for any form of federal food assistance. In fact, there are 104 counties in which a majority of food-insecure people are unlikely to qualify for any government food assistance programs. This group includes small rural counties like Borden County, Texas, but most (63%) are urban (metro) counties with higher-than-average median incomes.



Among counties with the highest rates of food insecurity (those in the top 10%), it is less common for people to be food insecure and ineligible for government food assistance. Whereas 28% of people estimated to be food insecure across all counties earn more than the state gross income limit, 21% of food-insecure individuals among counties with the highest food-insecurity rates are unlikely to qualify. Still, this indicates that even in high food-insecurity counties there are individuals in need who may fall outside the federal safety net and must instead rely on family, friends and charitable assistance when they need help.

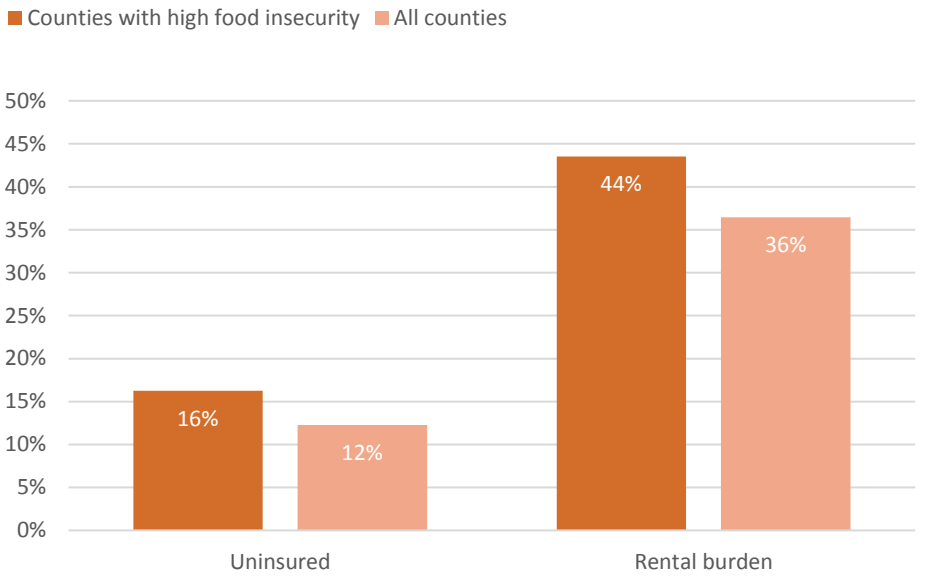
FOOD INSECURITY, HEALTH INSURANCE, AND HOUSING

Some households that are struggling to make ends meet may not have room in their budget for health insurance. Insurance helps pay for medical expenses, such as doctor visits and medications. For a household without health insurance, the cost of these expenses can take families from just above the poverty line to below it. However, a food-insecure household may not be able to afford health insurance, or the copays that come with it. Data from *Map the Meal Gap* indicate that counties with the highest rates of food insecurity also tend to have higher uninsured rates (16%) relative to all counties (12%).

Research also suggests a relationship between housing instability and poor health outcomes in a household. For example, bouts of homelessness can have a profoundly negative impact on a family's mental and emotional stress, and unstable housing increases the likelihood that a family will not be able to comply with a prescription or treatment for a chronic illness (Kushel, Gupta, Gee, & Haas, 2006; Hwang, 2001). High rental burden, which occurs when a household pays 35% or more of their income on rent, may also indicate a lack of resources for a household to afford adequate food and health insurance coverage, potentially increasing the risk for negative health outcomes. Compared to all counties, those with higher rates of food insecurity tend to have higher rates of rental burden (44% versus 36%).

Health and Housing in Counties with High Food Insecurity

Percentage of total county population by health insurance coverage, rental burden and food insecurity, 2016



Source: Food insecurity data from Feeding America; other data from from Centers for Disease Control (CDC) and the American Community Survey (ACS).
Note: Counties with high food insecurity refer to the top 10% (n=316) of all 3,142 U.S. counties and county equivalents with the highest estimated rates of food insecurity.

FOOD INSECURITY IN CONGRESSIONAL DISTRICTS

In addition to developing county-level food-insecurity estimates, Feeding America develops estimates for congressional districts using the same methodology (refer to the Methodology Overview on page 12).

No congressional district is free of food insecurity. Prevalence ranges from a low of 3% in Illinois' 4th congressional district to a high of 28% in Mississippi's 2nd.

Congressional districts that fall within the top 10% for high food-insecurity rates (44 districts) had an average (unweighted) food-insecurity rate of 22% compared to 13% across all districts. Much like the high food-insecurity rate counties, high food-insecurity rate congressional districts are heavily concentrated in the South, as shown in Table 07.

TABLE 07: HIGH FOOD-INSECURITY RATE DISTRICTS BY U.S. CENSUS REGION AND DIVISION, 2016		
U.S. Census Division (Region)	**Districts (#)**	**Districts (%)**
West South Central (South)	12	27.3%
East North Central (Midwest)	10	22.7%
South Atlantic (South)	10	22.7%
Middle Atlantic (Northeast)	6	13.6%
East South Central (South)	5	11.4%
West North Central (Midwest)	1	2.3%
Total	**44**	**100.0%**

When compared to national averages, the districts with the highest food-insecurity rates also had higher-than-average unemployment (8% versus 6%) poverty (22% versus 14%), and lower-than-average median income ($43,752 versus $60,090). The wealthiest districts, representing the 10% with the highest median incomes, are also not immune to the issue of hunger. These affluent communities are home to an average of 71,000 people estimated to be food insecure. Cumulatively, the wealthiest congressional districts are home to more than 3 million food-insecure men, women and children.

FOOD PRICE VARIATION ACROSS THE UNITED STATES

The first phase of the *Map the Meal Gap* analysis focused on increasing understanding of the population in need by estimating county and congressional district level food-insecurity rates. In conjunction, Feeding America sought to understand how much additional food those who are struggling with food insecurity feel they need and how the relative cost of meeting that need may vary due to food prices at the local level.

To address this goal, a local-level estimation of the additional food budget that food-insecure individuals report needing was developed. In order to understand how regional and local variations in food costs may present challenges for the food-insecure population, Feeding America worked with Nielsen to create a county-level food cost index. Although this analysis does not imply causality between food costs and food insecurity, other research indicates that food costs can directly impact food insecurity (Nord et al., 2014). Food prices represent an important component of cost-of-living that affects households' ability to afford food.

As of 2016, the average meal cost in the United States is $3.00, a slight increase from $2.94 in 2015. Local meal costs range from 68% to more than twice the national average, resulting in meal cost variations ranging from as little as $2.04 in Willacy County, Texas to as much as $6.20 in Crook County, Oregon. [12] Across all counties where the average meal cost is higher than the national average, there are an estimated 24.8 million food-insecure people. Among counties in the continental United States that have the highest food-insecurity rates, meal costs reach as high as 118% of the national average ($3.53 per meal in Orleans Parrish, Louisiana). For a household struggling to afford housing, utilities, transportation and other basic necessities, the additional burden of high food prices can have a significant impact on a household's budget.

TABLE 08: HIGH-COST COUNTIES BY GEOGRAPHIC AREA, 2016

County Type	High-Cost Counties	All Counties
Metropolitan	56%	37%
Micropolitan (Rural)	19%	20%
Neither (Rural)	25%	42%
Total	**100%**	**100%**

FOOD INSECURITY SINCE THE GREAT RECESSION

Across the United States, 41 million people (13%) are estimated to be food insecure as of 2016. Although essentially unchanged since 2015, the prevalence of food insecurity has declined

[12] The calculations for variance of food price and the highest meal cost among high food-insecure counties exclude Alaska and Hawaii; the total number of food-insecure people in counties with food costs higher than the national average includes all 50 states.

significantly since reaching 17% of the U.S. population in 2009, the last year of the Great Recession. The prevalence of food insecurity, however, only tells part of the story.

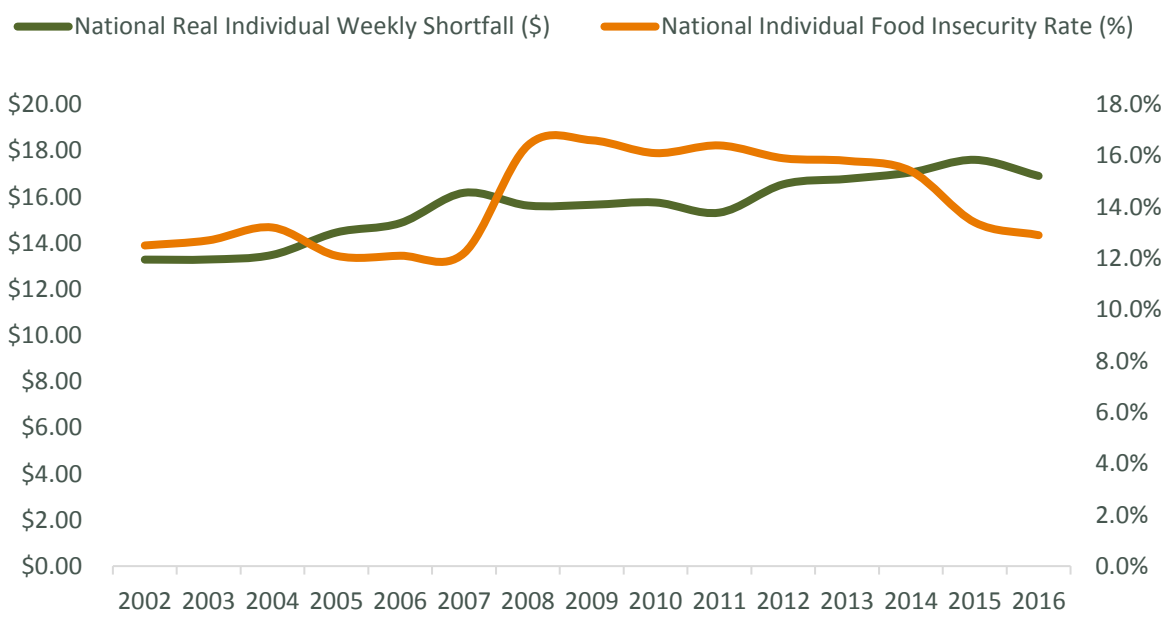
Food-insecurity rates alone don't provide insight into how the challenges facing food-insecure individuals have changed over time. One way to examine changing need among those struggling with hunger is to look at changes in how much additional money they report needing each week to meet their food needs, or the food budget shortfall.

In 2016, food-insecure households reported needing an additional $16.90 per person per week, on average, to meet their food needs. When accounting for inflation, this shortfall represents a 4% decrease from 2015; however, it also represents an 8% increase since 2008, the first full year of the Great Recession. Despite the national decline in food-insecurity rates, the amount of money food-insecure individuals report needing is still higher than it was at the start of the recession.

The increase in the food budget shortfall since 2008 helps shed some light on the continued struggles of food-insecure individuals and families across the country. Although the total number of people living in food-insecure households has decreased during the economic recovery, individual need among people who are food insecure has remained higher. Despite the economic recovery and reductions in unemployment and poverty, millions of people still struggle to get by because of persistent economic challenges, such as underemployment and

Reported Need Down but Still High in 2016

Reported dollars needed per week to be food secure



Note: Shortfall values from *Map the Meal Gap 2018* calculated using Current Population Survey (CPS) data and adjusted for inflation using 2016 dollars; food-insecurity rates from the USDA

stagnant wages. In addition, rising costs for essentials, especially rent and housing expenses, continue to put real cost pressure on low-income families, many of whom already report having to make regular spending tradeoffs to help ensure they have sufficient food.

COUNTIES WITH HIGHER FOOD PRICES

The top 10% of counties with the highest meal costs (316) have an average meal cost of $3.59, 20% higher than the national average of $3.00. There are 74 counties where the cost of a meal is at least 25% more than the national average ($3.75 or higher). Among the 10% of counties with highest meal costs, more than half (56%) are located in urban (metro) areas (versus 37% of all counties), while 44% are in rural (nonmetro) areas (versus 63% of all counties).

As noted above, a larger share of counites with the highest meal costs are part of populous urban (metro) areas. Food prices also tend to be higher in urban counties overall, but meal costs vary substantially by rural (nonmetro) county and region. For example, some of the highest meal costs in the country are in nonmetro counties adjacent to a major metro area. In one of these counties, Nevada County, California, the cost per meal is $4.61, 54% more than the national average; however, the largest municipality in Nevada County is Grass Valley, population 13,000, which is 60 miles from Sacramento, California. Other counties that rank among those with the highest meal costs are in the Northeast and are part of more urban metro areas; one example is Manhattan (New York County, New York), where the meal cost is $5.70, making it the county with the second highest meal cost in the United States.

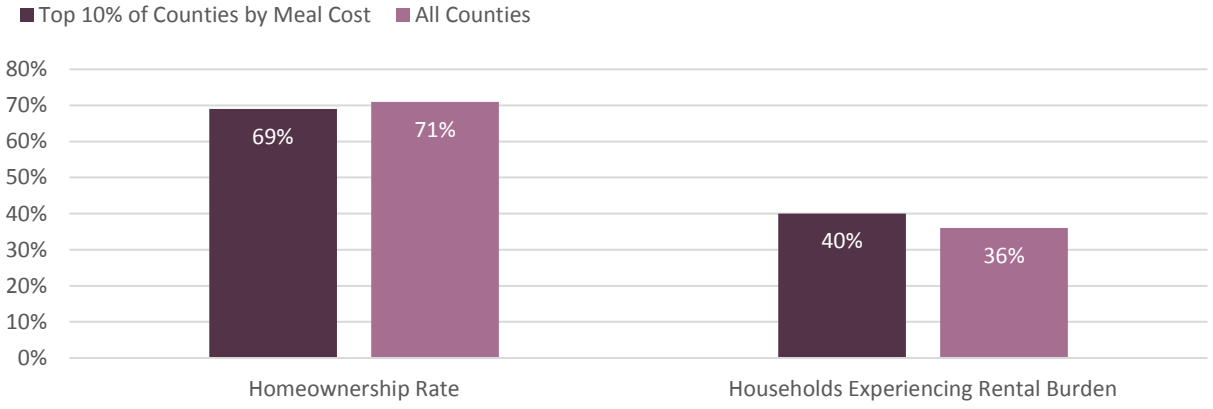
In some cases, the meal cost may be high in part due to the expense of transporting food to a resort area or an island. For example, Nantucket County, Massachusetts, where the average cost of a meal is $3.56, is a popular island vacation destination with a high median income. There are a few other counties with a significant resort or vacation presence among the highest meal-cost areas, such as Aspen in Pitkin County, Colorado ($3.54) and Napa County, California ($4.18). While local families in such areas typically have higher-than-average median incomes, these communities are also home to households with lower incomes for whom higher food costs can be particularly challenging.

HIGH FOOD INSECURITY COUPLED WITH HIGH FOOD COST

Six counties fall into the top 10% for both food insecurity and meal cost (see Table 09). An average of one in every five individuals in these counties is food insecure, totaling more than 165,000 food-insecure people who live in areas with some of the highest meal costs. Although these counties may not face the highest food prices in the nation, the average cost per meal reaches as high as $3.53 in Orleans Parrish, Louisiana, 18% higher than the national average. Five of the six counties are located in the South and have persistent poverty. While all six counties have average unemployment (5%), they also have higher-than-average poverty (27% on average versus 16% nationally) and low homeownership (57% versus 71%).

Counties with High Meal Costs have Slightly Lower Homeownership and Higher Rental Burden

Percentage of total county population by homeownership and rental burden among counties with high meal costs, 2016



Source: Data from 2012-2016 American Community Survey (ACS).
Note: A household experiences rental burden when it pays 35% or more of its income on rent.

Furthermore, high meal costs can force food-insecure households to make tradeoffs that in turn make it difficult to invest in their long-term economic success. They may even force families to choose between buying food and paying for housing. Compared to all counties, those with the highest meal costs tend to have lower rates of homeownership, higher rent, and a higher rental burden—which occurs when a household pays 35% or more of their income on rent.

TABLE 09: COUNTIES WITH HIGHEST FOOD INSECURITY AND HIGHEST MEAL COSTS, 2016

County	State	Region	Food Insecure	Meal Cost	Unemployment	Poverty	Homeownership	Median Income
Okitbbeha	MS	South	**23.6%**	$3.37	5.5%	32.6%*	52.1%	$33,431
Orleans	LA	South	**22.8%**	$3.53	5.9%	26.2%*	46.4%	$37,488
Grenada	MS	South	**20.7%**	$3.31	5.2%	24.1%*	70.9%	$33,026
Alachua	FL	South	**19.8%**	$3.46	4.3%	24.2%*	53.7%	$44,702
Whitman	WA	West	**19.7%**	$3.51	5.1%	30.0%	44.6%	$38,636
Yalobusha	MS	South	**19.4%**	$3.38	6.2%	21.6%*	74.4%	$34,749

* Persistent-poverty county

CHILD FOOD INSECURITY: RESULTS AND DISCUSSION

Although child food insecurity continued its downward trend since the recession in 2016, the results of *Map the Meal Gap* find that children remain at risk in every county in the United States.

The percent of children estimated to be food insecure at the county level ranged from a low of 6% to a high of 40%.[13] Although households with children have slightly higher median incomes on average, they may also experience greater budgetary constraints, due to larger household sizes and the fact that some household members rely on caregivers and do not contribute to household income (Coleman-Jensen et al., 2013). The following sections summarize key findings about child food-insecurity estimates from the *Map the Meal Gap* model, including a discussion on income and regional variations.

CHILD FOOD INSECURITY AT THE STATE LEVEL

Across states, the percentage of children estimated to live in a food-insecure household is notably higher compared to the general population. This is consistent with what the USDA finds at the national level. State estimates of child food insecurity from the USDA are presented in Table 10 on page 36.[14]

Child food insecurity ranges from a low of 9% in North Dakota to a high of 26% in New Mexico. Even in the most food-secure state (North Dakota), 1 in 11 children struggles with food insecurity. Additionally, 16 of the 20 states with the highest child food-insecurity rates also have the highest rates of food insecurity among the general population. Of these 16 states with the highest need among both populations, 12 (75%) are located in the South. Some states in the Northeast, despite having lower child food-insecurity rates, have high absolute numbers of children living in food-insecure households because they are densely populated. For example, New York (18%) is home to 750,000 food-insecure children.

[13] Results indicate that child food insecurity exists in every county in the U.S. with a population under age 18. The 2016 ACS dataset does not contain adequate data for Loving, TX and Kalawao, HI. As a result, child food-insecurity rates could not be estimated for these two counties

[14] Based on one-year state data aggregated from 2016 congressional districts, rather than the three-year state averages provided in the USDA's annual report on household food security

TABLE 10: CHILD FOOD INSECURITY BY STATE, 2016			
State	Rank	Child Food Insecurity (%)	Child Food Insecurity (#)
U.S. (USDA)		17.5%	12,938,000
NM	1	25.6%	125,210
MS	2	24.4%	176,580
AR	3	23.2%	163,800
LA	4	23.1%	258,630
TX	5	23.0%	1,676,740
AZ	6	22.7%	370,960
OK	6	22.7%	218,770
AL	8	22.5%	247,140
DC	9	22.2%	26,800
GA	10	20.9%	523,470
NC	10	20.9%	479,220
FL	12	20.7%	857,150
NV	13	20.5%	138,880
OH	14	20.3%	528,960
WV	15	20.2%	75,970
OR	16	20.0%	173,780
ME	17	19.8%	50,520
TN	18	19.7%	295,570
KY	19	19.2%	194,440
CA	20	19.0%	1,731,270
SC	21	18.9%	207,840
AK	22	18.6%	34,800
KS	23	18.3%	131,130
NY	24	17.9%	750,000
HI	25	17.8%	54,650
IN	26	17.7%	279,840
WA	27	17.5%	284,480
MO	28	17.4%	241,830
RI	28	17.4%	36,230
NE	30	17.3%	82,070
MT	31	17.0%	38,810
PA	32	16.9%	452,690
DE	33	16.8%	34,240
ID	34	16.7%	72,840
WY	34	16.7%	23,500
SD	36	16.5%	35,360
MI	37	16.3%	356,930
WI	38	16.0%	205,660
IA	39	15.9%	115,890
IL	40	15.7%	459,330
VT	40	15.7%	18,620
CT	42	15.6%	117,380
UT	43	15.4%	142,320
MD	44	15.3%	205,890
CO	45	15.1%	190,780
NJ	46	13.5%	268,080
VA	47	13.3%	249,170
MN	48	12.7%	163,070
MA	49	12.1%	167,450
NH	50	11.4%	29,740
ND	51	9.4%	16,440

CHILD FOOD INSECURITY AT THE COUNTY LEVEL

CHILD FOOD INSECURITY CHANGE BETWEEN 2015 AND 2016

Nationally, the percent of children living in food-insecure households stands at 17.5% in 2016, essentially the same as in 2015 (Coleman-Jensen et al., 2017a) (see Table 10). Consistent with this national trend, nearly 99% of all counties did not see statistically significant changes in their child food-insecurity rates between 2015 and 2016. Of the 45 counties that did, however, 41 (91%) saw decreases. It bears mentioning that county level estimates may be less stable from year to year than those at the state or national level due to smaller sample sizes, particularly in counties with very small child populations. Because of the likelihood for inaccurate estimates from smaller sample sizes, specific county comparisons between 2015 and 2016 are not provided in this report.

CHILD FOOD-INSECURITY RATES

The variation in rates of child food insecurity at the county level demonstrates that this issue is much more pervasive in specific communities, although no county is free of child food insecurity. Across the 324 counties that fall into the top 10% for the highest child food-insecurity rates, the percent of children living in food-insecure households ranges from 26% to 40%. These counties also have notably higher poverty rates compared to the rest of the nation. Across the highest child food-insecurity counties, an average of 41% of children live in poverty, compared to 23% across all U.S. counties. These counties also suffer from low median incomes and high unemployment rates (see Table 11).

Table 11: AVERAGE CHILD FOOD INSECURITY AND COUNTY-LEVEL ECONOMIC INDICATORS, 2016

	Child Food Insecurity		Unemployment		Child Poverty		Homeownership*		Median Income *	
County Grouping	**2015**	**2016**	**2015**	**2016**	**2015**	**2016**	**2015**	**2016**	**2015****	**2016**
High Child Food-Insecurity Rate Counties	29.3%	28.3%	8.1%	7.8%	40.9%	40.5%	56.8%	56.4%	$36,146	$36,221
All U.S. Counties	21.1%	20.1%	5.5%	5.3%	23.3%	22.8%	65.1%	64.8%	$55,796	$56,657

*Among households with children

**In 2016 inflation-adjusted dollars

Similar to the overall population, there is considerable overlap between the counties with the highest rates of child food insecurity and the persistent-poverty counties identified by the USDA: more than half (N=195) of the high child food-insecurity rate counties (N=324) are also persistent poverty counties. In eight of the top 10% of counites with the highest child food-insecurity rates, more than 35% of children live in food-insecure households, including Issaquena County, Mississippi with a rate of 40%. Seven of these counties are designated as persistent-poverty counties by the USDA and are home to a majority non-white population, consistent with the overall findings that minority groups in some of these communities are disproportionately affected by longstanding poverty and systemic challenges. Three counties, Issaquena County, Mississippi, Kusilvak Census Area, Alaska, and East Carroll Parish, Louisiana,

have higher child food-insecurity rates than even the highest rate of food insecurity among the general population (36% in Jefferson County, Mississippi). However, it is important to note that child food insecurity is more pervasive in rural areas. Rural (nonmetro) counties account for 85% of high child food-insecurity counties, but only 63% of all U.S. (see Table 12).

TABLE 12: HIGH CHILD FOOD-INSECURITY RATE COUNTIES BY GEOGRAPHIC AREAS, 2016		
County Type	**High Child Food-Insecurity Rate Counties**	**All Counties**
Metropolitan	14.5%	37.1%
Micropolitan (Rural)	21.3%	20.4%
Neither (Rural)	64.2%	42.5%
Total	**100.0%**	**100.0%**

COUNTIES WITH THE HIGHEST NUMBER OF FOOD-INSECURE CHILDREN

Although the rate of child food insecurity is one important indicator of need, even counties with modest rates may still be home to large numbers of children whose families are food insecure. There are 14 counties in the U.S. with more than 100,000 food-insecure children (see Table 13). For example, Los Angeles County, California is home to more than 430,000 food-insecure children. Cook County, Illinois and Harris County, Texas both fall into this group and contain the third and fourth most populous cities in the United States (Chicago and Houston, respectively). Across the five counties that comprise New York City, there are nearly 350,000 food-insecure children in total. Counties with more than 100,000 food-insecure children have an average child food-insecurity rate of 20%, an average child poverty rate of 24% and an average unemployment rate of 5%.

Table 13: COUNTIES WITH MORE THAN 100,000 FOOD-INSECURE CHILDREN, 2016			
State	**County (Metro Area)**	**Food-Insecure Children (#)**	**Food-Insecure Children (%)**
CA	Los Angeles	**439,010**	19.1%
NY	New York (five boroughs, collectively)	**348,500**	19.4%
TX	Harris (Houston)	**284,240**	23.5%
AZ	Maricopa (Phoenix)	**216,340**	21.1%
IL	Cook (Chicago)	**197,290**	16.6%
TX	Dallas	**157,870**	23.3%
CA	San Diego	**127,280**	17.5%
CA	Orange (Anaheim)	**117,350**	16.3%
CA	Riverside	**116,550**	19.0%
TX	Tarrant (Ft. Worth)	**115,120**	21.8%
CA	San Bernardino	**114,520**	19.9%
FL	Miami-Dade	**109,780**	20.0%
TX	Bexar (San Antonio)	**103,350**	21.2%
NV	Clark (Las Vegas)	**101,030**	20.5%

Although these counties may exhibit rates of child food insecurity close to the average of all counties, the fact that they are home to a large number of food-insecure children illustrates that they still face real challenges in addressing the need in their communities due to the sheer number of children whose families may be in need.

CHILD FOOD INSECURITY AT THE CONGRESSIONAL DISTRICT LEVEL

Similar to findings at the county and state level, no congressional district is free of child food insecurity. Rates range from an estimated low of 9% (more than 18,000 children) in Virginia's 10th congressional district and (almost 14,000 children) in New Jersey's 7th congressional district to 29% (more than 50,000 children) in Mississippi's 2nd congressional district. The congressional district with the largest number of food-insecure children is Texas' 15th, where an estimated 65,540 children (27%) live in food-insecure homes.

The congressional districts with the highest rates of child food insecurity – the 46 that fall into the top 10% among all districts – have an average rate of 26%, compared to 19% of children in the average district. Incomes in these districts are also much lower; the average child poverty rate across these districts is 34%, compared to 19% in the average district.

HEALTH IMPLICATIONS OF CHILD FOOD INSECURITY

There is a broad base of literature illustrating links between food insecurity and poor child health and behavioral outcomes at every age. For example, food-insecure women are more likely to experience birth complications than food-secure women (Laraia, Siega-Riz, & Gundersen, 2010). One indicator of child and maternal health is low birthweight among infants, which is more common among counties with the highest rates of child food insecurity than across all counties (10% versus 8%) (Robert Wood Johnson Foundation, 2018). Furthermore, children struggling with food insecurity may be at greater risk for stunted development, anemia and asthma, oral health problems and hospitalization (Kirkpatrick, McIntyre, & Potestio, 2010; Eicher-Miller, Mason, Weaver, McCabe, & Boushey, 2009; Skalicky et al., 2006; Muirhead, Quiñonez, Figueiredo, & Locker, 2009; Cook, 2006). Overall, food insecurity is linked with poorer physical quality of life, which may prevent children from fully engaging in daily activities (Casey et al., 2005). At school, food-insecure children are at increased risk of falling behind their food-secure peers both academically and socially; food insecurity is linked to lower reading and mathematics test scores, and they may be more likely to exhibit behavioral problems, including hyperactivity, aggression and anxiety (Jyoti, Frongillo, & Jones, 2005; Slack, & Yoo, 2005; Whitaker, Phillips, & Orzol, 2006; Slopen, Fitzmaurice, Williams, & Gilman, 2010).

CHILD FOOD INSECURITY, INCOME, & FEDERAL FOOD ASSISTANCE

In recognition of the importance of federal child nutrition programs to the development of low-income children, *Map the Meal Gap* also provides estimates around whether children in food-insecure households are income-eligible for these programs.

In 95% of U.S. counties (N=2,987), a majority (50% or more) of food-insecure children live in households with incomes at or below 185% of the federal poverty line, meaning they are likely eligible for government programs targeted for children like WIC and school lunch. Among the high child food-insecurity counties, an average of 78% of food-insecure children live in households with incomes below 185% of the poverty line.

Findings indicate that an overwhelming majority of food-insecure children in these counties are likely eligible to receive assistance from child nutrition programs. Nationally, WIC supports more than 7 million pregnant, breastfeeding and postpartum women and their young children (USDA, FNS, 2018). The NSLP, SBP and Summer Food Service Program (SFSP) provide meals to low-income children in school and during school breaks. More than 100,000 schools operate NSLP, providing free or reduced price lunches to 22 million children (USDA FNS, 2018). SNAP provides electronic benefit cards to households to purchase groceries, and although it is not limited to children, 44% of all SNAP participants in federal fiscal year 2016 were children (more than 19 million children) (United, 2017). Federal nutrition programs are the first line of defense against hunger, and it is critically important to understand the income composition of the food-insecure population in each county and congressional district to help flag where outreach may be needed to maximize participation in these programs.

CHARITABLE FOOD ASSISTANCE

Although many food-insecure households are also low-income, households with incomes well above the federal poverty line can also be food insecure. In many counties, there are still food-insecure children whose households have incomes above 185% of poverty, which render them likely ineligible for any federal assistance targeted specifically to children.

In more than 150 counties, a majority of food-insecure children are likely ineligible for assistance. Examples of food-insecure children are found in diverse locations around the country. For example, in Daggett County, Utah, approximately 14% of all children are food insecure and 97% of these children live in households with incomes above 185% of the poverty line. In Nassau County, New York, more than half (51%) of the estimated 34,890 food-insecure children are living in households with incomes above 185% of the poverty level. Some counties also have high child food-insecurity rates and low median incomes, but relatively high percentages of children living in ineligible households. In Clinch County, Georgia, for example, 28% of children are estimated to be food insecure and family median income is $25,161 (less than half the average of all counties). However, more than 1 in 4 food-insecure children (28%) are estimated to reside in households with incomes too high to qualify for government food programs. For these children and their families, charitable assistance may play a critical role in helping them meet their food needs.

As high levels of food insecurity persist, the number of families turning to charitable food assistance organizations remains at record levels. In 2013, more than 46 million people, representing nearly 15.5 million households, received assistance through the Feeding America network of food banks. Of the 46 million individuals reached by food banks, more than 12 million were children, 3.5 million of whom were ages 5 or younger. Nearly two-thirds (63%) of households served by Feeding America report planning to get food at meal or grocery programs on a regular basis to help with their monthly food budget, as opposed to waiting to come on an emergency basis (*Hunger in America*, 2014).

There may be a number of reasons why these households struggle. As discussed in the Methodology Overview (see page 12), unemployment is a strong risk factor for food insecurity; however, other challenges, such as income shocks, medical expenses, living in a high-cost area and underemployment, may also contribute to these households' struggles to meet their food needs. In the Feeding America research report *In Short Supply: American Families Struggle to Secure Everyday Essentials*, low-income families reported altering their food purchasing habits in order to afford non-food necessities such as soap, personal hygiene products and diapers, highlighting that non-food needs can place equal burden on a struggling household (Santos et al., 2013). Better understanding these nuances can enable state and local legislators, food banks and other community leaders to tailor efforts to best address the need within their own communities and understand where they can strengthen the safety net to ensure no child suffers. Children's vulnerability to recessions and other economic shifts depends on the strength of the social safety net.

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Carol Medlin is Chief Program Officer at Feeding America. Carol oversees the design, development and execution of Feeding America programs and partnerships that help improve access to a variety of nutritious food through our network and improve outcomes for the people we serve, with the goal of ending hunger. She guides the organization's strategic research agenda to shape polices and strategies for advancing a hunger free America.

Carol possesses more than twenty years of experience implementing strategy, and leveraging research, data, and analytics to maximize social impact and improve organizational performance. She has worked with leading think tanks and philanthropic organizations, including The Bill and Melinda Gates Foundation and, most recently, the Children's Investment Fund Foundation (CIFF) in London. Carol has served on the Board of Commissioners of the International Initiative on Impact Evaluation (3IE) and on the advisory committee of the Global Health Investment Fund (GHIF), an innovative social impact fund. She is Founder and Principal of Praxis Social Impact Consulting.

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MAP THE MEAL GAP 2018

TECHNICAL APPENDIX

The following methodological overview will provide a description of the methods and data used to establish the congressional district and county-level food insecurity estimates, the food budget shortfall, the cost-of-food index, and the average cost of a meal. Following each section, provide information on the central results for our methods.

REASERCH GOALS

The primary goal of the *Map the Meal Gap* analysis is to more accurately assess food insecurity at the community level. The methodology undertaken to make this assessment was developed to be responsive to the following questions:

- Is the methodology directly related to the need for food?
    - Yes, it uses the USDA food-insecurity measure.
- Does it reflect the many determinants of the need for food?
    - Yes, along with income, our measure uses information on unemployment rates, median incomes, and other factors that have been shown to be associated with food insecurity
- Can it be broken down by income categories?
    - Yes, we can break it down into relevant income categories
- Is it based on well-established, transparent methods?
    - Yes, the methods across the different dimensions are all well-established
- Can we provide the data without taxing the already limited resources of food banks?
    - Yes, the measures are all established by the Feeding America national office
- Can it be consistently applied to all counties in the U.S.?
    - Yes, the measure relies on publicly available data for all counties
- Can it be readily updated on an annual basis?
    - Yes, the publicly available data is released annually
- Does it allow one to see the potential effect of economic downturns?
    - Yes, by the inclusion of relevant measures of economic health in the models

SUMMARY OF METHODS

OVERALL AND CHILD FOOD-INSECURITY RATE

METHODOLOGY

We begin by analyzing the relationship between food insecurity and its determinants (poverty, unemployment, median income, etc.) at the state level. We then use the coefficient estimates from this analysis combined with information on the same variables defined at the county level to generate estimated food-insecurity rates for all individuals and for children at the county and congressional district levels.

DATA SOURCES

The Current Population Survey (CPS) survey data are used to assess the relationship between food insecurity and determinants of food insecurity at the state level. The variables used were selected because of their availability at the county, congressional district, and state level and included unemployment rates, median income, poverty rates, homeownership rates, percent of the population that is African American, and percent of the population that is Hispanic. County and congressional district level data are drawn from the American Community Survey (ACS), with the exception of the unemployment data, which are drawn from the Bureau of Labor Statistics (BLS). For the child food-insecurity estimates, we use data restricted to households with children for all variables except the unemployment rate, which is defined for the full population of the county.

FOOD BUDGET SHORFALL

METHODOLOGY

Responses from food-insecure households to CPS questions about a food budget shortfall are calculated at the individual level and then averaged to arrive at a weekly food budget shortfall of $16.90. As discussed in *Household Food Security in the United States in 2016* (Coleman-Jensen et al., 2017), households experiencing food insecurity experience this condition in, on average, seven months of the year.

FI persons * $16.90 * 52 weeks * (7/12) =	$ reported needed by the food insecure to meet their food needs in 2016

DATA SOURCES

The CPS data includes two questions relevant for this determination. First, a question asks if a household needed more, less, or the same amount of money to meet their basic food needs. Second, those that respond “more” are asked a further question about how much more money is needed. These questions are posed after questions about weekly food expenditures, but before the food security module.

COST-OF FOOD INDEX

METHODOLOGY

To establish a relative price index that allows for comparability between counties, Nielsen assigns every sale of UPC-coded food items in a county to one of the 26 food categories in the USDA Thrifty Food Plan (TFP). These are then weighted to the TFP market basket based on pounds

purchased per week by age and gender. For the current analyses, pounds purchased by males age 19-50 are examined. While other Thrifty Food Plans for different ages and/or genders may have resulted in different *total* market basket costs, *relative pricing* between counties (our goal for this analysis) is not affected. The total market basket is then translated into a multiplier that can be applied to any dollar amount. This multiplier differs by county, revealing differences in food costs at the county level.

DATA SOURCES

Nielsen provided in-store scanning data and Homescan data.

NATIONAL AVERAGE MEAL COST

METHODOLOGY

The average dollar amount spent on food per week by food-secure individuals is divided by 21 (three meals per day x seven days per week). Food expenditures for *food-secure* individuals were used to ensure that the result reflected the cost of an adequate diet. We then weight the national average cost per meal by the "cost-of-food index" to derive a localized estimate.

DATA SOURCES

Before respondents are asked the food security questions on the CPS, they are asked how much money their household usually spends on food in a week.

FOOD-INSECURITY RATE ESTIMATES

METHODS

Full Population of Counties (and Congressional Districts)

We proceed in two steps to estimate the extent of food insecurity in each county. In what follows, the descriptions are for counties but, except where otherwise noted, they also apply to congressional districts. Because congressional districts were redrawn in 2012, MMG estimates are available for the current congressional districts only for 2012 through 2016 (the last five years).

Step 1: Using state-level data from 2001-2016, we estimate a model where the food-insecurity rate for individuals at the state level is determined by the following equation:

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

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 percent Hispanic, BLACK is the percent African-American, OWN is the percent of individuals who are homeowners, μ_t is a year fixed effect, υ_s is a state fixed effect, and ε_{st} is an error term. This model is estimated using weights defined as the state population. 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. A household is said to be food insecure if the respondent answers affirmatively to three or more questions from the Core Food Security Module (CFSM). A complete list of questions in the CFSM is found in Table 1.

Our choice of variables was first guided by the literature on the determinants of food insecurity. We included variables that have been found in prior research to influence the probability of someone being food insecure. (For an overview of that literature in this context see Gundersen and Ziliak, 2014; Gundersen et al., 2012.) Next, we chose variables that are available both in the CPS and at the county level, such as those in the American Community Survey (ACS) or other sources (described below). The model does not include variables that are not available at both the state and county level.

Of course, these variables do not portray everything that could potentially affect food-insecurity rates. In response, we include the state and year fixed effects noted above which allow us to control for unobserved state-specific and year-specific influences on food insecurity.

Step 2: 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:

$$FI^*_c = \hat{\alpha} + \widehat{\beta_{UN}}UN_c + \widehat{\beta_{POV}}POV_c + \widehat{\beta_{MI}}MI_c + \widehat{\beta_{HISP}}HISP_c + \widehat{\beta_{BLACK}}BLACK_c + \widehat{\beta_{OWN}}OWN_C + \widehat{\mu_{2015}} + \hat{v_s} \quad (2)$$

where c denotes a county. The variables POV, MI, HISP, BLACK, and OWN are all based on averages taken from the ACS for 2012 to 2016 in the county-level models and from 2016 in the congressional district-level models. The variable UN is based on the 2016 values from BLS for the

county-level estimates and 2016 from the ACS for the congressional district models. From our estimation of (2), we calculate both food-insecurity rates and the number of food-insecure persons in a county. The latter is defined as $FI^*_c * N_c$ where N is the number of persons. The estimation of (1) gives us point estimates for food-insecurity rates at the county level.

Income Bands within Counties (and Congressional Districts)

Food-insecurity rates are also estimated for those above or below each state's Supplemental Nutrition Assistance Program (SNAP) and National School Lunch Program (NSLP) income eligibility threshold (see Appendix A for a list of SNAP and NSLP thresholds for each state). In this case, we continue to proceed with a two-step estimation method. The structure of the equations is slightly different than above. Equation (1) is instead specified as follows:

$$FIC_{st} = \alpha + \beta_{UN}UN_{st} + \beta_{HISP}HISP_{st} + \beta_{BLACK}BLACK_{st} + \beta_{OWN}OWN_{st} + \mu_t + \upsilon_s + \varepsilon_{st} \quad (1')$$

and equation (2) is specified as:

$$FIC^*_c = \hat{\alpha} + \widehat{\beta_{UN}}UN_c + \widehat{\beta_{HISP}}HISP_c + \widehat{\beta_{BLACK}}BLACK_c + \widehat{\beta_{OWN}}OWN_C + \widehat{\mu_{2015}} + \hat{v_s} \quad (2')$$

In this case, (1') is estimated on the following sample: We limit the estimation to those with incomes within a particular income range (e.g., below 130 percent of the poverty line) but UN, BLACK, HISPANIC, and OWN are defined for all individuals. We do so since these variables are only available in the ACS for all income levels.

Based on our estimation of (2'), we are interested in three main things. First, directly from (2'), we have the food-insecurity rate within a county for those within a particular income band. Second, using (2'), we can derive the percentage of food-insecure persons within a county with incomes within a particular band. This is calculated as $(FIC^*_{cs} * NC_{cs})/(FI^*_{cs} * N_{cs})$ where NC_{cs} is the number of people below a certain income threshold. Third, the percentage of food-insecure persons within a county above a particular threshold is then calculated as $1-(FIC_{cs} * NC_{cs})/(FI_{cs} * N_{cs})$. Estimated food-insecurity rates by income bands within congressional districts were estimated using the same methods.

Child Population of Counties (and Congressional Districts)

To estimate child food-insecurity rates at the county and congressional district levels, we proceed in essentially the same manner as for the full population. However, a few notes are needed regarding the specific procedures used for child food insecurity.

First, we define the variables for households with children rather than for all households. For example, the poverty rate is defined only for households with children. The only exception is for the unemployment rate variable, which is defined for all households. We made this decision because the sub-state unemployment rates as constructed by BLS are not broken down by whether or not an adult lives in a household where children are present.

Second, we define child food insecurity in the following manner. There are three measures of food insecurity related to children (Coleman-Jensen et al. 2017, Table 1B). The first, and the one we use, is "children in food-insecure households," which includes children residing in households experiencing low or very low food security among children, adults, or both. To be in this category, a household with children must respond affirmatively to at least three of the 18 questions in the Core Food Security Module (CFSM) in the CPS. The count of children who are food insecure is based on the number of children in food-insecure households, and the food-insecurity rate is the ratio of the number of children in food-insecure households to the total number of children in the relevant geographic area. (This measure is distinct from two other measures found in Coleman-Jensen et al. (2017) – households with food insecure children and households with very low food secure children, albeit all children falling into either of these two categories would also be categorized as being in a food insecure household.)

Third, in light of the smaller sample sizes for children, we do not break things down in the same income bands as with the full population. Instead, we break the analyses down in accordance with the threshold for free or reduced price lunches in the NSLP. Unlike for SNAP thresholds, this cutoff is the same for all states.

DATA

The information at the state level (i.e., the information used to estimate equations (1) and (1')) is derived from the CFSM in the December Supplement of the CPS for the years 2001-2016. While 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 post-2001 years 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, 50,000 households respond to a series of questions on the CFSM, in addition to 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 and thus do not include information on individuals living in group quarters, including nursing homes or assisted living facilities. Using information on all persons in the CPS for which we had information on (a) income and (b) food insecurity status, we aggregated information up to the state level for each year to estimate equation (1). We aggregated in a similar manner for equation (1'); however, only those below a defined income threshold were used in the aggregation. As noted above, the values for the full sample for the other variables outside of income are used.

For information at the county level (i.e., the information used to estimate equations (2) and (2')), we used information from the 2012-2016 five-year ACS estimates and unemployment data from the BLS. The ACS is a sample survey of three million addresses administered by the Census Bureau. In order to provide estimates for areas with small populations, this sample was defined over a five-year period. Information about unemployment at the county level was taken from information from the BLS's labor force data by county, 2016 annual averages. For information at

the congressional district level, including unemployment data (i.e., the information used to estimate equation (2)), we used information from the 2016 one-year ACS estimates. For both county and congressional districts, ACS data were drawn from tables S1701 (poverty rate), C17002 (ratio of income to poverty level), B19013 (median income), DP04 (homeownership rate), and DP05 (percent African-American and percent Hispanic). For congressional districts, unemployment data were drawn from S2301. All 3,142 counties provided by the Census Bureau were included in the analysis.

For information at the child level, ACS data were drawn from tables S1701 (poverty), B17024 (ratio of income to poverty level), B19125 (household median income), B09001I (number of Hispanic children), B09001B (number of African-American children), and B25115 (homeownership). For congressional districts, child data tables are the same as those used for the county-level data with the exception of percent Hispanic and African-American children, which were pulled from S1901.

RESULTS

We now turn to a brief discussion of the results from the estimation of equation (1) and (1'). These results for the full population are presented in Table 2. In this table, we present coefficient estimates for selected variables and the corresponding standard errors for the full population and for various income categories.

Concentrating on column (1), there are several points worth emphasizing from these results. First, as expected, the effects of unemployment and poverty are especially strong. A one percentage point increase in the unemployment rate leads to a 0.50 percentage point increase in food insecurity, while a one percentage point increase in the poverty rate leads to a 0.26 percentage point increase. Second, median income has a statistically insignificant effect on the food-insecurity rate. The proportion of a state's population that is African American, however, does have a statistically significant effect on food insecurity (a one percentage point increase in the share of a state's population that is African American leads to a 0.12 percentage point increase in food insecurity). The proportion of a state's population that is Hispanic also has a statistically significant effect: a one percentage point increase in the share of a state's population that is Hispanic leads to a 0.17 percentage point decrease in food insecurity. Third, states with higher proportions of homeowners have lower rates of food insecurity. A one percentage point increase in the proportion of a state's population that are homeowners leads to a 0.09 percentage point decrease in food insecurity. Fourth, at least as reflected in the variables used to predict food insecurity in our models, the continued high level of food insecurity in 2016 is unexpected. This can be seen in the positive and statistically significant coefficient on the year fixed effect for 2016.

The results for the various income categories (i.e., columns (2) through (6)) are broadly similar to those found for the full population, with a few differences. For example, while still negative, the effect of homeownership is statistically insignificant for all the income categories and the effect

of the proportion of a state that is Hispanic is statistically insignificant for all income categories albeit also negative in sign.

In Table 3, we present the results for children. Overall, the results are similar to those for the full population, so here we emphasize two areas where they differ. First, the effect of homeownership is statistically insignificant for both all incomes (column (1)) and when incomes are restricted to under 185 percent of the poverty line (column (2)). Second, with the exception of 2008, 2009, and 2014 for all incomes, and 2005 and 2010 for those under 185 percent of the poverty line, 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 child food-insecurity rates in comparison to those for the full population.

We conducted a series of tests of the *Map the Meal Gap* results to see how well the models performed. Our tests included, among other tests, the following: we compared county results aggregated to metropolitan areas with food-insecurity values for these metro areas taken from the CPS; we compared county results averaged over several years for counties that are observed in the CPS; we compared results with and without state fixed effects; we compared county results aggregated to the state level with food insecurity values for states taken from the CPS; and we compared predicted results from our model at the national level with actual food-insecurity rates per year. (For a broader discussion of *Map the Meal Gap* along with information on some further analyses of the robustness of the *Map the Meal Gap* results, see Gundersen et al., 2014.)

Trends in County Food Insecurity Rates between 2011 and 2016

This report reviews findings from the eighth year that Feeding America has conducted the *Map the Meal Gap* analysis. Here, we consider how food-insecurity rates and numbers in 2016 compare to those in the previous five years to identify any notable shifts. (We made a similar comparison for 2011 to 2015 in last year's MMG Technical Brief for the full population and for children.) Food-insecurity estimates at the county level may be less stable from year to year than those at the state or national level due to smaller geographies, particularly in counties with small populations. Efforts are taken to guard against unexpected fluctuations that can occur in these populations by using the five-year averages from the ACS for key variables, including poverty, median income, homeownership, and the percent of the population that is African American or Hispanic. However, the other key variable in the model—unemployment—is based on a one-year estimate for each county as reported by the BLS. The model looks at the relationship between all of these variables and the rate of food insecurity as reported by USDA in order to generate the estimates.

Nationally, the food-insecurity rate stayed approximately the same between 2015 (13.4 percent) and 2016 (12.9 percent) (Coleman-Jensen et al., 2017). The same occurred in regards to the national child food-insecurity rate (17.9 percent to 17.5 percent).

Only a handful of counties saw a statistically significant change in their food insecurity rates. Only about one percent (38) of all 3,142 counties experienced a statistically significant change

between 2015 and 2016, most of which were decreases. The number of counties with statistically significant changes is substantially higher at 10 percent (316) since 2015, 27 percent (834) since 2013, 20 percent (631) since 2012, and 25 percent (798) since 2011.

Those counties that experienced a three-percentage point or greater change in their food-insecurity estimates between 2015 and 2016 were flagged for further examination (see Appendix B). Out of 3,142 counties analyzed, only eight experienced changes in food-insecurity rates equal to or beyond the threshold of three percentage points, most of which were decreases. The list of these counties can be found in Appendix B. All of these counties have populations of less than 20,000. Moreover, out of these, only two— Zavala County, Texas and Graham County, North Carolina—have populations greater than 5,000.

Child food-insecurity rates are, as covered above, on average higher than overall food insecurity rates. As such, we only list counties with more than four percentage point changes in child food-insecurity rates. As seen in Appendix C, there are 18 counties with a child population of at least 1,000 that fell into this category. These are similar to the changes seen for the full population in that most of them are decreases. However, the counties seeing changes in child food insecurity of at least four percentage points differ from the changes seen for the full population in that all of them have an estimated child population of under 8,000.

FOOD BUDGET SHORTFALL

METHODS

In an effort to understand the food needs of the food-insecure population, we sought to estimate the shortfall in their food budgets. To do so, we use the following question taken from the CPS Food Security Supplement:

In order to buy just enough food to meet (your needs/the needs of your household), would you need to spend more than you do now, or could you spend less?

This question is asked prior to the 18 questions used to derive the food-insecurity measure and, as a consequence, is not influenced by their responses about food insecurity. Out of those responding "more," the following question is posed:

About how much MORE would you need to spend each week to buy just enough food to meet the needs of your household?

Restricting the sample to households experiencing food insecurity over the previous 12 months, and assigning a value of "0" to households that report needing zero dollars (i.e. those who could spend "the same" each week), as well as to those that report needing "less money", we divide by the number of people in the household to arrive at a per-person figure of $16.90 per week. This value is denoted as PPC.

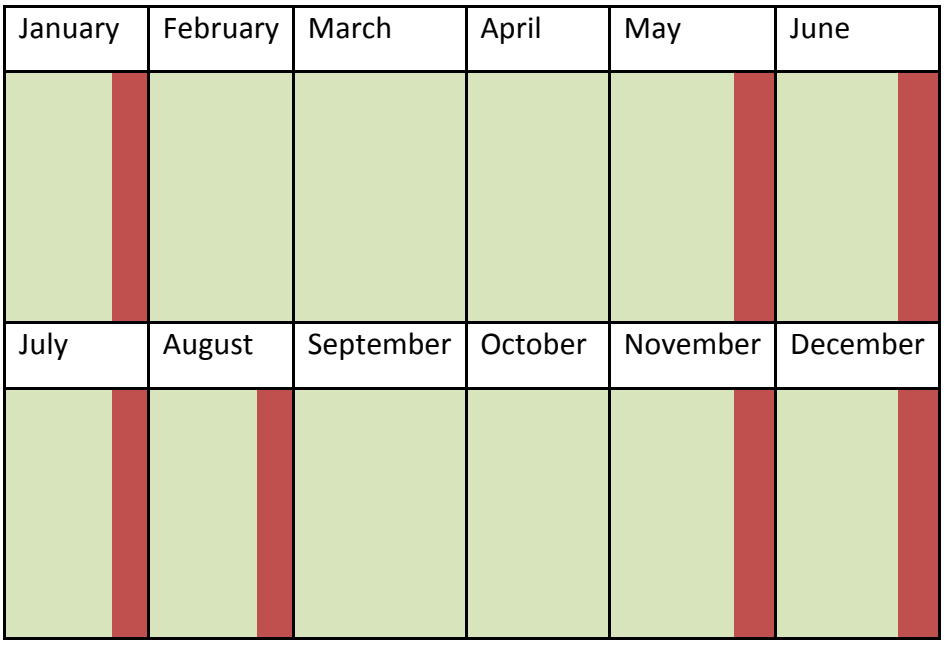
Not all food-insecure households reported needing additional food every day of the week. The phrasing of the questions above, however, suggests that responses are given with respect to a week during which the household needed to "spend more." We have assumed that these responses therefore incorporate days of the week in question during which the household was able to meet its food needs and days during which it needed more money. This assumption is supported by the dollar amount reported, which amounts to approximately 5.6 meals per week (or fewer than two days per week, assuming three meals per day), and the inclusion of food-insecure households which reported needing $0 more per week. These respondents were assumed to be responding from the perspective of a recent week, one in which they did not require additional money.

Visually, this theoretical week would then look like this:

Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**	**Day 6**	**Day 7**
With enough food	With enough food	With enough food	With enough food	With enough food	In need of food	In need of food

In addition to being food insecure only some days of any month in which they experience food insecurity, not all food-insecure households experience food insecurity every month. As reported by the USDA, in the annual report *Household Food Security in the United States*, "the average household that was food insecure at some time during the year experienced this condition in 7 months of the year." (Coleman-Jensen et al., 2017)

Visually, using the above illustration as a typical week, a sample year would look like this:



With this information, we are then able to calculate the dollar figure needed per county, per year as follows: $PPC*52*(7/12)*FI^{*}_{cs}*N_{cs}$. This calculation incorporates the number of weeks in a year (52) and the average number of months of the year in which someone experiences food insecurity (7 out of 12).

DATA

To calculate the dollars needed for a food-insecure person to meet his/her food needs, we used information from the 2016 CPS.

RESULTS

In developing the results for the amount of money needed by a food-insecure person to meet weekly food needs, we examined additional possible values, including those for (a) households experiencing food insecurity any time over the prior 12 months and (b) households experiencing food insecurity any time over the prior 30 days. We further broke this analysis down for (a) a sample of those responding "more" or "the same" to the first question above and (b) a sample of those responding "more" to the first question. Households responding "less" were included in these analyses and coded as "zero".

The value of $16.90 was selected both because it was the most conservative result and because it was the result most similar to the difference in per-person weekly food expenditures between food-secure and food-insecure households. We note that the food budget shortfall decreased between 2015 and 2016 ($17.38 to $16.90), and that this is the first *decrease* in this figure since 2012.

In Table 4, we present some descriptive statistics about reports of dollars needed to be food secure from the CPS. As done above, we restrict the sample to those reporting food insecurity and that they need to spend more on food. In the first column, we present results on individuals and in the second column, we present results for households. The average cost to be food secure in 2016 was $16.90 per-person, per week. When we break things down further by household size, income levels, and food-insecurity levels, the results are consistent with expectations. Namely, larger households report needing more money to be food secure than smaller households; individuals with lower incomes report needing more money to be food secure than better-off individuals; and individuals in households with higher levels of food insecurity need more money to be food secure than households with lower levels of food insecurity.

COST-OF-FOOD INDEX

METHODS

Because the amount of money needed to be food secure is established as a national average, it does not reflect the range of that figure's food-purchasing power at the local level. In order to estimate the *local* food budget shortfall, therefore, we worked with Nielsen to incorporate differences in the price of food that exist across counties in the continental U.S. To do so, Nielsen designed custom product characteristics so that UPC codes for all food items could be mapped to one of the 26 categories described in the USDA's Thrifty Food Plan (TFP). This is based on 26 categories of food items (examples include "all potato products", "fruit juices", and "whole fruits.") Each UPC-coded food item (non-food items, such as vitamins, were excluded) was assigned to one of the categories. Random-weight food items (such as loose produce or bulk grains) were not included but packaged fresh produce, such as bagged fruits and vegetables, were included. Prepared meals were categorized as a whole (rather than broken down by ingredients) and were coded to "frozen or refrigerated entrees." Processed foods, such as granola bars, cookies, etc. were coded to "sugars, sweets, and candies" or "non-whole grain breads, cereal, rice, pasta, pies, pastries, snacks, and flours," as appropriate.

The cost to purchase a market basket of these 26 categories is then calculated for each county. Sales of all items within each category were used to develop a cost-per-pound of food items in that category. Some categories, such as milk, are sold in a volume unit of measure and not in an ounces unit of measure. Volume unit of measures were converted to ounces by using "FareShare Conversion Tables" (fareshare.net/conversions-volume-to-weight.html). Each category was priced based on the pounds purchased per week as defined by the TFP for each of 26 categories by age and gender. We used the weights in pounds for purchases by males 19-50 years for this analysis. Other age/gender weights may have resulted in different total market basket costs, but are unlikely to have impacted relative pricing between counties, which was the goal of the analysis. (The TFP does have 29 categories, but three categories are weighted as 0.0 lbs. for this age/gender grouping. These include "popcorn and other whole grain snacks," "milk drinks and milk desserts," and "soft drinks, sodas, fruit drinks, and -ades (including rice beverages.)")

The methods used by Nielsen do not, in general, include all stores selling food in a county in the annual sample they use to construct the market basket described above. In counties with sufficient population size and corresponding number of stores selling food, the non-inclusion of some stores is unlikely to bias the cost of the market basket. However, in small counties, the exclusion of some or even all stores can lead to pricing of the market basket that is not an accurate reflection of the "true cost." Along with some stores being excluded, some of the stores included may be too small to have sufficient sales of products included in the market basket. In response to these biases, for all counties with less than 20,000 persons, we ascertain the cost of a market basket that is based on the average of prices found in that county and the prices of the contiguous counties. To request a full list of counties for which cost data were imputed, please email research@feedingamerica.org.

In an effort to accurately reflect the prices paid at the register by consumers, food sales taxes are integrated into the market basket prices. County-level food taxes include all state taxes and all county taxes levied on grocery items. Within some counties, municipalities may levy additional grocery taxes. Because these taxes are not consistently applied across the county and we do not calculate food prices at the sub-county level, they are not included. Taxes on vending machine food items or prepared foods were not included, as the market baskets do not incorporate those types of foods. For state-level market basket costs, the average of the county-level food taxes was used. Twelve states levy grocery taxes. An additional six states do not levy state-level grocery taxes, but do permit counties to levy a grocery tax. Finally, an additional state does not levy state or county-level grocery taxes, but does permit municipalities to levy grocery taxes (more detail about the tax rates used can be found in Appendix D).

As suggested above, our interest is in the relative rather than the absolute price of the TFP, so using the value of the TFP (VTFP), we then calculate an index as follows: $IVTFP=VTFP_{cs}/AVTP$ where AVTP is the weighted average value of the TFP across all counties. We then create a value for the cost to alleviate food insecurity that incorporates these price differences. This is calculated for each county as $CAFI_{cs}=IVTFP_{cs}*PPC*52*(7/12)*FI_{cs}*N_{cs}$.

DATA

To calculate the differences in food costs across counties, we used information from the Nielsen Scantrack service. This includes prices paid for each UPC code in over 65,000 stores across the U.S. For all these analyses we are using data for a 4-week period in October 2016.

NATIONAL AVERAGE MEAL COST

METHODS

With the above information, we have calculated a localized food budget shortfall for all food-insecure individuals in a county area. In many situations, however, food banks have found it useful and meaningful to be able to discuss the "meals" or "meal equivalents" represented by these dollar values. In an effort to provide the necessary information to allow for this communication tool, we calculated an approximation of the number of meal equivalents represented by the county-level food budget shortfall as follows.

On CPS there is a question that asks how much a household usually spends on food in a week:

Now think about how much (you/your household) USUALLY (spend/spends). How much (do you/does your household) USUALLY spend on food at all the different places we've been talking about IN A WEEK? (Please include any purchases made with SNAP or food stamp benefits).

Restricting the sample to households that are food secure, constructing this sample on a per-person basis, and dividing by 21 (i.e., the usual number of meals a person eats), we arrive at a per-meal cost of $3.00. We restricted the sample to food-secure households to ensure that the per-meal cost was based on the experiences of those with the ability to purchase a food-secure diet.

Using this information, the number of meals needed in a county can then be calculated as $MCAFI_{cs}=(IVTFP_{cs}*PPC*52*(7/12)*FI^{*}_{cs}*N_{cs})/(IVTFP_{cs}*3.00)$.

The *Map the Meal Gap 2018* meal-cost analysis includes all observations from the sample of CPS responses to the question regarding weekly household food expenditures in the calculations of the 2016 national average and local meal cost values as in previous years of *Map the Meal Gap*. It is important to note that the "meal gap" is descriptive of a food budget shortfall, rather than a literal number of meals.

DATA

To calculate the average meal cost, we used information from the 2016 CPS.

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TECHNICAL APPENDICES

APPENDIX A: SNAP AND NSLP THRESHOLDS

In order to be most useful for planning purposes, SNAP thresholds effective by January 1, 2018 were used for all states in this analysis. SNAP thresholds provided are the gross income eligibility criteria as established by the state. Applicants must meet other criteria (such as net income and asset criteria) in order to receive the SNAP benefit. Children in households receiving SNAP are categorically eligible for such programs as free National School Lunch Program (NSLP). In states with a SNAP threshold lower than 185 percent of the poverty line, persons earning between the SNAP threshold and 185 percent of the poverty line are income-eligible for other nutrition programs such as the reduced price National School Lunch Program, Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), etc.

State	SNAP Threshold	Other Nutrition Program Threshold (if applicable)
AK	130%	185%
AL	130%	185%
AR	130%	185%
AZ	185%	
CA	200%	
CO	130%	185%
CT	185%	
DC	200%	
DE	200%	
FL	200%	
GA	130%	185%
HI	200%	
IA	160%	185%
ID	130%	185%
IL	165%	185%
IN	130%	185%
KS	130%	185%
KY	130%	185%
LA	130%	185%
MA	200%	
MD	200%	
ME	185%	
MI	200%	
MN	165%	185%
MO	130%	185%
MS	130%	185%

State	SNAP Threshold	Other Nutrition Program Threshold (if applicable)
MT	200%	
NC	200%	
ND	200%	
NE	130%	185%
NH	185%	
NJ	185%	
NM	165%	185%
NV	200%	
NY	200%	
OH	130%	185%
OK	130%	185%
OR	185%	
PA	160%	185%
RI	185%	
SC	130%	185%
SD	130%	185%
TN	130%	185%
TX	165%	185%
UT	130%	185%
VA	130%	185%
VT	185%	
WA	200%	
WI	200%	
WV	130%	185%
WY	130%	185%

APPENDIX B: COUNTIES WITH FOOD-INSECURITY RATE CHANGES OF 3 PERCENTAGE POINTS OR MORE

State	County	2015 Food-Insecurity Rate	2016 Food-Insecurity Rate	Change from 2015 to 2016	Total Population (2016)
Alaska	Hoonah-Angoon	19.1%	16.1%	-3	2,107
Colorado	San Juan	13.2%	7.9%	-5.3	552
Georgia	Baker	19.7%	16.5%	-3.2	3,250
Montana	Petroleum	11.1%	14.3%	3.2	445
North Carolina	Graham	17.7%	14.7%	-3	8,651
Texas	Foard	16.4%	13.4%	-3	1,320
Texas	Jim Hogg	3.9%	7.3%	3.4	5,218
Texas	Zavala	10.5%	13.9%	3.4	12,107

APPENDIX C: COUNTIES WITH CHILD FOOD-INSECURITY RATE CHANGES OF 4 PERCENTAGE POINTS OR MORE AND A CHILD POPULATION OF AT LEAST 1,000

State	County	2015 Child Food-Insecurity Rate	2016 Child Food-Insecurity Rate	Change from 2015 to 2016	Total Child Population (2016)
Arkansas	Randolph	28.8%	24.7%	-4.1	3,966
Arkansas	Stone	30.7%	26.7%	-4	2,509
Florida	Calhoun	23.8%	19.4%	-4.4	3,079
Georgia	Fannin	28.9%	22.2%	-6.7	4,277
Georgia	Gilmer	29.6%	25.2%	-4.4	5,984
Georgia	Jenkins	33.1%	28.8%	-4.3	2,091
Georgia	Pickens	23.4%	18.9%	-4.5	6,243
Georgia	Towns	28.4%	24.0%	-4.4	1,461
Kentucky	Lee	24.8%	29.6%	4.8	1,419
Kentucky	Magoffin	30.7%	34.9%	4.2	3,000
North Carolina	Clay	27.3%	22.6%	-4.7	1,933
North Carolina	Graham	30.1%	24.6%	-5.5	1,841
North Carolina	Swain	31.7%	27.6%	-4.1	3,292
Texas	Coleman	32.3%	26.8%	-5.5	1,859
Texas	Jim Hogg	20.2%	25.8%	5.6	1,482
Texas	Zavala	31.2%	36.1%	4.9	3,687
West Virginia	Clay	25.0%	20.9%	-4.1	2,059
West Virginia	Grant	20.2%	15.6%	-4.6	2,309

APPENDIX D: FOOD TAX RATES

States not listed in this appendix do not levy grocery taxes and do not permit counties or municipalities to levy grocery taxes (with the exception of Alaska and Hawaii, as noted below). In some cases, as noted below, municipalities may levy additional grocery taxes. These taxes were not included in this analysis. A full list of individual counties' rates is not provided here, but is available upon request.

Twelve states levy grocery taxes. In the following three states, no additional grocery taxes are levied at the individual county level. In some counties, additional taxes may be levied by municipalities, but those rates were not included in this analysis.

State	2016 Food Tax (state rate)
ID	6.0%
MS	7.0%
SD	4.0%

In the following nine states, additional grocery taxes are levied at the county or municipal level. Only those rates levied at the county and state level were incorporated into this analysis.

State	2016 Food Tax (state rate)	2016 Food Tax (average of all county rates)	Total Food Tax (state + county)
AL	4.00%	2.16%	6.16%
AR	1.50%	1.60%	3.10%
IL	1.00%	0.06%	1.06%
KS	6.50%	1.06%	7.56%
MO	1.23%	1.69%	2.92%
OK	4.50%	1.33%	5.83%
TN	5.00%	2.51%	7.51%
UT*	1.75%	1.25%	3.00%
VA*	1.50%	1.00%	2.50%

An additional six states do not levy state-level grocery taxes, but do permit counties and municipalities to levy a grocery tax. Municipal taxes were not included in this analysis.

State	2016 Food Tax (state rate)	2016 Food Tax (average of all county rates)
AK	0%	1.86%
CO	0%	1.10%
GA	0%	3.23%
LA	0%	0.27%
NC	0%	2.00%
SC	0%	0.77%

Finally, an additional state does not levy state or county-level grocery taxes but does permit municipalities to levy grocery taxes. In these cases, no taxes were factored into the food-cost index, but it is worth noting that additional burden may be placed on residents of municipalities in which food taxes are in effect.

State	Food Tax (state rate)	Food Tax (county rate)
AZ	0%	0.00%

TABLES

Table 1: Food Insecurity Questions in the Core Food Security Module (administered in the Current Population Survey)

ASKED OF ALL HOUSEHOLDS

1. “We worried whether our food would run out before we got money to buy more.” Was that **often, sometimes**, or never true for you in the last 12 months?

2. “The food that we bought just didn’t last and we didn’t have money to get more.” Was that **often, sometimes**, or never true for you in the last 12 months?

3. “We couldn’t afford to eat balanced meals.” Was that **often, sometimes**, or never true for you in the last 12 months?

4. In the last 12 months, did you or other adults in the household ever cut the size of your meals or skip meals because there wasn’t enough money for food? (**Yes**/No)

5. In the last 12 months, did you ever eat less than you felt you should because there wasn’t enough money for food? (**Yes**/No)

6. (If yes to Question 4) How often did this happen—**almost every month, some months but not every month**, or in only 1 or 2 months?

7. In the last 12 months, were you ever hungry, but didn’t eat, because you couldn’t afford enough food? (**Yes**/No)

8. In the last 12 months, did you lose weight because you didn’t have enough money for food? (**Yes**/No)

9. In the last 12 months did you or other adults in your household ever not eat for a whole day because there wasn’t enough money for food? (**Yes**/No)

10. (If yes to Question 9) How often did this happen—**almost every month, some months but not every month**, or in only 1 or 2 months?

ONLY ASKED OF HOUSEHOLDS WITH CHILDREN

11. “We relied on only a few kinds of low-cost food to feed our children because we were running out of money to buy food.” Was that **often, sometimes**, or never true for you in the last 12 months?

12. “We couldn’t feed our children a balanced meal, because we couldn’t afford that.” Was that **often, sometimes**, or never true for you in the last 12 months?

13. “The children were not eating enough because we just couldn’t afford enough food.” Was that **often, sometimes**, or never true for you in the last 12 months?

14. In the last 12 months, did you ever cut the size of any of the children’s meals because there wasn’t enough money for food? (**Yes**/No)

15. In the last 12 months, were the children ever hungry but you just couldn’t afford more food? (**Yes**/No)

16. In the last 12 months, did any of the children ever skip a meal because there wasn’t enough money for food? (**Yes**/No)

17. (If yes to Question 16) How often did this happen—**almost every month, some months but not every month**, or in only 1 or 2 months?

18. In the last 12 months did any of the children ever not eat for a whole day because there wasn’t enough money for food? (**Yes**/No)

Note: Responses in bold indicate an affirmative response.

Table 2: Estimates of the Impact of Various Factors on Food Insecurity at the State Level, 2001-2016

	Full Population	<130% of the poverty line	<160% of the poverty line	<165% of the poverty line	<185% of the poverty line	<200% of the poverty line
	coefficient	coefficient	coefficient	coefficient	coefficient	coefficient
	(s.e.)	(s.e.)	(s.e.)	(s.e.)	(s.e.)	(s.e.)
Poverty Rate	0.263**					
	(0.049)					
Unemployment Rate	0.504**	0.681*	0.725**	0.686**	0.691**	0.747**
	(0.099)	(0.279)	(0.252)	(0.247)	(0.226)	(0.208)
Median Income	-0.002					
	(0.002)					
Percent Hispanic	-0.174**	-0.275	-0.227	-0.233	-0.228	-0.179
	(0.057)	(0.195)	(0.169)	(0.170)	(0.162)	(0.149)
Percent African-American	0.124*	0.171	0.226	0.241	0.218	0.254
	(0.057)	(0.178)	(0.158)	(0.159)	(0.140)	(0.133)
Percent Homeownership	-0.088*	-0.163	-0.167	-0.184	-0.150	-0.166
	(0.037)	(0.113)	(0.099)	(0.099)	(0.092)	(0.089)
2002 (year fixed effect)	0.001	0.014	0.010	0.010	0.007	0.007
	(0.003)	(0.012)	(0.011)	(0.011)	(0.010)	(0.009)
2003 (year fixed effect)	0.005	0.020	0.018	0.019	0.018	0.015
	(0.004)	(0.015)	(0.013)	(0.013)	(0.013)	(0.011)
2004 (year fixed effect)	0.015**	0.034**	0.031**	0.030**	0.006	0.027**
	(0.004)	(0.013)	(0.011)	(0.011)	(0.010)	(0.009)
2005 (year fixed effect)	0.010**	0.029*	0.023*	0.019	-0.005	0.017
	(0.004)	(0.013)	(0.012)	(0.012)	(0.010)	(0.009)
2006 (year fixed effect)	0.015**	0.037**	0.031**	0.031**	0.004	0.027**
	(0.003)	(0.012)	(0.010)	(0.010)	(0.010)	(0.008)
2007 (year fixed effect)	0.021**	0.027*	0.045**	0.045**	0.018	0.041**
	(0.004)	(0.013)	(0.011)	(0.011)	(0.010)	(0.009)

2008 (year fixed effect)	0.042**	0.067**	0.070**	0.060**	0.059**	0.070**
	(0.004)	(0.012)	(0.010)	(0.011)	(0.011)	(0.010)
2009 (year fixed effect)	0.028**	0.049**	0.053**	0.044**	0.044**	0.052**
	(0.006)	(0.015)	(0.015)	(0.014)	(0.014)	(0.012)
2010 (year fixed effect)	0.023**	0.028	0.029*	0.031*	0.030*	0.039**
	(0.006)	(0.016)	(0.014)	(0.014)	(0.014)	(0.012)
2011 (year fixed effect)	0.021**	0.044**	0.045**	0.044**	0.045**	0.043**
	(0.005)	(0.015)	(0.014)	(0.014)	(0.013)	(0.012)
2012 (year fixed effect)	0.023**	0.059**	0.051**	0.050**	0.041**	0.047**
	(0.005)	(0.014)	(0.012)	(0.012)	(0.012)	(0.010)
2013 (year fixed effect)	0.026**	0.068**	0.057**	0.058**	0.048**	0.055**
	(0.005)	(0.013)	(0.012)	(0.012)	(0.012)	(0.010)
2014 (year fixed effect)	0.029**	0.062**	0.058**	0.057**	0.053**	0.057**
	(0.005)	(0.014)	(0.012)	(0.013)	(0.012)	(0.011)
2015 (year fixed effect)	0.027**	0.063**	0.059**	0.058**	0.051**	0.054**
	(0.005)	(0.014)	(0.012)	(0.012)	(0.011)	(0.010)
2016 (year fixed effect)	0.024**	0.058**	0.055**	0.054**	0.032**	0.049**
	(0.005)	(0.014)	(0.012)	(0.012)	(0.011)	(0.009)
Constant	0.119**	0.422**	0.392**	0.406**	0.375**	0.358**
	(0.030)	(0.084)	(0.074)	(0.074)	(0.069)	(0.066)

* p<0.05 ** p<0.01. The omitted year for the year fixed effects is 2001. The data used is taken from the December Supplements of the 2001-2016 Current Population Survey.

Table 3: Estimates of the Impact of Various Factors on Child Food Insecurity at the State Level, 2001-2016

	Full Population	<185% of the poverty line
	coefficient	coefficient
	(s.e.)	(s.e.)
Poverty Rate	0.257**	
	(0.058)	
Unemployment Rate	0.750**	1.152**
	(0.182)	(0.305)
Median Income	-0.003	
	(0.003)	
Percent Hispanic	-0.066	-0.161
	(0.058)	(0.114)
Percent African-American	-0.036	-0.160
	(0.065)	(0.119)
Percent Homeownership	-0.013	0.046
	(0.046)	(0.083)
2002 (year fixed effect)	-0.004	-0.027
	(0.007)	(0.014)
2003 (year fixed effect)	0.001	-0.022
	(0.009)	(0.019)
2004 (year fixed effect)	0.008	-0.016
	(0.009)	(0.017)
2005 (year fixed effect)	-0.005	-0.034*
	(0.008)	(0.016)
2006 (year fixed effect)	0.002	-0.019
	(0.008)	(0.015)
2007 (year fixed effect)	0.009	-0.022
	(0.008)	(0.016)
2008 (year fixed effect)	0.047**	0.026

	(0.008)	(0.015)
2009 (year fixed effect)	0.026*	-0.007
	(0.011)	(0.019)
2010 (year fixed effect)	0.000	-0.043*
	(0.011)	(0.020)
2011 (year fixed effect)	0.000	-0.026
	(0.011)	(0.020)
2012 (year fixed effect)	0.009	-0.013
	(0.010)	(0.018)
2013 (year fixed effect)	0.016	0.010
	(0.010)	(0.019)
2014 (year fixed effect)	0.017*	-0.004
	(0.010)	(0.018)
2015 (year fixed effect)	0.005	-0.013
	(0.010)	(0.017)
2016 (year fixed effect)	-0.001	-0.025
	(0.009)	(0.015)
Constant	0.131**	0.298**
	(0.039)	(0.067)

* p<0.05 ** p<0.01. The omitted year for the year fixed effects is 2001. The data used are taken from the December Supplements of the 2001-2016 Current Population Survey.

Table 4: Breakdowns of Weekly Cost to be Food Secure (in $) in 2016

	Individuals	Households
All Food Insecure	16.90	
By Household Size		
1 person		25.53
2 person		31.33
3 person		40.01
4 person		42.70
5 person		47.59
6 person		50.88
By Income Categories		
<130% of poverty line	18.97	
>130% of poverty line	14.90	
<185% of poverty line	18.20	
>185% of poverty line	13.98	
By food security status		
Marginally food secure	6.81	
Low food secure	12.67	
Very low food secure	23.40	

The data used are taken from the December Supplement of the 2016 Current Population Survey.