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.

FI persons * $13.99 * 52 weeks * (7/12) =	$ reported needed by the food insecure 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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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.

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:

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

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, 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:

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

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. 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:

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

and equation (2) is specified as:

$$FIC^*_{cs} = \hat{\alpha} + \widehat{\beta_{UN}} UN_{cs} + \widehat{\beta_{HISP}} HISP_{cs} + \widehat{\beta_{BLACK}} BLACK_{cs} + \widehat{\mu_T} + \widehat{v_s} \quad (2')$$

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, 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, 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.

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).

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.

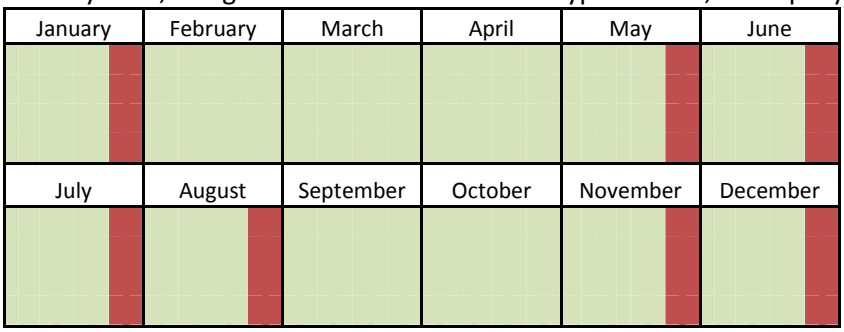
Not all food insecure households experienced needing additional food every day of the week. The phrasing of the questions, above, however, suggest that responses are given from the perspective of a week during which the household needed to "spend more." We have assumed that these responses therefore 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:



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. 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 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:
  - Ratio of FIPS market basket price to average market basket price in the **food bank service area** is above the 95th percentile;
  - No mass retailers in the county; and
  - Total dollars expended **per Nielsen store** in the FIPS is in the bottom 20th percentile.
- Set two:
  - Ratio of FIPS market basket price to average market basket price in the **food bank service area** is above the 95th percentile;
  - No mass retailers in the county; and
  - Total dollars expended on food **in the county** is in the bottom 20th percentile.
- Set three:
  - Ratio of FIPS market basket price to **national average** market basket price is above the 95th percentile;
  - No mass retailers in the FIPS; and
  - Total dollars expended **per Nielsen store** in the FIPS is in the bottom 20th percentile.
- Set four:
  - Ratio of FIPS market basket price to **national average** market basket price is above the 95th percentile;
  - No mass retailers in the FIPS; and
  - 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 (0.19% of the counties in the continental US) met at least one of the above conditions. 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. 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. An additional four states 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.

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.

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 $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.