Map the Meal Gap: Technical Brief

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Overview
In order to address the problem of hunger, we must first understand it. We undertook the Map the Meal Gap project to learn more about food insecurity, its distribution by income categories, and the reported need at the local level. By understanding the population, we can better identify strategies for reaching the people who need us most.

Research Goals
The primary goal of the Map the Meal Gap analysis is to more accurately assess the need for food. The methodology undertaken to make this assessment was developed to be responsive to the following questions:

- Is it 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
- 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

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

Summary of Methods

Food insecurity rate

Methodology: We begin by analyzing the relationship between food insecurity and indicators of food insecurity (poverty, unemployment, median income, etc.) at the state level. We then use the coefficient estimates from this analysis plus information on the same variables defined at the county level to generate estimated food insecurity rates for individuals at the county level.

Data Sources: CPS data are used to assess the relationship between food insecurity and indicators of food insecurity at the state level. The indicators used were selected because of their availability at the county and state level and included: unemployment rates, median income, poverty rates, and percent African American and Hispanic. County-level data are drawn from the American Community Survey (ACS.)

Food-budget shortfall

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 $13.99. Per the USDA, households experiencing food insecurity experience this condition in, on average, in seven months of the year.

$$\text{FI persons} * \$13.99 * 52 \text{ weeks} * (7/12) = \frac{\text{\$ reported needed by the food insecure}}{\text{to meet their food needs in 2009}}$$

Data Sources: CPS data includes two questions asking if and how much more money a person would need to meet the food needs of the household if and how much more money would be needed to meet the food needs of the household. These questions are posed after questions about usual weekly expenditures, but before the food security module.

Cost-of-food index

Methodology: To establish a relative price index that would allow 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. Specifically, pounds purchased by males age 19-50 are examined. While other age and gender weights may have resulted in different *total* market basket costs, *relative pricing* between counties (our goal for this analysis) would not have been 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: The Nielsen Company 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 (3 meals per day x 7 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.

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Methods

Full Population of Counties (and Congressional Districts)
We proceed in two steps to estimate the extent of food insecurity in each county.

Step 1: Using state-level data from 2001-2009, we estimate a model where the food insecurity rate for individuals at the state level is determined by the following equation:

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

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, 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.

Our choice of variables was first guided by the literature on the determinants of food insecurity insofar as we included variables that have been found to influence the probability of someone being food insecure. Next, we chose variables that are available both in the Current Population Survey and that are available at the county level, such as those in the American Community Survey or other sources (described below). Variables that are not available at both the state and county level cannot be used.

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 all other observed and unobserved 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:

$$FI^*_{cs} = \hat{\alpha} + \widehat{\beta_{UN}}UN_{cs} + \widehat{\beta_{POV}}POV_{cs} + \widehat{\beta_{MI}}MI_{cs} + \widehat{\beta_{HISP}}HISP_{cs} + \widehat{\beta_{BLACK}}BLACK_{cs} + \widehat{\mu_T} + \hat{v}_s \qquad (2)$$

where c denotes a county and T denotes the year from which the county level variables are defined. 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 $FI^*_{cs}*N_{cs}$ where N is the number of persons. Congressional district food insecurity rates were estimated using the same methods.

The estimation of (1) gives us point estimates for food insecurity rates at the county level. In addition, we have established confidence intervals around these point estimates. These take into consideration both the variation around the estimated coefficients in (1) and the variation around the values in (2) (e.g., the unemployment rate).

Income Bands within Counties (and Congressional Districts)
Food insecurity rates are also estimated for those above or below each state's typical Supplemental Nutrition Assistance Program (SNAP) and National School Lunch Program (NSLP) income eligibility threshold (see Appendix A for a complete 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:

$$FIC_{st} = \alpha + \beta_{UN}UN_{st} + \beta_{HISP}HISP_{st} + \beta_{BLACK}BLACK_{st} + \mu_t + \upsilon_s + \varepsilon_{st} \tag{1'}$$

and equation (2) is specified as:

$$FIC^*_{cs} = \hat{\alpha} + \widehat{\beta_{UN}}UN_{cs} + \widehat{\beta_{HISP}}HISP_{cs} + \widehat{\beta_{BLACK}}BLACK_{cs} + \widehat{\mu_T} + \hat{v}_s \tag{2'}$$

In this case, (1') is specified on a sample composed only of those below a particular income threshold and, as a consequence, BLACK and HISPANIC are defined with the sample restricted to an income range. UN continues to be the unemployment rate for all households, not just within income categories.

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 below a particular income threshold. Second, using (2'), we can derive the percentage of food insecure persons within a county with incomes below a particular threshold. 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.

In a very few cases (N=18 or 0.57% of counties), the results of the calculation $(FIC^*_{cs}*NC_{cs})/(FI^*_{cs}*N_{cs})$ were slightly greater than 1. The set of counties for which this was the case had higher than average poverty and unemployment rates. In these cases, the results were set to 1.

In order to prepare banded information for those states in which the SNAP and NSLP thresholds are different, the percent of food insecure persons within a county below the SNAP threshold was added to the percent of food insecure persons within a county below the NSLP threshold and the result was then subtracted from 1. In a very few cases (N=45 or 1.43% of counties), the sum of those below the SNAP threshold and above the NSLP threshold was greater than 1. In those cases, the following correction was made: Percent above NSLP threshold=1-average difference between SNAP and NSLP thresholds-percent below SNAP threshold.

A full listing of counties for which either of the above indicated corrections was made can be found in Appendix B.

Data

The information at the state level (i.e., the information used to estimate equations (1) and (1')) is derived from the Core Food Security Module (CFSM) in the December Supplement of the Current

Population Survey (CPS) for the years 2001-2009. 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 from 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') only now those below a defined income threshold were used in the aggregation.

For information at the county and congressional district level (i.e., the information used to estimate equations (2) and (2')), we used information from the 2005-2009 five-year American Community Survey (ACS) estimates. The ACS is a sample survey of 3 million addresses administered by the Census Bureau. In order to provide estimates for areas with small populations, this sample was accumulated over a 5-year period. Data was drawn from tables C17002 (ratio of income to poverty level), B19013 (median income), B2001 (percent African-American) and B3002 (percent Hispanic). Information about unemployment at the county level was taken from information from the Bureau of Labor Statistics' labor force data by county, 2009 annual averages. Information about unemployment in congressional districts was taken from data produced by Proximity and made available publicly on their website (http://proximityone.com/cd_employment.htm.) Their data are based on 2007-2009 American Community Survey estimates from the economic characteristics profile (items E001-E009).

All counties provided by the Census Bureau (geographic summary level 050) were included in the analysis with a very small number of exceptions. For three counties (two in Alaska and one in Hawaii), the Bureau of Labor Statistics did not provide 2009 Unemployment data. For three additional counties (all in Alaska), the county-defined area changed between 2008 and 2009. Because the model relies on data over time, we elected to exclude them from our analysis. Therefore, a total of 3,137 counties were analyzed out of the 3,143 for which data is provided by the Census Bureau. In four states (Maryland, Missouri, Nevada, and Virginia), one or more cities are independent of any county organization and thus constitute primary divisions of their states. Food insecurity estimates were created for these cities, as they are included in the Census Bureau's geographic summary level 050.

Results

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

There are several points worth emphasizing from these results. First, the effect of unemployment is strong across each of the groups we considered. As a consequence, areas with higher unemployment

rates will have higher food insecurity rates, all else equal. Second, the effect of the unemployment rate is slightly larger than the effect of the poverty rate. (Its magnitude is larger but this is partly due to the lower average value of the unemployment rate in comparison to the poverty rate.) This is further evidence that the extent of poverty is not the only determinant of food insecurity in a county. Third, the proportion of the population that is Hispanic or African-American in a county generally has no effect on the food insecurity rate in our models. (The only exception is for the below 130% of the poverty line category where the percent African-American has a statistically significant positive effect.) This is, on the surface, surprising insofar as both of these groups have higher than average rates of food insecurity. In these models, however, the limited impact is due to the small changes that occur over time in the distribution of race/ethnicity in a state over time. These models rely on changes over time to identify the impact of different variables. Consequently, the impacts of relatively static variables like these are instead portrayed by the state fixed effects. Fourth, the sharp increase in food insecurity seen in 2008 over 2007 is "unexpected" within our models as can be seen by the distinctly larger coefficient on the year fixed effect in 2008. In contrast, in 2009 when the rates were similar to 2008, the coefficient on the year fixed effect is relatively smaller. This indicates that the food insecurity rates in 2009 – when unemployment rates were substantially higher than in 2008 – are more "expected."

To see how well the models performed, we did a series of tests. Among other issues, we compared county results aggregated to metropolitan areas with food insecurity values for these metro areas taken from 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. In each of these cases and in other tests, our models performed very well.

Table 1: Estimates of the Impact of Various Factors on Food Insecurity at the State Level, 2001-2009

	Full Population	<130% of the poverty line	<165% of the poverty line	<185% of the poverty line	<200% of the poverty line
	coefficient (s.e.)	coefficient (s.e.)	coefficient (s.e.)	coefficient (s.e.)	coefficient (s.e.)
Poverty Rate	0.266 (0.060)**				
Unemployment Rate	0.784 (0.150)**	1.482 (0.452)**	1.489 (0.415)**	1.435 (0.389)**	1.388 (0.339)**
Median Income	-0.003 (0.003)				
Percent Hispanic	-0.023 (0.083)	-0.026 (0.100)	0.032 (0.094)	0.026 (0.106)	-0.013 (0.093)
Percent African-American	0.062 (0.088)	0.227 (0.070)**	0.146 (0.075)	0.056 (0.077)	0.088 (0.082)
2002 (year fixed effect)	-0.003 (0.003)	0.002 (0.011)	-0.001 (0.011)	-0.002 (0.011)	-0.002 (0.009)
2003 (year fixed effect)	-0.002 (0.004)	-0.001 (0.013)	-0.003 (0.012)	-0.002 (0.012)	-0.000 (0.010)
2004 (year fixed effect)	0.009 (0.004)*	0.019 (0.012)	0.014 (0.010)	-0.006 (0.010)	0.016 (0.009)
2005 (year fixed effect)	0.006 (0.004)	0.016 (0.013)	0.006 (0.013)	-0.014 (0.012)	0.009 (0.011)
2006 (year fixed effect)	0.013 (0.004)**	0.027 (0.011)*	0.021 (0.010)*	-0.004 (0.010)	0.021 (0.008)*
2007 (year fixed effect)	0.019 (0.004)**	0.017 (0.012)	0.034 (0.011)**	0.010 (0.011)	0.034 (0.010)**
2008 (year fixed effect)	0.040 (0.004)**	0.050 (0.011)**	0.068 (0.011)**	0.045 (0.012)**	0.069 (0.011)**
2009 (year fixed effect)	0.014 (0.008)	0.009 (0.023)	0.002 (0.022)	0.006 (0.021)	0.020 (0.018)
Constant	0.051 (0.019)**	0.243 (0.035)**	0.229 (0.035)**	0.227 (0.031)**	0.210 (0.027)**

* $p<0.05$ ** $p<0.01$. The omitted year for the year fixed effects is 2001. The data used is taken from the December Supplements of the 2001-2009 Current Population Survey.

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 a question taken from the CFSM which asks respondents, prior to asking the 18 questions used to derive the food insecurity measure:

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?

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 including those who report zero dollars (i.e. those who could spend "the same" each week), we divide by the number of people in the household to arrive at a per-person figure of $13.99 per week. Denote this value as PPC.

Not all food insecure households experienced needing additional food every day of the week. The phrasing of the questions, above, however, suggest that responses are given from the perspective of 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 5.5 meals per week (or fewer than 2 days per week, assuming 3 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 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" (Nord, M., Coleman-Jensen, A., Andrews, M. & Carlson, S. USDA ERS. 2010, p. 59.)

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

January	February	March	April	May	June

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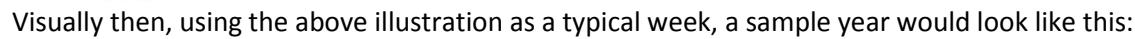
With this information, we are then able to calculate the dollar figure needed per county, per year as follows: $PPC*52*(7/12)*FI^*_{cs}*N_{cs}$. This calculation incorporates the number of weeks in a year (52) and the average number of months of the year in which someone experiences food insecurity (7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

Data

To calculate the dollars needed to for a food insecure person to meet his/her food needs, we used information from the 2009 CPS. The CPS is described above.

Results

In developing the results for the amount of money needed by a food insecure person to meet weekly food needs, described above, 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 thirty days. We further broke this analysis down for (a) a sample of those responding "more" or "same" to the first question above and (b) a sample of those responding "more" to the first question. Households responding "less" were not included in these analyses.

The value of $13.99 was selected both because it is the most conservative result and because it is the result most similar to the difference in per-person weekly food expenditures between food secure and food insecure households (Seligman, H. & Schillinger, D. Hunger and socioeconomic disparities in chronic disease. New England Journal of Medicine. 2010.)

In Table 2 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 that they need to spend more on food and food insecure households. 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 2009 was $13.99. 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. Analysis of these data over time indicates consistency with food pricing, showing a notable increase when food prices spiked in 2007.

Table 2: Breakdowns of Cost to be Food Secure ($)

	Individuals	Households
All Food Insecure	13.99	
By Household Size		
1 person		22.77
2 person		27.61
3 person		33.73
4 person		35.14
5 person		39.97
6 person		42.48
7 person		58.97
8 person		74.81
By Income Categories		
<130% of poverty line	16.63	
>130% of poverty line	11.71	
<185% of poverty line	15.63	
>185% of poverty line	11.69	
By food insecurity status		
Marginally food secure	5.97	
Low food secure	10.34	
Very low food secure	19.72	

The data used is taken from the December Supplement of the 2009 Current Population Survey.

Cost-of-food index

Methods

Because the dollar figure needed is a national average, it does not reflect the potential 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 The Nielsen Company to incorporate differences in the price of food that exists across counties in the continental U.S. (Due to a limited number of stores and special pricing considerations in Alaska and Hawaii, these states were excluded from the analysis.) To do so, The Nielsen Company 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 2006 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; 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 USDA Thrifty Food Plan for each of 26 TFP 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. Several 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.)'

For some counties, there were no sales within a category (see Appendix C for list) while in other counties, low numbers of sales in categories resulted in a market basket prices that seemed "too high" to be consistent with the probable food costs for residents in that county.

To define the counties for which the market basket price appeared to be "too high," all counties were assessed on the following sets of conditions:
- Set one:
    o Ratio of FIPS market basket price to average market basket price in the **food bank service area** is above the 95th percentile;
    o No mass retailers in the county; and
    o Total dollars expended **per Nielsen store** in the FIPS is in the bottom 20th percentile.
- Set two:
    o Ratio of FIPS market basket price to average market basket price in the **food bank service area** is above the 95th percentile;
    o No mass retailers in the county; and
    o Total dollars expended on food **in the county** is in the bottom 20th percentile.
- Set three:
    o Ratio of FIPS market basket price to **national average** market basket price is above the 95th percentile;
    o No mass retailers in the FIPS; and
    o Total dollars expended **per Nielsen store** in the FIPS is in the bottom 20th percentile.
- Set four:
    o Ratio of FIPS market basket price to **national average** market basket price is above the 95th percentile;
    o No mass retailers in the FIPS; and
    o Total dollars expended on food **in the county** is in the bottom 20th percentile.

33 counties met at least two of the above set of conditions. They were then further reviewed to assess the presence of various possible explanations for particularly high cost-of-food:
- Median household income in the county exceeds the average median income of all counties;
- County is deemed to be fully Urban or Rural (Rural-Urban Continuum Codes 1, 8 or 9);
- Presence of high hills or mountains (USGS Land Surface Form Topographical Codes 10-12, 15-17, or 19-21)

All but 6 counties met at least one of the above conditions (see Appendix C for list). In these 6 cases, with insufficient food options and no readily apparent explanation for the high food costs, residents are assumed to make at least some of their food purchases in other counties.

In cases where categories of sales are missing and in cases where extremely high prices in categories distorted the overall basket prices, we imputed a price for that category based on information from the next-nearest county. Counties with several missing or distorted categories might end up using values from multiple neighbors. Neighbor A (first closest) might also be missing some of the same categories, so Neighbor B (second closest) would be used. In two cases, this process resulted in the county *becoming* an 'outlier' according to the criteria described above. In those two cases, we instead used an average of all of the neighbors within a distance less than 2 times the distance of the closest (these counties are noted in Appendix C). In future years, we anticipate using this method for all counties.

In an effort to most directly reflect the prices paid at the register by consumers, we elected to integrate food sales taxes 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, however, 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. Fifteen states levy grocery taxes (fourteen that were included in this analysis). An additional four states (three that were included in this analysis) do not levy state-level grocery taxes, but do permit counties to levy a grocery tax. Finally, an additional two states do not levy state or county-level grocery taxes, but do permit municipalities to levy grocery taxes (more detail abou 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 which 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 two data sources from Nielsen. The first is via the Nielsen Scantrack service. This includes prices paid for each UPC code in over 65,000 stores across the U.S. Nielsen does not have in-store data from all mass or club retailers, so the second source of information is from Homescan Data, which allows us to calculate national average prices paid for food items. Because these stores have national pricing, the national average provides an accurate depiction of prices paid at the local level. For all these analyses we are using data for a 4-week period ending October 30, 2009.

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 $2.54. 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
$MCAFI_{cs} = (IVTFP_{cs} * PPC * 52 * (7/12) * FI^{*}_{cs} * N_{cs}) / (IVTFP_{cs} * 2.54)$.

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 2009 CPS. The CPS is described above.

Appendix A: SNAP and NSLP thresholds

In order to be most useful for planning purposes, SNAP thresholds effective March, 2011 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. SNAP clients are categorically eligible for such programs as free National School Lunch Program. In states with a SNAP threshold lower than 185% of the poverty line, persons earning between the SNAP threshold and 185% of the poverty line are income-eligible for other nutrition programs such as reduced price National School Lunch Program, WIC, etc.

State	SNAP Threshold	Other Nutrition Program Threshold (if applicable)
AK	130%	185%
AL	130%	185%
AR	130%	185%
AZ	185%	
CA	130%	185%
CO	130%	185%
CT	185%	
DC	200%	
DE	200%	
FL	200%	
GA	130%	185%
HI	200%	
IA	160%	185%
ID	130%	185%
IL	130%	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%
MT	185%	

State	SNAP Threshold	Other Nutrition Program Threshold (if applicable)
NC	200%	
ND	200%	
NE	130%	185%
NH	185%	
NJ	185%	
NM	130%	185%
NV	200%	
NY	130%	185%
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: Income-band Adjustments

The following counties resulted in errors when income band data was directly calculated. The calculated and adjusted data are provided. Data presented below are rounded to the nearest tenth. In the final dataset, data are rounded to the nearest integer.

In the following cases, the results of the calculation $(FIC^*_{cs}*NC_{cs})/(FI^*_{cs}*N_{cs})$ were slightly greater than 1. In these cases, the results were set to 1.

State	County	Population	State SNAP threshold	Calculated % of individuals ≤ SNAP threshold	Adjusted % of individuals ≤ SNAP threshold
AK	WADE HAMPTON	7,577	185%	115.80%	100%
ID	CLARK	984	185%	106.70%	100%
KS	HAMILTON	2,583	185%	103.40%	100%
KY	LESLIE	11,674	185%	100.40%	100%
MO	CARTER	5,894	185%	104.10%	100%
ND	GOLDEN VALLEY	1,533	200%	100.60%	100%
ND	STEELE	1,929	200%	106.40%	100%
NE	ARTHUR	364	185%	102.10%	100%
TX	BAILEY	6,360	185%	115.50%	100%
TX	CAMERON	383,171	185%	100.70%	100%
TX	CASTRO	7,233	185%	100.50%	100%
TX	CROCKETT	3,784	185%	101.90%	100%
TX	HIDALGO	702,697	185%	100.70%	100%
TX	MAVERICK	51,300	185%	114.80%	100%
TX	WEBB	60,936	185%	102.90%	100%
TX	STARR	231,035	165%	108.90%	100%
TX	ZAVALA	11,620	165%	101.40%	100%
WA	ADAMS	17,029	200%	105.70%	100%

In the following cases, the sum of those below the SNAP threshold and above the NSLP threshold was greater than 1. In these cases, the following correction was made: Percent above NSLP threshold=1-average difference between SNAP and NSLP thresholds-percent below SNAP threshold.

State	County	Population	State SNAP threshold; Other threshold	% of FI ≤ SNAP threshold	Original % of FI > Other threshold	Adjusted % of FI > Other threshold
AL	MACON	22,304	130%; 185%	66.5%	33.6%	16.0%
AR	CHICOT	12,279	130%; 185%	79.8%	20.8%	2.7%
AR	LEE	10,776	130%; 185%	72.2%	32.0%	10.3%
CA	LASSEN	34,428	130%; 185%	50.0%	57.5%	32.5%
CO	BENT	6,128	130%; 185%	60.1%	41.6%	22.4%
CO	CROWLEY	6,311	130%; 185%	72.3%	39.0%	10.2%
GA	CHATTAHOOCHEE	14,364	130%; 185%	42.0%	58.4%	40.5%
GA	STEWART	4,638	130%; 185%	92.4%	9.4%	0.0%
GA	WHEELER	6,819	130%; 185%	60.7%	44.1%	21.8%
KY	LYON	8,325	130%; 185%	53.3%	49.1%	29.2%
LA	EAST CARROLL	8,265	130%; 185%	90.3%	26.9%	0.0%
LA	WEST FELICIANA	15,134	130%; 185%	41.4%	58.8%	41.1%
MS	SUNFLOWER	30,604	130%; 185%	78.8%	24.9%	3.7%
OK	GREER	5,800	130%; 185%	56.7%	44.0%	25.8%
PA	CENTRE	144,306	160%; 185%	53.6%	47.0%	39.2%
PA	FOREST	6,811	160%; 185%	65.2%	48.4%	27.7%
PA	PHILADELPHIA	1,531,112	160%; 185%	69.9%	31.4%	22.9%
PA	UNION	43,424	160%; 185%	58.5%	44.7%	34.4%
SC	ALLENDALE	10,459	130%; 185%	84.0%	19.5%	0.0%

State	County	Population	State SNAP threshold; Other threshold	% of FI ≤ SNAP threshold	Original % of FI > Other threshold	Adjusted % of FI > Other threshold
SD	CLAY	13,431	130%; 185%	55.9%	48.2%	26.6%
TX	ANDERSON	56,575	165%; 185%	59.7%	45.8%	33.5%
TX	BEE	32,413	165%; 185%	74.3%	35.5%	18.9%
TX	CHILDRESS	7,530	165%; 185%	68.5%	42.2%	24.7%
TX	CONCHO	3,610	165%; 185%	50.6%	59.5%	42.5%
TX	DAWSON	13,831	165%; 185%	75.6%	28.1%	17.6%
TX	DICKENS	2,479	165%; 185%	71.5%	33.5%	21.7%
TX	FALLS	17,048	165%; 185%	76.4%	24.5%	16.8%
TX	GARZA	4,743	165%; 185%	70.3%	45.4%	22.8%
TX	GRIMES	25,621	165%; 185%	62.4%	38.7%	30.8%
TX	HARTLEY	5,089	165%; 185%	36.9%	69.3%	56.3%
TX	HOWARD	32,324	165%; 185%	67.2%	35.3%	26.0%
TX	JONES	19,223	165%; 185%	55.5%	51.7%	37.7%
TX	KARNES	15,060	165%; 185%	65.4%	57.3%	27.8%
TX	LIMESTONE	22,367	165%; 185%	61.3%	39.3%	31.9%
TX	MADISON	13,202	165%; 185%	68.1%	39.2%	25.1%
TX	MITCHELL	9,275	165%; 185%	60.2%	53.6%	33.0%
TX	PECOS	15,901	165%; 185%	73.6%	28.4%	19.6%
TX	SCURRY	15,994	165%; 185%	66.0%	35.3%	27.1%
TX	UPTON	3,046	165%; 185%	65.2%	35.2%	28.0%
TX	WALKER	63,928	165%; 185%	67.9%	48.4%	25.3%
VA	BUCKINGHAM	15,932	130%; 185%	51.8%	60.1%	30.8%
VA	GREENSVILLE	11,916	130%; 185%	52.6%	48.8%	30.0%
VA	LEXINGTON CITY	6,909	130%; 185%	59.7%	58.9%	22.8%
VA	WILLIAMSBURG CITY	12,330	130%; 185%	47.1%	61.8%	35.4%
WV	GILMER	6,889	130%; 185%	62.0%	47.6%	20.5%

Appendix C: Food Cost Adjustments

In the following 91 cases, certain categories of sales were missing entirely. In these cases, The Nielsen Company imputed a price *for that category* based on information from the next-nearest county. Counties might end up using values from multiple neighbors. Neighbor A (first closest) might also be missing some of the same categories, so Neighbor B (second closest) would be used.

State	County	Population	Categories Imputed	Final Food Price Index	State	County	Population	Categories Imputed	Final Food Price Index
CO	SAGUACHE	6,929	1	1.0510	ND	CAVALIER	3,905	2	1.1180
GA	JOHNSON	9,202	1	1.1130	ND	DICKEY	5,341	2	1.1720
GA	SCHLEY	4,129	1	1.1730	ND	FOSTER	3,424	2	1.1200
IA	DAVIS	8,549	1	0.9650	ND	MOUNTRAIL	6,540	2	1.2790
IA	WORTH	7,620	1	0.8930	ND	PEMBINA	7,607	2	1.0130
ID	BEAR LAKE	5,859	1	1.1440	ND	PIERCE	4,101	2	0.9110
ID	FREMONT	12,537	1	1.2490	ND	RANSOM	5,670	2	1.0490
ID	OWYHEE	10,995	1	1.1740	NM	HIDALGO	5,001	2	1.2050
ID	WASHINGTON	10,011	1	1.1200	NV	LANDER	5,047	2	1.1020
IN	OHIO	5,871	1	0.9830	SD	BRULE	5,169	2	1.1130
KS	MORTON	3,097	1	1.2090	SD	DAY	5,637	2	1.0290
MI	BARAGA	8,650	1	0.9930	SD	HAND	3,268	2	1.1010
MN	CHISAGO	49,771	1	1.1440	CA	MODOC	9,162	3	1.5790
MN	KANABEC	16,059	1	0.9380	CA	TRINITY	13,922	3	1.2190
MN	KOOCHICHING	13,396	1	1.3390	CO	CUSTER	3,598	3	0.9680
MN	POPE	10,979	1	0.9980	ID	LEMHI	7,818	3	1.2960
MN	ROSEAU	16,012	1	0.9190	KS	NORTON	5,456	3	0.9520
MN	WATONWAN	11,019	1	0.9210	LA	TENSAS	5,798	3	1.0890
MT	SHERIDAN	3,568	1	1.1010	MN	PIPESTONE	9,303	3	0.8610
ND	BOWMAN	2,944	1	1.2600	MN	WABASHA	21,831	3	1.0840
ND	MORTON	25,850	1	0.9780	MT	RICHLAND	9,128	3	1.0610
ND	TRAILL	7,997	1	1.1220	NV	WHITE PINE	9,060	3	1.1350
NE	BUTLER	8,416	1	0.9340	OK	ELLIS	3,855	3	1.1490
NE	WAYNE	9,334	1	0.9140	SD	TODD	9,997	3	1.1580
PA	SULLIVAN	6,219	1	1.1090	UT	EMERY	10,408	3	1.1440
SD	CHARLES MIX	8,999	1	1.1230	WY	HOT SPRINGS	4,523	3	0.9780
SD	DEWEY	6,007	1	1.1240	CA	COLUSA	21,001	3	1.3030
SD	SPINK	6,673	1	1.0990	MN	RENVILLE	16,101	4	1.0800
TX	COCHRAN	3,080	1	0.9920	ND	MCKENZIE	5,594	4	1.5100
TX	FISHER	4,028	1	1.0230	CA	MARIPOSA	17,865	5	1.4370
TX	HALL	3,455	1	1.1660	CO	RIO BLANCO	6,183	5	1.5040
UT	SAN JUAN	14,429	1	1.1940	ID	VALLEY	8,667	5	1.6440
WI	BUFFALO	13,683	1	1.0410	MN	JACKSON	10,881	5	0.8590
WY	GOSHEN	12,137	1	0.9840	SD	UNION	13,947	5	1.4410
WY	WESTON	6,765	1	0.9410	TN	CANNON	13,505	5	1.3110
ID	CARIBOU	6,888	2	1.1520	WY	BIG HORN	11,372	5	0.9240
KS	BARBER	4,714	2	1.1760	MI	LEELANAU	21,877	7	0.9640
KS	KINGMAN	7,789	2	1.1790	ND	ADAMS	2,291	8	1.6160
KS	PHILLIPS	5,329	2	1.1710	OR	CROOK	22,473	8	1.3690
MI	LUCE	6,645	2	1.0800	MT	ROSEBUD	9,152	9	1.1010
MN	CASS	28,654	2	1.0780	IN	CRAWFORD	10,795	10	1.1150
MN	LAKE	10,751	2	1.1490	KY	WASHINGTON	11,365	11	1.0000
MN	LE SUEUR	27,768	2	1.1830	MT	MUSSELSHELL	4,413	21	0.9930
MN	MAHNOMEN	5,051	2	1.1500	MT	SWEET GRASS	3,675	22	1.3430
MT	BIG HORN	12,809	2	0.9820	CO	PHILLIPS	4,479	24	1.1290
MT	LINCOLN	18,698	2	0.9150					

The following 289 counties had no store data available. In these cases, all 26 category prices were imputed from the next nearest county. Counties might end up using values from multiple neighbors. Neighbor A (first closest) might be missing a particular category, so Neighbor B (second closest) would be used.

State	County	Population	Final Food Price Index	State	County	Population	Final Food Price Index
CA	ALPINE	1,153	0.9310	KS	CLARK	2,133	1.0840
CA	SIERRA	3,240	1.4090	KS	COMANCHE	1,850	1.2020
CO	CROWLEY	6,311	0.9610	KS	DONIPHAN	7,732	0.9450
CO	CHEYENNE	1,622	1.1230	KS	EDWARDS	3,118	0.9490
CO	COSTILLA	3,282	0.9910	KS	ELK	3,016	1.1030
CO	DOLORES	1,771	0.9870	KS	GOVE	2,599	1.1360
CO	GILPIN	5,177	1.2360	KS	GREELEY	1,183	1.1630
CO	HINSDALE	554	1.0820	KS	HAMILTON	2,583	1.1260
CO	JACKSON	1,305	1.2880	KS	HODGEMAN	1,960	0.9940
CO	KIOWA	1,644	0.9550	KS	JEWELL	3,175	0.9550
CO	MINERAL	1077	1.1800	KS	KEARNY	4,197	0.9440
CO	OURAY	4,519	1.0510	KS	KIOWA	2,646	1.0010
CO	PARK	16,788	1.1630	KS	LANE	1,661	1.0030
CO	SAN JUAN	686	1.1310	KS	LINCOLN	3,249	1.1430
CO	SAN MIGUEL	7,385	1.0300	KS	NESS	2,949	1.1250
CO	SEDGWICK	2,378	1.0370	KS	OTTAWA	5,985	0.9160
CO	WASHINGTON	4,647	0.9500	KS	RAWLINS	2,517	1.0070
GA	ECHOLS	4,157	1.0870	KS	RUSH	3,203	0.9960
GA	GLASCOCK	2,736	1.0930	KS	STANTON	2,152	1.1320
GA	TALIAFERRO	1,863	1.0930	KS	WABAUNSEE	6,804	1.0810
GA	WEBSTER	2,203	1.1190	KS	WALLACE	1,543	1.0050
IA	VAN BUREN	7,662	0.9590	KS	WASHINGTON	5,821	1.0140
ID	ADAMS	3,520	1.6380	KY	ROBERTSON	2,234	1.0550
ID	BENEWAH	9,246	0.9860	MI	KEWEENAW	2,224	0.9420
ID	BOISE	7,467	1.2130	MN	BIG STONE	5,335	1.0180
ID	BUTTE	2,769	1.4830	MN	CLEARWATER	8,231	0.9420
ID	CAMAS	1,040	1.4830	MN	COOK	5,411	0.9960
ID	CLARK	984	1.1500	MN	DODGE	19,504	0.9540
ID	CLEARWATER	8,192	1.1150	MN	GRANT	5,965	0.9330
ID	CUSTER	4,129	1.4830	MN	KITTSON	4,523	1.0130
ID	IDAHO	15,286	1.1150	MN	LAC QUI PARLE	7,258	0.9450
ID	LEWIS	3,645	1.1150	MN	LAKE OF THE WOODS	4,068	0.9190
ID	LINCOLN	4,533	1.0020	MN	LINCOLN	5,832	0.9540
ID	ONEIDA	4,148	1.1390	MN	MARSHALL	9,452	0.9460
ID	TETON	8,422	1.5090	MN	MURRAY	8,529	0.9330
IL	BROWN	6,593	1.0700	MN	NORMAN	6,629	1.1580
IL	CALHOUN	5,076	0.9440	MN	RED LAKE	4,157	0.9420
IL	HENDERSON	7,550	0.8720	MN	SIBLEY	15,001	0.9470
IL	POPE	4,071	1.0460	MN	TRAVERSE	3,684	0.9520
IL	PULASKI	6,430	1.0470	MN	WILKIN	6,455	0.9450
IL	PUTNAM	5,977	1.0690	MN	YELLOW MEDICINE	10,067	0.9450
IL	STARK	6,076	0.8020	MO	CLARK	7,178	0.8200
IN	WARREN	8,573	0.9470	MO	SCHUYLER	4,106	0.9670
KS	CHASE	2,880	0.8890	MS	ISSAQUENA	2,130	1.1470
KS	CHAUTAUQUA	3,826	0.9200	MT	BROADWATER	4,602	0.9360
KS	CHEYENNE	2,769	1.0240	MT	CARBON	9,741	0.9470

State	County	Population	Final Food Price Index	State	County	Population	Final Food Price Index
MT	CARTER	1,260	0.9150	NE	CLAY	6,334	1.0490
MT	CHOUTEAU	5,223	0.9360	NE	ARTHUR	364	1.0410
MT	DANIELS	1,483	1.1320	NE	BANNER	824	0.9380
MT	FALLON	2,657	1.2890	NE	BLAINE	471	0.9080
MT	GARFIELD	1,135	1.1130	NE	BOYD	2,120	1.0800
MT	GOLDEN VALLEY	873	1.1530	NE	DEUEL	1,988	1.0410
MT	GRANITE	2,880	1.1240	NE	DIXON	6,224	0.9150
MT	JEFFERSON	11,105	0.9960	NE	DUNDY	1,939	1.0820
MT	JUDITH BASIN	2,077	1.1460	NE	FRANKLIN	3,187	1.0200
MT	LIBERTY	2,100	1.0970	NE	FRONTIER	2,643	0.9410
MT	MADISON	7,314	1.1820	NE	FURNAS	4,681	0.9320
MT	MCCONE	1,747	1.2190	NE	GARDEN	1,856	1.0410
MT	MEAGHER	1,628	0.9360	NE	GARFIELD	1,902	1.0140
MT	MINERAL	3,898	1.0540	NE	GOSPER	1,932	0.9410
MT	PETROLEUM	512	1.3500	NE	GRANT	608	1.0410
MT	PONDERA	5,909	1.0970	NE	GREELEY	2,344	1.0680
MT	PRAIRIE	1,004	1.2190	NE	HARLAN	3,350	1.0180
MT	SANDERS	10,950	0.9450	NE	HAYES	1,044	1.0820
MT	STILLWATER	8,573	1.3330	NE	HITCHCOCK	2,858	0.9450
MT	TETON	6,132	0.9360	NE	HOOKER	661	1.0630
MT	WHEATLAND	2,018	1.5250	NE	KEYA PAHA	863	0.9620
MT	WIBAUX	922	1.2190	NE	LOGAN	720	0.9590
NC	CAMDEN	9,375	0.9760	NE	LOUP	550	1.0140
ND	BENSON	6,889	0.9850	NE	MCPHERSON	498	0.9590
ND	BILLINGS	912	0.9470	NE	NANCE	3,552	1.0590
ND	BURKE	2,027	1.2810	NE	PAWNEE	2,682	1.0410
ND	DIVIDE	1,863	0.9730	NE	PERKINS	2,771	1.0410
ND	DUNN	3,318	0.9470	NE	PIERCE	7,293	0.9290
ND	EDDY	2,417	1.1210	NE	POLK	5,164	0.9370
ND	EMMONS	3,542	0.9130	NE	ROCK	1,494	0.9620
ND	GOLDEN VALLEY	1,533	1.2190	NE	SHERMAN	2,962	1.0140
ND	GRANT	2,525	1.0320	NE	SIOUX	1,218	0.9540
ND	GRIGGS	2,310	0.9390	NE	STANTON	6,360	0.9290
ND	HETTINGER	2,407	1.5120	NE	THOMAS	662	0.9620
ND	KIDDER	2,298	0.9130	NE	WEBSTER	3,555	0.8900
ND	LAMOURE	4,085	1.1710	NE	WHEELER	741	1.0140
ND	LOGAN	1,946	0.9460	NM	CATRON	3,410	0.9980
ND	MCHENRY	5,275	0.9240	NM	DE BACA	1,934	1.1790
ND	MCINTOSH	2,754	1.0380	NM	HARDING	655	1.1050
ND	MCLEAN	8,360	0.9760	NM	MORA	5,020	0.9470
ND	NELSON	3,234	0.9850	NV	ESMERALDA	849	1.3470
ND	OLIVER	1,624	1.0180	NV	EUREKA	1,387	1.1410
ND	RENVILLE	2,291	0.9240	NV	LINCOLN	4,523	0.9270
ND	SARGENT	4,058	1.0720	NV	STOREY	4,265	0.9810
ND	SHERIDAN	1,320	0.9130	NY	HAMILTON	5,011	1.0050
ND	SIOUX	4,144	1.0380	OK	BEAVER	5,311	0.9990
ND	SLOPE	703	1.2600	OK	CIMARRON	2,652	1.1630
ND	STEELE	1,929	1.0980	OK	DEWEY	4,391	1.0080
ND	TOWNER	2,318	0.9850	OK	GRANT	4,483	0.8990
ND	WELLS	4,251	1.1210	OK	ROGER MILLS	3,310	1.0700

State	County	Population	Final Food Price Index	State	County	Population	Final Food Price Index
OR	GILLIAM	1,623	1.0520	TX	GLASSCOCK	1,408	1.1070
OR	GRANT	6,928	1.1150	TX	HUDSPETH	3,169	0.9300
OR	MORROW	11,394	0.9760	TX	IRION	1,678	0.8890
OR	SHERMAN	1,779	1.0520	TX	JEFF DAVIS	2,192	1.1350
OR	WHEELER	1,346	1.6040	TX	KENEDY	336	0.8550
SD	JONES	1,033	0.9830	TX	KENT	703	1.1060
SD	AURORA	2,878	0.9840	TX	KING	233	1.0850
SD	BENNETT	3,408	1.1280	TX	LIPSCOMB	2,994	1.1350
SD	BON HOMME	7,023	1.0930	TX	LOVING	81	0.9750
SD	BUFFALO	2,091	1.1110	TX	MCMULLEN	938	0.8310
SD	CAMPBELL	1,450	1.0790	TX	MOTLEY	1,175	1.0270
SD	CLARK	3,526	0.9600	TX	OLDHAM	2,089	0.9450
SD	CORSON	4,146	1.0790	TX	REAL	2,966	0.8640
SD	DEUEL	4,238	0.9600	TX	ROBERTS	913	1.0870
SD	DOUGLAS	3,050	1.1230	TX	SHERMAN	2,905	0.9450
SD	EDMUNDS	3,981	0.9880	TX	STERLING	1,114	1.0730
SD	FAULK	2,276	1.0990	TX	STONEWALL	1,381	0.9750
SD	GREGORY	4,083	0.9610	TX	TERRELL	810	0.9760
SD	HAAKON	1,841	0.9830	TX	THROCKMORTON	1,630	1.0630
SD	HAMLIN	5,620	0.9600	UT	DAGGETT	779	0.9810
SD	HANSON	3,585	0.9840	UT	GARFIELD	4,488	1.1280
SD	HARDING	1,205	1.2860	UT	MORGAN	8,381	0.9530
SD	HYDE	1,481	1.1010	UT	PIUTE	1,516	1.2000
SD	JACKSON	2,720	1.1660	UT	RICH	2,067	0.9440
SD	JERAULD	1,994	0.9840	UT	WAYNE	2,502	0.9850
SD	KINGSBURY	5,345	0.9250	VA	BATH	4,636	0.9620
SD	LYMAN	3,855	1.1130	VA	CHARLES CITY	7,146	1.0850
SD	MARSHALL	4,266	1.0290	VA	KING AND QUEEN	6,806	1.0450
SD	MCCOOK	5,697	0.9250	VA	RAPPAHANNOCK	7,171	0.8930
SD	MCPHERSON	2,515	0.9880	VT	ESSEX	6,436	1.1680
SD	MELLETTE	2,032	1.1590	VT	GRAND ISLE	7,575	0.9290
SD	MINER	2,454	0.9250	WA	COLUMBIA	3,984	1.0210
SD	PERKINS	2,877	1.6350	WA	FERRY	7,444	0.9610
SD	POTTER	2,149	1.0790	WA	GARFIELD	2,129	0.9000
SD	SANBORN	2,458	0.9840	WA	KLICKITAT	20,066	1.0520
SD	SHANNON	13,593	1.1280	WA	PACIFIC	21,341	0.9010
SD	STANLEY	2,775	0.9830	WA	SAN JUAN	15,295	0.9490
SD	SULLY	1,363	0.9830	WA	SKAMANIA	10,666	1.0810
SD	TURNER	8,331	1.1940	WA	WAHKIAKUM	3,975	0.9010
SD	ZIEBACH	2,574	1.1240	WI	BAYFIELD	14,938	0.9410
TX	CONCHO	3,610	1.1470	WI	FLORENCE	4,721	0.9450
TX	DICKENS	2,479	1.0700	WI	IRON	6,267	0.9460
TX	ARMSTRONG	2,014	1.0910	WI	MENOMINEE	4,537	0.8470
TX	BORDEN	585	1.0500	WY	CROOK	6,338	0.9990
TX	BRISCOE	1,583	1.0270	WY	NIOBRARA	2,306	1.1130
TX	COTTLE	1,696	0.9450	WY	SUBLETTE	7,801	1.1610
TX	CROCKETT	3,784	1.0760				
TX	CULBERSON	2,476	0.9750				
TX	EDWARDS	1,908	1.0520				
TX	FOARD	1,324	1.0130				

In two additional cases where a county had no store data available, the "next-nearest" county process described above resulted in the county *becoming* an outlier according to the criteria described in the text. In those two cases, The Nielsen Company instead imputed a market basket cost based on an average of all of neighboring counties within a distance less than 2 times the distance of the closest.

State	County	Population	Final Food Price Index
MT	POWDER RIVER	1,668	0.9875
MT	TREASURE	912	0.9495

The following 6 counties, which originally had no categories imputed, resulted in extremely high market basket costs, but did not meet any of the conditions we established to justify outliers as described in the text. In these six cases, The Nielsen Company imputed a price for the category/ies that were skewing the overall basket price based on information from the next-nearest county.

State	County	Population	Final Food Price Index
IL	HANCOCK	18,720	0.8060
MI	MENOMINEE	24,230	0.7840
MS	NOXUBEE	11,814	1.1640
TX	DUVAL	12,199	0.8520
TX	LIVE OAK	11,271	0.8530
TX	ZAPATA	13,561	0.9470

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. Documentation regarding state and/or county rates/policies is provided through the hyperlink. A full list of individual counties' rates is not provided here, but is available upon request.

Fifteen states levy grocery taxes (one of these states, Hawaii, is excluded from the list below because it was not included in the food price analysis).

> In the following six states, no additional grocery taxes are levied at the individual county level. In South Dakota, additional taxes may be levied by municipalities, but those rates were not included in this analysis.

State	2009 Food Tax (state rate)
MS	7.0%
NC	2.0%
SD	4.0%
UT	3.0%
VA	2.5%
WV	3.0%

> In the following eight 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	County	2009 Food Tax (state rate)	2009 Food Tax (average of all county rates)	Total Food Tax (state + county)
AL	All Counties	4.0%	1.9%	5.9%
AR	All Counties	2.0%	1.2%	3.2%
ID	All Counties	6.0%	0.0%	6.0%
IL	All Counties	1.0%	0.7%	1.7%
KS	All Counties	5.3%	2.0%	7.3%
MO	All Counties	1.225%	1.675%	2.9%
OK	All Counties	4.5%	1.1%	5.6%
TN	All Counties	5.5%	2.4%	7.9%

An additional four states do not levy state-level grocery taxes, but do permit counties and municipalities to levy a grocery tax (one of these states, Alaska, is excluded from the list below because it was not included in the food price analysis). Municipal taxes were not included in this analysis.

State	County	2009 Food Tax (state rate)	2009 Food Tax (average of all county rates)
CO	All Counties	0%	0.2%
GA	All Counties	0% (rate history)	2.8%
SC	All Counties	0%	0.9%

Finally, an additional two states do not levy state or county-level grocery taxes, but do 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%	0.000%
LA	0%	0.000%