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Does Economic Decline Contribute to a Decline in Children's Food Security?

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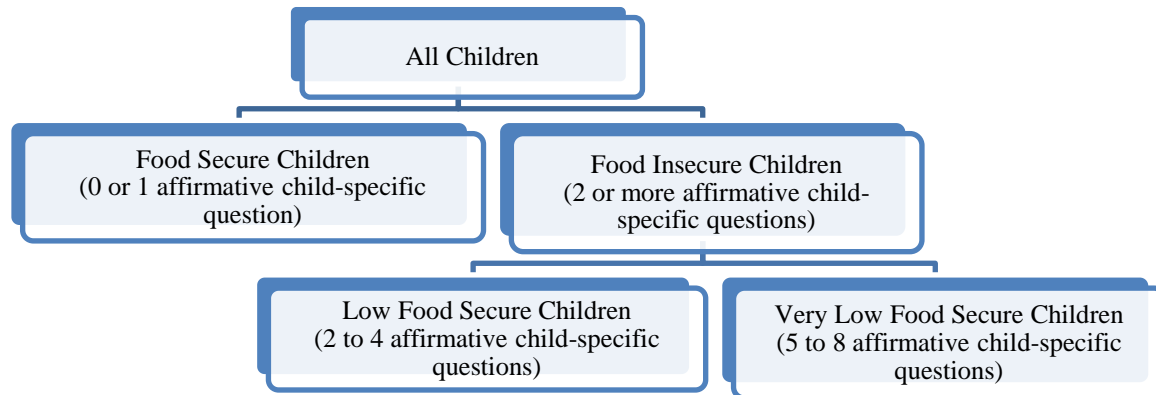
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1. Background and Objectives

Most Americans believe that children should not experience persistent worry about the quality or quantity of food consumed due to low household resources. Since 1995, the USDA has tracked children's food security based upon household responses to the annual Current Population Survey Food Security Supplement (CPS-FSS). During this time, a small, but recently growing, share of U.S. households report multiple indicators of reduced food intake and disrupted eating patterns among children due to inadequate resources to obtain food (Coleman-Jenson *et al*, 2012). The USDA classifies children as *food secure*, *low food secure*, or *very low food secure* based upon the number of affirmative responses to eight child-specific food sufficiency questions in the CPS-FSS (Nord, 2009). Children in households that answer one or none of the child specific questions affirmatively are classified as *food secure*. Children in households that affirmatively answer two to four of the child specific questions are *low food secure*. Children in households answering five or more questions affirmatively are classified as *very low food secure*. Jointly, very low food secure children and low food secure children are considered food insecure children. This paper follows the USDA's definitions in classifying children's food security status (Figure 1).

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Figure 1:



Major characteristics of the relatively small population of households with very low food secure children have been identified in Nord (2009) and Nord and Parker (2010). Parents of very low food secure children tend to have relatively low education levels and are disproportionately likely to be single mothers, African Americans, and to reside in metropolitan or suburban areas (Nord, 2009). However, Andrews and Nord report that between 1999 and 2008 “percentage increases (in food insecurity rates) were largest for groups in which very low food security has historically been *less* [emphasis added] prevalent” (Andrews and Nord, 2009). Thus, recent increases in children’s food insecurity continue to be a concern for all sub-populations within the United States.

Since the start of the latest recession in December 2007, children’s food insecurity rates have increased significantly. In 2007, approximately 323,000 households with children (0.8 percent) were estimated to have very low food secure children (Nord, 2009). By 2009, the number increased by 45 percent to 469,000 households or 1.2 percent of households with children (Nord et al., 2010). Strong economic shocks can have different types of temporal impacts on children’s food security. In response to a negative economic shock, some households may experience temporary or transient spells of children’s food insecurity while others may face more permanent, chronic periods of children’s food insecurity. Different social assistance

policies are required in the two cases. Households with children chronically exposed to food insecurity often require long-term assistance to improve their food procurement asset bases and long-term consumption patterns. On the other hand, households where children are exposed to transient spells of food insecurity may require some form of insurance like temporary social assistance with rapid enrollment and disbursement of benefits to ameliorate the impacts of short and medium term negative economic shocks on household food consumption.

Relatively little is known about the persistence of spells of food insecurity, particularly in households with children. For example, a preliminary look at the Panel Survey of Income Dynamics data indicates that 10-15 percent (depending on the year) of the households classified as food insecure reported that they “had difficulty getting enough food” in only one month, while more than 50 percent of the food insecure households reported problems in three months or less during each year. So most food insecurity spells are rather short. However, within the food insecure group, Nord *et al* (2009) find that *very low food secure* households experience recurring, frequent, and chronic food insecurity more often than food insecure households overall. This finding suggests that households which experience the most severe conditions of food insecurity also experience longer periods of food insecurity. Inferences about the duration of children’s food insecurity as chronic (usual throughout the year) or transient (one or two months a year) can be made with the cross-sectional CPS-FSS data set based upon household responses to the food sufficiency questions in the survey.

Despite the obvious link between the household’s local economy and child food security, the role of negative economic shocks in generating child food insecurity has received virtually no attention until recently. Hacker, Rehm, and Schlesinger (2010) find that economic shocks to household well-being were extremely widespread in 2009, with 93 percent of households

experiencing at least one substantial decline in wealth or earnings or a substantial increase in nondiscretionary spending. Further, households with children appear to be at greater risk of food insecurity stemming from economic instability and insecurity than households without children. From 2007 to 2008, households with children experienced greater percentage increases in food insecurity than households without children (Andrews and Nord, 2009). In Nord's (2009) recent report on child food insecurity, rates are significantly higher for households with unemployed adults or adults not in the labor force. This is of particular, immediate concern as Lovell and Issacs (2010) estimate that from the start of the recession in December 2007 to December of 2009, the number of children with an unemployed parent increased from 4.8 million to 8.1 million.

In addition to household employment conditions, regional employment conditions appear to impact household food insecurity as well. Tapogna *et al* (2004) find a strong, positive relationship between state unemployment rates and food insecure households experiencing hunger.² However, the relationship is weaker and insignificant when considering food insecure households with and without hunger. Bartfeld and Dunifon (2005) also estimate a strong positive relationship between state unemployment rates and child food insecurity. Part of the potentially distinct impact of regional economic conditions may arise from the fact that the CPS-FSS measures children's food security status based upon households' self-evaluation of their children's food sufficiency. Yet even with the CPS-FSS's careful wording, children's food security status measures are subjective and a household's perception of their children's food sufficiency levels can be influenced by individual experiences, expectations, and environments. In a survey of 2,584 Texas residents, Dean and Sharkey (2011) find a positive relationship

² Tapogna *et al* use data from the 1999 – 2001 Current Population Surveys. In these surveys, food insecure households experiencing hunger are synonymous with very low food secure households in the 2005 to 2009 Current Population Surveys.

between household food insecurity and respondent perceptions that they are worse off than others in their community. Thus, declining economic conditions likely influence household perceptions of children's food sufficiency, both through the household's own conditions and through surrounding regional economic conditions.

Despite research on the characteristics of households experiencing children's very low food security and documentation of the impact of regional economic conditions on household well-being, a study directly linking regional unemployment and children's very low food security is missing in the literature. In light of the recent recession and the noticeable increase in children's very low food security rates since 2007, a deeper understanding of the relationship between economic conditions and children's food insecurity is necessary. This paper explores the impact of regional economic conditions on child food insecurity, particularly very low child food security. The temporal dimensions of child food insecurity in the recent recession are also explored by distinguishing chronic and transient occurrences of children's food insecurity.

The next section of the report describes the datasets used in the analysis. The methods used to classify children as chronically food insecure and transiently food insecure children are in section 3. Section 4 describes the major characteristics of food insecure children, particularly very low food secure children. Section 5 presents the methods used to identify the factors associated with children's food insecurity, emphasizing the roles household-level unemployment and regional unemployment. The results are then presented in section 6, followed by conclusions and policy recommendations in section 7.

2. Datasets

Household-level data is drawn from the 2005 to 2009 December Current Population Surveys (CPS) (BLS, 2006 – 2010). Although data is available prior to 2005, the sample is

restricted to the 2005 - 2009 period in order to compare child food security responses immediately prior to and after the abrupt decline in economic conditions occurring after December 2007. The CPS is designed to be nationally representative of the civilian non-institutionalized US population and contains questions covering household employment and demographic characteristics (U.S. Bureau of Labor Statistics, 2006). A more detailed description of the CPS and its sampling method can be found in US Bureau of Labor Statistics (2006-2010) reports. The December CPS also includes the Food Security Supplement which contains eight child-specific questions assessing food security based on a 12-month recall and a 30-day recall. This paper only uses responses to the 12 month recall CPS-FSS questions. From 2005 to 2009, approximately 14,500 households with children completed the CPS-FSS each year³.

Supplemental datasets on regional economic conditions are matched to the household records. Rates of unemployment for state-level metropolitan or non-metropolitan regions are obtained from the Bureau of Labor Statistics' Economic and Employment Statistics for the years 2004 to 2009 (BLS, 2011). Data for the number of counties experiencing persistent poverty is obtained from the Economic Research Service's county typology codes (ERS, 2004). A county is classified as persistently poor by the ERS if at least 20 percent of residents are poor in each of the last four censuses (1970, 1980, 1990, 2000).

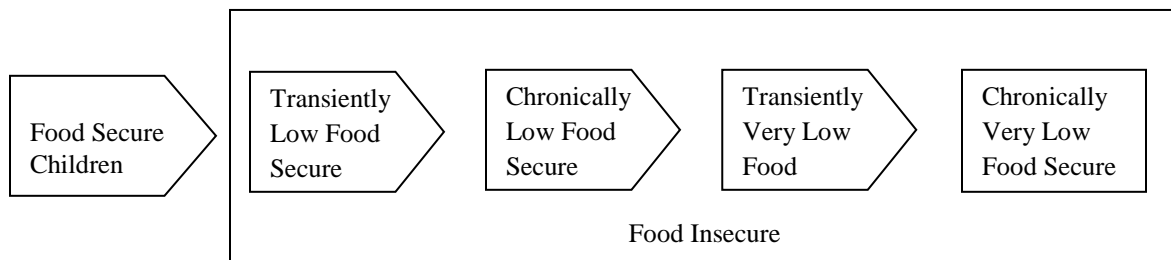
Classifying children's food security status

Classification of children's food security status can be done several ways. Here we implement and explore the implications of two classification schemes that further divide the food insecure category. Children are first classified as *low food secure* or *very low food secure*

³ Ideally, households completing the CPS-FSS in December could be linked to observations in the CPS's March Annual Social and Economic Supplement to gain detailed information on household income and social assistance program transfers. However, the rotational design of the CPS and the small sample size of low and very low food secure households that can be linked to the March Supplement.

following the definitions provided in the introduction. Low food secure children and very low food secure children are then each classified as *chronically food insecure* or *transiently food insecure* based upon responses to the individual CPS-FSS questions. Under this classification, child food security status can be viewed as a continuum, where the intensity of children's food insecurity transitions from food secure to chronic, very low food secure (Figure 2). Table A.1 provides a list of the child-specific CPS-FSS food sufficiency questions that are used to classify chronic and transient food insecure children (Census Bureau, 2010).⁴

Figure 2: Continuum of Children's Food Security Status



As an example, the question “(I/We) relied on only a few types of low cost food to feed the child(ren) in (my/our) household because (I was/we were) running out of money to buy food” can be answered “often true”, “sometimes true”, or “never true”. The response “often true” is employed as an indicator of *chronic children’s food insecurity*, while “sometimes true” is an indicator of *transient children’s food insecurity*. *Chronically food insecure children* must have at least one response to the children-specific questions indicative of chronic food insecurity. *Transiently food insecure children* are then classified as food insecure if they do not meet the criteria for chronic food insecurity. A threshold of one response ensures that any child

⁴ Only questions with responses indicating duration are used for classification of chronic and transient children’s food insecurity. Thus, the “yes” “no” questions are not included for classification purposes.

experiencing persistent emotional or physical indicators of food insecurity is classified as chronically food insecure.

Describing Children's Food Insecurity

Table 1 gives children's food security status rates from 2005 to 2009 for two key populations, all households with children and poor and near poor households with children. A few key trends are clear in table 1. First, among all households with children, the percent of food secure children fell noticeably from 2005 to 2009, from 91.8 percent to 89.36 percent. Second, in all households with children, most food insecure children experience low food security and a small percentage experience very low food security. Third, the largest increase in children's very low food security and low food security rates occurs from December 2007 to December 2008, during the first year of the recession. Child rates of very low food security and low food security improve slightly in the last survey period, December 2009. Lastly, there is a large increase in very low food security rates during the survey period. In 2005, 0.68 percent of children were classified as very low food secure; by 2008, that rate almost doubled to 1.28 percent. Rates of very low food security are higher for poor and near poor households with children, reaching 2.70 percent in 2008. This is expected, as poor households are likely to have fewer assets to safeguard against negative economic shocks.

Chronic and Transient Children's Food Insecurity

We now turn to the dynamics of food insecurity among children. Table 2 presents the proportion of children that are chronically and transiently food insecure based upon the definitions in the last section. Averaged over all years, the majority (71.0 percent) of very low food secure children experience chronic food insecurity, meaning the household reported consistent exposure to at least one indicator of children's food insecurity in the last 12 months

(indicated by a response of “often” or “almost all months”). By contrast, the majority of low food secure children experience only short spells of exposure (where the household responds “sometimes true” “some months” or “1 or 2 months”), with 62.0 percent classified as transiently food insecure when averaged across all years. After the start of the recession in 2007, the percentage of chronically *low food secure* children increases while the percentage of chronically *very low food secure* children decreases. Thus, these tables reveal that during 2008 and 2009, there is a movement of households with food secure children further down the continuum of children's food security status. However, rates for the most extreme form of children's food insecurity, chronic very low food security, remain low.

Children's Food Security Status by Key Household Demographics

Table 3 describes children's food security rates for major household demographic groups averaged across all survey years. In single, female-headed households, 1.8 percent of children are very low food secure compared to 0.5 percent of children in married households. The high rates of very low food secure children in households with single, female heads highlight the importance of continued targeting of single mothers, particularly non-working mothers, in government assistance programs focusing on child well-being. Another striking relationship exists between child food security and households headed by a disabled adult. Only 2.6 percent of households with children are headed by a disabled adult, but these households have a 3.8 percent rate of very low food secure children. The link between the mental and physical capabilities of the household head and children's food security status is an important area for further research and policy attention.

The strong relationship between educational attainment in the household and child food security status is also highlighted in Table 3. For example, 98.2 percent of children are food

secure in households with a post-graduate degree, while only 77.1 percent are food secure when the household head does not have their high school diploma or GED. Not surprisingly, rates of child very low food security also increase dramatically in households where the head has a very low level of education. In households with a head without a high school graduate or GED, an average 2.26 percent of children are very low food secure. This number is markedly higher than the rate of children's very low food security among households with a post-graduate degree (0.12 percent). Considering the head of household's race, Black, American Indian or Alaskan Native and Hawaiian or Pacific Islander, and multi-racial-headed households have much lower rates of child food security (83.6 percent, 85.2 percent, and 84.9 percent, respectively), compared to the 91.9 percent of children that are food secure in households headed by Whites.

Household Employment and Children's Food Security Status

Table 4 provides children's food security status rates by employment status of the household head across survey years. Not surprisingly, the lowest rates of children's food security are among children in unemployed households, at 73.55 percent in 2008. However, across all employment groups, children's food security rates significantly decline from 2007 to 2008. Interestingly, from 2008 to 2009, children's food security rates notably improve for unemployed households heads and those not in the labor force. This may be, in part, because many households with traditionally higher levels of well-being entered the ranks of the unemployed and, in part, due to the impact of expanded household transfers through the American Recovery Act. Focusing on very low food security, rates increase annually within every employment group until 2008 and then decline in 2009.

Average Regional Economic Indicators by Children's Food Security Status

Table 5 provides the means of county-level economic variables across state metropolitan or non-metropolitan regions by children's food security status. Of note from the first section of the table, low food secure children live in regions that are disproportionately likely to be persistently poor, even when compared to children with very low food security. This suggests that very low food security often occurs as relatively isolated incidences in communities with average levels of affluence or above. The second and third sections in table 5 displays average county unemployment rates and the average percent change in county unemployment rates for state-level metropolitan or non-metropolitan areas by children's food security status. Low food secure children and very low food secure children live in regions with similar average unemployment rates. Average percent changes in unemployment rates also remain roughly the same across children's food security status. Thus, regional economic indicators do not show strong evidence that low or very low child food security are linked to poor regional economic performance at the state metropolitan and non-metropolitan level. But, as expected given the depth of the Great Recession, all groups lived in regions that experienced large increases in unemployment rates and percent changes in unemployment rates in 2008 and 2009.

Overall, the descriptive statistics suggest that households which experience child food insecurity are not a homogeneous population. With respect to time, the spike in child food insecurity after 2007 is apparent. Below we present a method to identify the role that changing economic conditions have played in observed increases in child food security during the first two years of the Great Recession.

3. Methods

Impacts of regional economic conditions and household characteristics on child food insecurity

As mentioned above, children's food insecurity can be seen as a continuum, with an implicit ordering of very low food security at one end of the spectrum and food security at the opposite end. An ordered probit model that allows for this ordering is used to estimate the impact of regional economic conditions and household characteristics on a children's food security status. Following the ordered probit model specified in Greene (2002), food security status is modeled as an unobserved latent variable FS^* , such that:

$$FS^* = \beta \mathbf{x}' + \varepsilon \quad (1)$$

Where \mathbf{x}' is the column vector and ε is the error term. The observed food status, FS , is determined by the household's unobserved latent food security status, FS^* relative to estimated cut points, μ , as follows:

$$\begin{aligned} FS_i = 1 & \quad \text{if } FS^* \leq \mu_1 \\ FS_i = 2 & \quad \text{if } \mu_1 \leq FS^* \leq \mu_2 \\ FS_i = 3 & \quad \text{if } \mu_2 \leq FS^*. \end{aligned}$$

FS is defined using the classifications for children's food security status provided by the CPS, where $FS = 1$ indicates very low food secure, $FS = 2$ indicates low food secure, and $FS = 3$ indicates food secure. The probability of a household being in a particular food security status is then estimated as:

$$Prob (FS_i = 1 | \mathbf{x}) = \Phi (\mu_1 - \beta \mathbf{x}'), \quad (2)$$

$$Prob (FS_i = 2 | \mathbf{x}) = \Phi (\mu_2 - \beta \mathbf{x}') - \Phi (\mu_1 - \beta \mathbf{x}'), \quad (3)$$

$$Prob (FS_i = 3 | \mathbf{x}) = \Phi (\beta \mathbf{x}' - \mu_2) \quad (4)$$

An ordered probit model is also employed with the alternative categorical ordering of chronically food insecure, transiently food insecure, and food secure.

Model Specification

The child food security status specification in the ordered probit model is:

$$\begin{aligned}
\beta x' \equiv & \beta_1 * R_Poverty + \beta_2 * R_Rate_Unemply + \beta_3 * R_Change_Unemploy + \beta_4 * H_NILF + \\
& \beta_5 * H_PT + \beta_6 * H_UNEM + \beta_7 * H_DurUNEM + \beta_8 * H_INCOME + \beta_9 * H_INCOMEREP + \\
& \beta_{10} * H_INCOMEZ + \beta_{11} * H_NONWHITE + \beta_{12} * H_NONCIT + \beta_{13} * H_SINGLEFEM + \\
& \beta_{14} * H_SINGLEFEMUNEM + \beta_{15} * H_AGE + \beta_{16} * H_DISBALED + \beta_{17} * H_NUMCHILD + \\
& \beta_{18} * H_NUMHOUSEHOLD + \beta_{19} * H_METRO + \beta_{20} * H_GED + \beta_{21} * H_COLLEGE + \beta_{22} * \\
& H_POSTCOLLEGE + \beta_{23} * YEAR05 + \beta_{24} * YEAR06 + \beta_{25} * YEAR08 + \beta_{26} * YEAR09 \quad (5)
\end{aligned}$$

Definitions for the variables included in the model are presented in appendix table A.2.

The *R* prefix indicates a regional variable and regional variables are defined at the level of the metropolitan or non-metropolitan region within each state. Ideally, regional variables would be specific to the household's county of residence; however, the county codes are not publically available for CPS households (US Census Bureau, 2010). Unemployment rates are drawn from the Bureau of Labor Statistics county level data and then averaged across metropolitan and non-metropolitan regions for each state in each year.⁵ The proportion of the counties classified as persistently poor is calculated as the total number of counties classified as persistently poor divided by the total number of counties in states' metropolitan or non-metropolitan region.

Characteristics of the household ultimately depend on the characteristics of the household members. The *H* prefix indicates a household variable and household level variables are constructed based on the characteristics of the household head. The household head is defined as the adult member with the highest level of education. If a tie in education level occurs, the household head is the adult member with the highest number of weekly hours worked.⁶ The employment status of the household head is broken into four categories: full-time employment,

⁵ In four states the metropolitan status of households is not identified. Regional variables for these households are constructed at the state-level.

⁶ Weekly income, the number of actual hours worked, and age are sequentially used if further information was needed to break ties.

part-time employment, unemployed, and not in the labor force. Definitions for these categories are drawn from the CPS and are summarized in Table A.2. Full-time employment is the base category for employment status in the model. The duration of unemployment is also included in the model, and is defined as the number of weeks an unemployed household head is actively looking for work. Education status refers to the highest level of educational attainment in the household. There are four levels of education in the model: households with a high school diploma or equivalent (GED), households with an associates or bachelors degree (college graduates), and households with a post-graduate degree (master's, professional school, or doctorate). The base category is households without a high school diploma or equivalent.

Several control variables for household income are included in the model. In the December CPS, household income is recorded categorically as a range. The median value of the household's reported income range is therefore employed as an approximation of household income. An indicator variable is included to account for households who do not have a valid income range.⁷ This indicator variable is also interacted with the household income variable. A direct link exists between household income and food security status, especially for households at lower levels of income. Income *inequality* is also likely to influence household self-perceptions of food insecurity through comparisons with those around them (Migotto *et al*, 2006; Ravillion and Losken, 1999). For a given level of income, a household is likely to feel worse off compared to others if they are at the lower tail of their relevant income distribution, rather than higher up in the distribution. The impact on household perceptions of children's food security status is controlled for based upon the household's position in their regional income distribution. State metropolitan and non-metropolitan area specific income z-scores are generated based on

⁷ Households without a valid income range either left this question blank, did not know the household income, or refused to answer during the survey.

county-level household income data. A household's income z-score is calculated by taking the household annual income, subtracting the region's mean income, and dividing by the region's standard deviation of income.⁸ The household income z-score normalizes households' position in regional income distributions by providing the number of standard deviations a household's income lies above or below the regional average household income. Lastly, survey weights are drawn from the December CPS for 2005 – 2009 and are used to weight observations during the estimation to be representative of the national civilian non-institutionalized population" (Census Bureau, 2010). The ordered probit model is run using household observations from the 2005 to 2009 December CPS.

Probability simulations for regional and household economic variables

The parameters obtained from the model using data for all five survey years are then used to simulate shifts in rates of very low food security and low food security due to changes in regional and household economic conditions.⁹ Seven simulations are undertaken based on changes in the following variables: 1) regional unemployment rates, 2) regional unemployment rates as a percent change, 3) the proportion of household heads who work part-time, 4) the proportion of children household heads who are unemployed, 5) the proportion of children household heads who are not in the labor force, 6) the average duration of unemployment (in weeks), and 7) household income. The first simulation is run to isolate the impact of the large 2008 and 2009 increases in regional unemployment rates on children's food security. The second simulation isolates the impact of large percent changes in regional unemployment rates on

⁸ The estimated standard deviation for household income will be lower than the real standard deviation for household income, as we are using the median value for each income bracket.

⁹ The proportion of counties which have over 20% of their population classified as persistently poor in the last four censuses is not included in the decomposition since the variable is calculated based on the 2000 US Census and does not change over the survey periods.

children's food security. This simulation accounts for the fact that a two percentage point increase in unemployment will likely have a different impact if the unemployment rate is moving from 0.2 to 2.2 percent than from 7.2 percent to 9.2 percent. Simulations 3 to 5 test the sensitivity of children's food security status probabilities to changes in household head's *propensity* to work part-time, be unemployed, or to leave the labor force at a given regional unemployment rate. For example, as a recession continues and low expectations of economic recovery are maintained, it is likely that businesses will be more likely to hire part-time rather than full-time employees or lay-off employees, and households will be more likely to leave the labor force, even with high, but stable, unemployment rates. These changes in household head employment propensities likely impact child food security status. Simulation 6 examines changes in the probability of children's food security status as households face longer periods of unemployment during the recession, keeping other household and regional employment variables constant. Simulation 7 similarly accounts for changes in the probability of children's food security status with changes in household income, keeping household and regional economic variables constant.

The following method is employed to calculate differences in child food security status probabilities with changes in regional economic factors (state metropolitan or non-metropolitan unemployment rates and percent changes in unemployment rates). First, probabilities are estimated for the full model (that which includes observations for all five survey years) using the linear predictions obtained in equation 5. The linear predictions are then generated with the observations from individual survey years of x_t , while retaining the parameters β , μ_1 , and μ_2 from the full model (e.g., Todd and Wolpin 2007). The linear predictions for each survey year are recalculated by the variable of interest, x_t , with that of the following year, x_{t+1} . For instance, in

determining the change in the probability of children's food insecurity due to a rise in unemployment rates from 2008 to 2009 the probabilities of each food security category are estimated using observations from the December 2008 CPS. These probabilities are then re-generated with the 2008 observations, except the unemployment rate variable in the linear prediction is replaced with the unemployment rate observed in 2009. The difference in the two sets of probabilities represents the change in children's food security status probabilities resulting from changes in the 2008 to 2009 unemployment rate *ceteris paribus*.

These simulations isolate the impact of annual changes in a single variable on children's food security status probabilities, keeping all other variables and parameters constant. The contribution a change in a specific variable level has on the overall change in children's food security status probabilities is then estimated by dividing the change in probability due to changes in variable levels by the total observed change in probability between survey years

For Household Level Employment and Income Variables

Households may have experienced changes in their perceptions of children's food security as a result of increased economic uncertainty. Households may experience increased feelings of vulnerability due to wide-spread increases in lay-offs, part-time positions, longer unemployment periods, and changes in expected household income. Ideally, changes in individual household employment status, duration of unemployment, or income would be observed over time.

However, the CPS is a cross-sectional dataset and *an expected value* approach is developed to estimate changes in household head's propensity to have a specific employment status.

Household head's employment status is defined as a binary variable, which takes the value of 1 if the employment status is observed and 0 if the employment status is not observed. State-level

proportions are calculated for employment status of household heads (not in the labor force, working part-time, or unemployed). In each survey year, the number of household heads with an observed employment outcome is divided by the total number of households to derive state-level employment status propensities. The employment propensities (i.e., expected value) are then used to estimate the impact changes in a household's employment opportunities may have on children's food security status, keeping all other regional and household economic variables constant. Similarly, changes in state-level average duration of unemployment and state-level average household income proxy for changes in households' expected length of unemployment duration and income, respectively.

4. Results:

Ordered probit

Average marginal effects over all five survey years are estimated from the ordered probit model and are presented in table 6. The effect of persistent regional poverty on child food security appears to be strong. A one percent increase in the proportion of the county classified as persistently poor increases the probability of very low food security among children by 0.67 percentage points and the probability of low food secure among children by 3.65 percentage points. The unemployment rate shows an insignificant impact on the probability of child very low food security and low food security. On the other hand, the percent change in the unemployment rate is positive and significant ($p = 0.10$). However, the magnitudes of the marginal effects of percent change in regional unemployment rates on child very low food security and low food security are small. A one percent increase in the regional unemployment rate generates a 0.003 percent point increases in probability of child very low food security and 0.018 percent point increase in the probability of child low food security.

Household employment status is a key household-level factor in predicting child food security status in the model. Compared to households with a full-time employed head, children in households with an unemployed head are 0.72 percentage points more likely to have very low food security and 3.95 percentage points more likely to have low food security than children in households with an employed head. The marginal effect of an unemployed household head is appreciably larger than the marginal effect of a household head not in the labor force or working part-time for both very low food secure and low food secure outcomes. The duration of unemployment also significantly ($p=0.10$) increases the probability of very low food security and low food security among children.

As expected, households with low per capita incomes are particularly vulnerable to very low food security and low food security among children. Further, a lower household income z-score increases the probability of children's very low food security and low food security. This result suggests that children in households at the lower end of the regional income distribution are more likely to be food insecure even after controlling for household income. Thus, perceived child food security depends, in part, on well-being relative to others in the region.

Other characteristics of the head of household with particularly strong impacts on the probability of children's food security status include if the head is non-White, not a US citizen, a single female, or has a disability. Compared to married or male headed households, children in single, female headed households show a high level of vulnerability to food insecurity, being 0.61 and 3.31 percentage points more likely to be very low food secure and low food secure, respectively. The marginal impact of a disabled household head on the child food insecurity is also substantial. Children in households with a disabled head are 0.84 percentage points more likely to be very low food secure and 4.58 percentage points more likely to be low food secure.

The results also highlight the importance of education levels of the head of household in assuring child food security. Compared to the base case of households without a high school diploma or GED, children in households where the head has a high school diploma or equivalent are 0.25 percentage points less likely to be very low food secure and 1.39 percentage points less likely to be low food secure. Another significant decrease in the probability of children's food insecurity occurs in households with a bachelor's or associate's degree. The probability of children's very low food insecurity decreases by 0.61 percentage points and by 3.36 percentage points for children's low food security, compared to the same base.

When examining the indicator variables for survey year, the impact of being surveyed during the pre-recession years, 2005 and 2006, on the probability of children's food insecurity is not statistically different from that of the base year, 2007, after controlling for household and economic factors. However, compared to households with children surveyed in 2007, children in households surveyed in 2008 are 0.28 percentage points more likely to be very low food secure and 1.55 percentage points more likely to be low food secure. At the same time, probability of children being food insecure is not statistically different for households surveyed in 2009 than in 2007.

A second, restricted model is run to test the sensitivity of regional economic variable parameters estimates to the exclusion of household employment variables (table A.3). The specific concern is that household employment status may capture part of regional employment status effects. However, in the restricted model the magnitude of the marginal effect for regional unemployment rates decreases, but remains insignificant. Further, marginal effects for the percent increases in regional unemployment rates and the proportion of the region classified as

persistently poor remain similar across the two model specifications. The marginal effects for the remaining variables are also comparable between the two model specifications.

An ordered probit model was also run to compare variables' marginal effects between the chronic, transient, and food secure classification of children households. Table A.4 shows that the marginal effects and significance of variables are similar when the chronic and transient food security classifications are employed instead of very low and low food security classifications, suggesting that little additional information is added to the model by accounting for the duration of children's food insecurity. For this reason we focus on the food secure, low food secure, and very low food secure model.

Probability Simulations

The probability simulations estimate the impact of changes in regional and household economic variable levels on the probability of each child food security status. Table 7 provides the results from the unemployment rate probability simulations and the percent change in unemployment rate probability simulations. The results highlight that it is the changes in , unemployment rates, not the levels that strongly impact the probability of children's food security status. Replacing the percent change in unemployment rates from 2007 to 2008 with the percent change in unemployment rates from 2008 to 2009 for all observations in the December 2008 survey year accounts for over 30 percent of the observed changes in child very low food security rates and low food security rates from 2005 to 2009. This finding is consistent with the conclusions reached by Tapogna *et al*, 2004. Similar results are obtained for the unemployment rate simulations and the percent change in unemployment rate simulations using the restricted model (not shown).

Compared to regional unemployment variables, changes in households' propensity to be unemployed make a minimal contribution to the total observed changes in child food security status (table 8). Keep in mind that with cross-sectional data it is not possible to observe changes in households' observed employment status. Thus, household unemployment propensities are not synonymous with actual movement of household heads from an employed status to an unemployed status. Rather, state metropolitan non-metropolitan area proportions of the employment status of household heads proxy for increases in household probabilities to work part-time, leave the labor force, and be unemployed at a given regional unemployment rate. Changes in state metropolitan non-metropolitan area proportions of household heads not in the labor force or working part-time also make minimal contributions in explaining observed changes in child food security status.

Table 9 includes changes in the probabilities of children's food security status resulting from changes in the average duration of unemployment and average household income. When substituting the higher 2009 regional mean for the duration of unemployment for the 2008 observations, this increase in the mean unemployment duration accounted for 19.43 percent of the total change in observed rates of child very low food security and 16.84 percent of the observed rates of child low food security. On the other hand, changes in average household income account for a very modest percent of the total change in the probability of children's very low security and low food security.

5. Conclusions and Policy Recommendations:

Since the start of the Great Recession in 2007, regional economic conditions, household employment levels, and children's food security have experienced notable declines. This report presents evidence that spikes in regional and household characteristics played a significant role

in the observed 2008 increase in child with very low food security and low food security. Perhaps not surprisingly, unemployment of the household head is found to substantially increase the probability of very low food security and low food insecurity among children. Further, simulations of changes in regional economic conditions indicate rising unemployment rates during the Great Recession explain a significant portion of observed increases in child food insecurity. The findings suggest that there is a need to examine unemployment insurance and job creation policies during severe labor market shocks in order to better protect the food security of families with children.

The study also finds that the factors which place children at risk of very low food security are in some cases different than those that place children at risk of low food security. Nord *et al* (2002) using a 30-day recall period find that most food insecurity is transient in nature. However, based on households' 12-month recall responses to the 2005 - 2009 December CPS-FFS, most very low food secure children experience chronic food insecurity. This connection between the severity and the duration of children's food insecurity is also an area for further research. But these initial findings suggest the need of a two-tier food assistance program to address child food insecurity. In tier one, low food insecurity is addressed through rapid assistance of a limited duration and with low transaction costs to households that predominantly experience low food security among children for a short duration. On the other hand, tier two interventions would place a special emphasis on long-term multidimensional assistance for households with very low food security children.

Tables:

Table 1: Children's Food Security Rates for Key Populations of Children Households					
	2005	2006	2007	2008	2009
All Children Households					
Food Secure	91.80	91.62	91.69	89.03	89.36
Low Food Secure	7.53	7.82	7.45	9.65	9.45
Very Low Food Secure	0.68	0.56	0.82	1.28	1.18
Poor and Near Poor Children Households					
Food Secure	82.40	81.05	82.17	78.63	79.30
Low Food Secure	16.12	17.54	16.00	18.68	18.08
Very Low Food Secure	1.48	1.41	1.82	2.70	2.62

Table 2: Proportion of Households with Children Experiencing Chronic and Transient Food Insecurity				
	Very Low Food Secure		Low Food Secure	
	<u>Chronic</u>	<u>Transient</u>	<u>Chronic</u>	<u>Transient</u>
2005	65.80	34.20	35.21	64.79
2006	70.89	29.11	36.59	63.41
2007	74.72	25.28	37.62	62.38
2008	74.53	25.47	40.45	59.55
2009	68.33	31.67	39.23	60.77
Average	71.02	28.98	38.03	61.97

Table 3: Children's Food Security Status by Key Household Demographics			
	<u>Very Low Food Secure</u>	<u>Low Food Secure</u>	<u>Food Secure</u>
Children in Married Households	0.51	5.24	94.25
Children in Single, Female-headed Households	1.79	15.86	82.35
Children in Households with a Disabled Head of Household	3.79	26.35	69.86
<i>Education</i>			
12th grade with no diploma or lower	2.26	20.65	77.09
High school diploma or GED	1.32	11.37	87.31
Associate or Bachelor's degree	0.44	5.02	94.53
Master's, Professional, or Doctorate Degree	0.12	1.66	98.22
<i>Race</i>			
White	0.71	7.43	91.86
Black	1.92	14.46	83.62
American Indian or Alaskan Native, Hawaiian or Pacific Islander	1.78	13.00	85.22
Asian	0.42	4.24	95.34
More than 2 races	2.38	12.70	84.92

Table 4: Children's Food Security Status by Employment Status of the Head of Household (percent)

	Full-time			Part-time			Unemployed			Not in the Labor Force		
	Very Low Food <u>Secure</u>	Low Food <u>Secure</u>	Food <u>Secure</u>	Very Low Food <u>Secure</u>	Low Food <u>Secure</u>	Food <u>Secure</u>	Very Low Food <u>Secure</u>	Low Food <u>Secure</u>	Food <u>Secure</u>	Very Low Food <u>Secure</u>	Low Food <u>Secure</u>	Food <u>Secure</u>
2005	0.51	5.18	94.31	0.68	10.05	89.26	1.32	16.81	81.86	1.36	14.13	84.51
2006	0.24	5.50	94.26	0.89	9.96	89.14	2.98	17.20	79.82	1.32	15.39	83.29
2007	0.59	5.01	94.40	0.86	11.14	88.00	2.23	18.48	79.30	1.60	13.62	84.78
2008	0.61	6.60	92.79	2.11	11.03	86.86	3.18	23.26	73.55	2.78	18.28	78.94
2009	0.68	6.47	92.85	1.67	11.95	86.37	3.25	18.57	78.18	1.92	15.40	82.68

**Table 5: Average Regional Economic Conditions across Children's Food Security Status
(for state metro and non-metro regions)**

	Proportion of Counties Classified as Persistently Poor				Average Unemployment Rates				Average Percent Change in the Unemployment Rates			
	Very Low Food <u>Secure</u>	Low Food <u>Secure</u>	Food <u>Secure</u>	All households	Very Low Food <u>Secure</u>	Low Food <u>Secure</u>	Food <u>Secure</u>	All households	Very Low Food <u>Secure</u>	Low Food <u>Secure</u>	Food <u>Secure</u>	All households
2005	0.036	0.064	0.047	0.048	5.12	5.25	5.14	5.13	-7.42	-6.52	-7.80	-7.35
2006	0.066	0.067	0.047	0.049	4.64	4.71	4.68	4.65	-9.47	-9.87	-10.77	-9.51
2007	0.046	0.058	0.048	0.048	4.63	4.69	4.54	4.63	0.23	0.04	1.10	0.22
2008	0.042	0.058	0.046	0.047	5.79	5.83	5.87	5.79	25.66	25.51	26.97	25.66
2009	0.036	0.064	0.047	0.048	9.27	9.32	9.2	9.27	60.38	60.32	61.25	60.38

Table 6: Ordered Probit Average Marginal Effects (Full Model)

	Very Low Food Secure			Low Food Secure			Food Secure		
	dy/dx	Std. Err.	P>z	dy/dx	Std. Err.	P>z	dy/dx	Std. Err.	P>z
<i>Regional Economic Variables</i>									
Proportion of region classified as persistently poor	0.00667	0.00186	0.000	0.03654	0.01015	0.000	-0.04320	0.01199	0.000
Unemployment Rate	-0.00011	0.00015	0.455	-0.00060	0.00080	0.455	0.00071	0.00094	0.455
Percent change in unemployment rate	0.00003	0.00002	0.077	0.00018	0.00010	0.076	-0.00021	0.00012	0.076
<i>Household Variables</i>									
Not in Labor Force	0.00367	0.00067	0.000	0.02010	0.00360	0.000	-0.02377	0.00425	0.000
Part Time	0.00318	0.00051	0.000	0.01743	0.00271	0.000	-0.02061	0.00320	0.000
Unemployed	0.00721	0.00107	0.000	0.03952	0.00563	0.000	-0.04673	0.00666	0.000
Duration of unemployment (weeks)	0.00005	0.00003	0.100	0.00026	0.00016	0.099	-0.00031	0.00019	0.099
Household income	-0.00019	0.00003	0.000	-0.00102	0.00016	0.000	0.00120	0.00019	0.000
Household has valid income	0.01728	0.00096	0.000	0.09466	0.00384	0.000	-0.11194	0.00449	0.000
Household income z-score	-0.00604	0.00181	0.001	-0.03310	0.00984	0.001	0.03914	0.01164	0.001
Non-white	0.00210	0.00045	0.000	0.01150	0.00241	0.000	-0.01360	0.00286	0.000
Not a US citizen	0.00220	0.00059	0.000	0.01206	0.00318	0.000	-0.01426	0.00377	0.000
Single female head	0.00605	0.00054	0.000	0.03313	0.00266	0.000	-0.03917	0.00314	0.000
Single, unemployed female head	-0.00386	0.00084	0.000	-0.02114	0.00450	0.000	0.02499	0.00532	0.000
Age	0.00006	0.00002	0.000	0.00033	0.00009	0.000	-0.00040	0.00011	0.000
Disabled	0.00835	0.00095	0.000	0.04577	0.00490	0.000	-0.05412	0.00579	0.000
Number of Children	0.00149	0.00029	0.000	0.00816	0.00158	0.000	-0.00965	0.00187	0.000
Number in Household	0.00099	0.00023	0.000	0.00541	0.00126	0.000	-0.00640	0.00149	0.000
Metro area	0.00248	0.00053	0.000	0.01359	0.00284	0.000	-0.01607	0.00336	0.000
HS diploma or GED	-0.00254	0.00059	0.000	-0.01390	0.00322	0.000	0.01643	0.00380	0.000
Associate's/Bachelor's	-0.00613	0.00071	0.000	-0.03356	0.00371	0.000	0.03969	0.00438	0.000
Post-Graduate	-0.01082	0.00112	0.000	-0.05931	0.00570	0.000	0.07013	0.00673	0.000
Survey year 2005	-0.00092	0.00064	0.152	-0.00504	0.00351	0.151	0.00596	0.00415	0.151
Survey year 2006	-0.00010	0.00064	0.881	-0.00053	0.00353	0.881	0.00062	0.00418	0.881
Survey year 2008	0.00283	0.00076	0.000	0.01548	0.00411	0.000	-0.01831	0.00486	0.000
Survey year 2009	0.00134	0.00127	0.291	0.00734	0.00696	0.292	-0.00869	0.00823	0.291

Table 7: Probability Simulations with State Rates of Unemployment and Percent Change in State Rates of Unemployment

	State Rates of Unemployment			Percent change in State Rates of Unemployment		
	Very Low Food Secure	Low Food Secure	Food Secure	Very Low Food Secure	Low Food Secure	Food Secure
Average Probability in 2005	0.007364	0.073857	0.918779	0.007364	0.073857	0.918779
Probability at 2006 State Rates	0.007408	0.074127	0.918466	0.007303	0.073511	0.919187
Change in Predicted Probability	0.000044	0.00027	-0.00031	-6.1E-05	-0.00035	0.000408
Percent of Total Change Accounted for from 2005 - 2009	1.06%	1.24%	1.21%	1.47%	1.59%	1.57%
Average Probability in 2006	0.00741	0.073932	0.918659	0.00741	0.073932	0.918659
Probability at 2007 State Rates	0.007411	0.07394	0.918649	0.007674	0.075531	0.916796
Change in Predicted Probability	0.000002	0.000008	-0.00001	0.000264	0.001599	-0.00186
Percent of Total Change Accounted for from 2005 - 2009	0.04%	0.04%	0.04%	6.36%	7.34%	7.18%
Average Probability in 2007	0.007763	0.075523	0.916714	0.007763	0.075523	0.916714
Probability at 2008 State Rates	0.007654	0.074868	0.917479	0.008516	0.079887	0.911597
Change in Predicted Probability	-0.00011	-0.00066	0.000765	0.000752	0.004365	-0.00512
Percent of Total Change Accounted for from 2005 - 2009	2.64%	3.01%	2.95%	18.13%	20.03%	19.73%
Average Probability in 2008	0.012076	0.098062	0.889862	0.012076	0.098062	0.889862
Probability at 2009 State Rates	0.011605	0.095789	0.892606	0.013534	0.104917	0.881549
Change in Predicted Probability	-0.00047	-0.00227	0.002744	0.001458	0.006855	-0.00831
Percent of Total Change Accounted for from 2005 - 2009	11.34%	10.43%	10.58%	35.14%	31.46%	32.05%

Table 8: Probability Simulations with State Proportions of Employment Status for Heads of Children Households

	State Proportion of Children Household Heads Not in the Labor Force			State Proportion of Children Household Heads Working Part-time			State Proportion of Children Household Heads Unemployed		
	Very Low Food Secure	Low Food Secure	Food Secure	Very Low Food Secure	Low Food Secure	Food Secure	Very Low Food Secure	Low Food Secure	Food Secure
Probability at 2005 Levels	0.006958	0.072585	0.920457	0.007269	0.073396	0.919335	0.007148	0.073196	0.919657
Probability at 2006 Levels	0.006936	0.072428	0.920637	0.007275	0.073422	0.919303	0.007148	0.073189	0.919663
Change in Predicted Probability	-0.000022	-0.000158	0.000180	0.000006	0.000026	-0.000032	0.000000	-0.000007	0.000006
Percent of Total Change Accounted for from 2005 - 2009	0.53%	0.72%	0.69%	0.14%	0.12%	0.12%	0.01%	0.03%	0.02%
Probability at 2006 Levels	0.006987	0.072706	0.920308	0.007352	0.073605	0.919043	0.007196	0.073252	0.919553
Probability at 2007 Levels	0.006981	0.072682	0.920337	0.007356	0.073627	0.919017	0.007212	0.073356	0.919432
Change in Predicted Probability	-0.000005	-0.000024	0.000030	0.000004	0.000022	-0.000026	0.000016	0.000104	-0.000120
Percent of Total Change Accounted for from 2005 - 2009	0.13%	0.11%	0.11%	0.09%	0.10%	0.10%	0.39%	0.48%	0.46%
Probability at 2007 Levels	0.007341	0.074242	0.918417	0.007679	0.075186	0.917135	0.007475	0.074647	0.917878
Probability at 2008 Levels	0.007361	0.074364	0.918275	0.007726	0.075463	0.916811	0.007548	0.075090	0.917362
Change in Predicted Probability	0.000020	0.000122	-0.000142	0.000046	0.000277	-0.000324	0.000073	0.000443	-0.000516
Percent of Total Change Accounted for from 2005 - 2009	0.48%	0.56%	0.55%	1.12%	1.27%	1.25%	1.76%	2.03%	1.99%

	State Proportion of Children Household Heads Not in the Labor Force			State Proportion of Children Household Heads Working Part-time			State Proportion of Children Household Heads Unemployed		
	Very Low Food Secure	Low Food Secure	Food Secure	Very Low Food Secure	Low Food Secure	Food Secure	Very Low Food Secure	Low Food Secure	Food Secure
Probability at 2008 Levels	0.011500	0.096815	0.891685	0.011924	0.097468	0.890608	0.011674	0.097069	0.891257
Probability at 2009 Levels	0.011533	0.096994	0.891473	0.011947	0.097580	0.890474	0.011818	0.097773	0.890409
Change in Predicted Probability	0.000033	0.000179	-0.000212	0.000023	0.000112	-0.000134	0.000144	0.000704	-0.000848
Percent of Total Change Accounted for from 2005 - 2009	0.80%	0.82%	0.82%	0.55%	0.51%	0.52%	3.47%	3.23%	3.27%

Table 9: Probability Simulations with Average Duration of Unemployment and Average Household Income for Children Households

	State Average Duration of Unemployment for Unemployed Children Household Heads (in weeks)			State's Average Household Income for Children Households		
	Very Low Food Secure	Low Food Secure	Food Secure	Very Low Food Secure	Low Food Secure	Food Secure
Probability at 2005 Levels	0.007362	0.073858	0.918780	0.003483	0.050844	0.945673
Probability at 2006 Levels	0.007352	0.073825	0.918824	0.003199	0.048130	0.948671
Change in Predicted Probability	-0.000010	-0.000033	0.000043	-0.000285	-0.002714	0.002999
Percent of Total Change Accounted for from 2005 - 2009	0.24%	0.15%	0.17%	6.86%	12.46%	11.56%
Probability at 2006 State Levels	0.007953	0.077389	0.914658	0.003315	0.049237	0.947448
Probability at 2007 State Levels	0.008038	0.077910	0.914051	0.003154	0.047600	0.949247
Change in Predicted Probability	0.000086	0.000521	-0.000607	-0.000161	-0.001637	0.001799
Percent of Total Change Accounted for from 2005 – 2009	2.07%	2.39%	2.34%	3.88%	7.51%	6.93%
Probability at 2007 State Levels	0.008409	0.079467	0.912124	0.003365	0.049650	0.946985
Probability at 2008 State Levels	0.008429	0.079555	0.912015	0.003369	0.049617	0.947014
Change in Predicted Probability	0.000020	0.000088	-0.000109	0.000004	-0.000033	0.000029
Percent of Total Change Accounted for from 2005 – 2009	0.49%	0.40%	0.42%	0.10%	0.15%	0.11%
Probability at 2008 State Levels	0.012978	0.102548	0.884474	0.005600	0.068773	0.925627
Probability at 2009 State Levels	0.013784	0.106217	0.879999	0.005857	0.070712	0.923431
Change in Predicted Probability	0.000806	0.003669	-0.004475	0.000257	0.001939	-0.002196
Percent of Total Change Accounted for from 2005 – 2009	19.43%	16.84%	17.25%	6.19%	8.90%	8.47%

Appendix:

Table A.1: Current Population Survey Food Security Supplement Child-Specific Food Sufficiency Questions <i>Indicators of Chronic Food Insecurity = almost every month, often</i> <i>Indicators of Transient Food Insecurity = sometimes true, some months, 1 or 2 months</i> <i>Excludes yes/no questions</i>		
Survey Code	Question	Accepted Responses
HESS5	Relied on few kinds of low-cost food to feed child(ren)	Often true, Sometimes true, Never True
HESS6	Couldn't feed child(ren) a balanced meal	Often true, Sometimes true, Never True
HESH1	Child(ren) were not eating enough	Often true, Sometimes true, Never True
HESSHF2	Cut the size of children's meals	Almost every month, Some months, 1 or 2 months
HESSHF3	Child(ren) were hungry	Almost every month, Some months, 1 or 2 months
HESSHF4	Child(ren) skipped meals	Almost every month, Some months, 1 or 2 months

Table A.2 : Variable Definitions

Variable code	Variable definition
Regional Economic Variables	
R_Poverty	The proportion of counties in state metropolitan and non-metropolitan regions which are classified as persistently poor. Counties are classified as persistently poor by the Economic Research Service if they have over 20% of their population in poverty in the 1970, 1980, 1990, and 2000 censuses.
R_Rate_Unemploy	Average annual unemployment rate for state metropolitan and non-metropolitan regions. Averages are calculated from county unemployment rates provided from the Bureau of Labor Statistics.
R_Change_Unemploy	The annual percent change in the unemployment rate for state metropolitan and non-metropolitan regions. These calculations are derived from the average unemployment rates for state metropolitan and non-metropolitan regions.
Household-level Variables	
H_NILF	The head of the household is not in the labor force. The CPS defines these individuals as those age 15 or older who are not looking for work and not expecting to return to work soon. This category includes students, retirees, homemakers, and those unable to work due to illness or disability.
H_PT	The head of the household is paid for working part-time. This includes individuals who have worked less than 35 hours during the reference week and do not usually work more than 35 hours.
H_UNEM	Unemployed head of household. This includes individuals actively looking for paid work or those expecting to start paid working soon.
H_DurUNEM	The duration of unemployment in weeks for unemployed households.
H_INCOME	The household's income value as the median of their reported income range.
	Household income is interacted with a dummy variable for whether the household had a valid income code.
H_INCOMEREP	A dummy variable for whether the household had a valid income code.
H_INCOMEZ	The household income z-score. This is the household's income value subtracted from the annual household income at the state metropolitan and non-metropolitan level, divided by the standard deviation in income values for the region. The standard deviation is derived from average incomes for counties in each region.
H_NONWHITE	The head of household is not white.
H_NONCIT	The head of household is not a US citizen, excludes foreign born civilians who are naturalized.
H_SINGLEFEM	The head of household is a single female.
H_SINGLEFEMUNEM	The head of household is an unemployed, single female
H_AGE	The age of the head of household.
H_DISABLED	The head of household has a disability and is not working.
H_NUMCHILD	The number of single (never married) children under age 18 in the household.
H_NUMHOUSEHOLD	The number of related and unrelated individuals living in the household.
H_METRO	The household is in a metropolitan county.
H_GED	The head of household's highest level of educational attainment is a high school diploma or equivalent (GED).
H_COLLEGE	The head of household's highest level of educational attainment is an associate's or bachelor's degree.
H_POSTCOLLEGE	The head of household's highest level of educational attainment is a master's, professional, or doctorate degree.

Survey Year Variables	
YEAR05	The household was surveyed in December 2005.
YEAR06	The household was surveyed in December 2006.
YEAR07	The household was surveyed in December 2008.
YEAR08	The household was surveyed in December 2009.

Table A.3: Ordered Probit Average Marginal Effects (Restricted Model)

	Very Low Food Secure			Low Food Secure			Food Secure		
	dy/dx	Std. Err.	P>z	dy/dx	Std. Err.	P>z	dy/dx	Std. Err.	P>z
Proportion of region classified as persistently poor	0.00657	0.00187	0.000	0.03604	0.01022	0.000	-0.04261	0.01207	0.000
Unemployment Rate	-0.00006	0.00015	0.693	-0.00032	0.00080	0.693	0.00037	0.00095	0.693
Percent change in unemployment rate	0.00003	0.00002	0.069	0.00018	0.00010	0.068	-0.00022	0.00012	0.068
Household income	-0.00020	0.00003	0.000	-0.00108	0.00017	0.000	0.00128	0.00020	0.000
Household has valid income	0.01834	0.00098	0.000	0.10065	0.00384	0.000	-0.11899	0.00448	0.000
Household income z-score	-0.00665	0.00184	0.000	-0.03651	0.01000	0.000	0.04316	0.01182	0.000
Non-white	0.00212	0.00045	0.000	0.01166	0.00242	0.000	-0.01378	0.00287	0.000
Not a US citizen	0.00215	0.00060	0.000	0.01178	0.00322	0.000	-0.01392	0.00381	0.000
Single female head	0.00520	0.00046	0.000	0.02856	0.00231	0.000	-0.03376	0.00273	0.000
Age	0.00005	0.00002	0.002	0.00029	0.00009	0.002	-0.00035	0.00011	0.002
Disabled	0.00841	0.00087	0.000	0.04618	0.00444	0.000	-0.05459	0.00524	0.000
Number of Children	0.00145	0.00030	0.000	0.00798	0.00160	0.000	-0.00943	0.00189	0.000
# in Household	0.00103	0.00024	0.000	0.00564	0.00127	0.000	-0.00666	0.00150	0.000
Metro area	0.00251	0.00053	0.000	0.01379	0.00286	0.000	-0.01630	0.00338	0.000
HS diploma or GED	-0.00273	0.00059	0.000	-0.01498	0.00322	0.000	0.01771	0.00381	0.000
Associate's/Bachelor's	-0.00622	0.00072	0.000	-0.03416	0.00374	0.000	0.04039	0.00441	0.000
Post-Graduate	-0.01099	0.00113	0.000	-0.06035	0.00574	0.000	0.07135	0.00678	0.000
Survey year 2005	-0.00101	0.00064	0.119	-0.00552	0.00353	0.117	0.00653	0.00417	0.117
Survey year 2006	-0.00014	0.00065	0.823	-0.00080	0.00356	0.823	0.00094	0.00421	0.823
Survey year 2008	0.00295	0.00076	0.000	0.01618	0.00414	0.000	-0.01913	0.00489	0.000
Survey year 2009	0.00148	0.00128	0.245	0.00814	0.00701	0.246	-0.00962	0.00828	0.246

Table A.4: Ordered Probit Average Marginal Effects (Chronic and Transient Classifications)						
	Chronic			Transient		
	dy/dx	Std. Err.	P>z	dy/dx	Std. Err.	P>z
Proportion of region classified as persistently poor	0.02227	0.00611	0.000	0.02148	0.00590	0.000
Unemployment Rate	-0.00037	0.00048	0.444	-0.00036	0.00047	0.444
Percent change in unemployment rate	0.00012	0.00006	0.039	0.00012	0.00006	0.039
Not in Labor Force	0.01164	0.00214	0.000	0.01123	0.00206	0.000
Part Time	0.01068	0.00163	0.000	0.01030	0.00156	0.000
Unemployed	0.02379	0.00341	0.000	0.02295	0.00327	0.000
Duration of unemployment (weeks)	0.00015	0.00010	0.117	0.00015	0.00009	0.117
Household income	-0.00066	0.00010	0.000	-0.00064	0.00009	0.000
Household has valid income	0.05713	0.00242	0.000	0.05512	0.00231	0.000
Household income z-score	-0.01762	0.00589	0.003	-0.01700	0.00569	0.003
Non-white	0.00529	0.00145	0.000	0.00511	0.00140	0.000
Not a US citizen	0.00424	0.00186	0.022	0.00409	0.00179	0.023
Single female head	0.02008	0.00161	0.000	0.01937	0.00154	0.000
Single, unemployed female head	-0.01214	0.00271	0.000	-0.01172	0.00261	0.000
Age	0.00020	0.00005	0.000	0.00019	0.00005	0.000
Disabled	0.03019	0.00302	0.000	0.02913	0.00290	0.000
Number of Children	0.00472	0.00094	0.000	0.00455	0.00091	0.000
Number in Household	0.00314	0.00076	0.000	0.00303	0.00073	0.000
Metro area	0.00787	0.00173	0.000	0.00759	0.00166	0.000
HS diploma or GED	-0.00790	0.00192	0.000	-0.00762	0.00186	0.000
Associate's/Bachelor's	-0.01969	0.00223	0.000	-0.01899	0.00215	0.000
Post-Graduate	-0.03474	0.00343	0.000	-0.03351	0.00329	0.000
Survey year 2005	-0.00238	0.00210	0.258	-0.00229	0.00202	0.258
Survey year 2006	0.00102	0.00212	0.629	0.00099	0.00205	0.629
Survey year 2008	0.00959	0.00246	0.000	0.00925	0.00238	0.000
Survey year 2009	0.00384	0.00416	0.356	0.00370	0.00402	0.356

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