# Beyond Income: What Else Predicts Very Low Food Security among Children?

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Abstract

We examine characteristics and correlates of households in the United States that are most likely to have children at risk of inadequate nutrition – those that report very low food security (VLFS) among their children. Using 11 years of the Current Population Survey, plus data from the National Health and Nutrition Examination Survey, we describe these households in great detail with the goal of trying to understand how these households differ from households without such severe food insecurity. While household income certainly plays an important role in determining VLFS among children, we find that even after flexibly controlling for income-to-poverty rates some household characteristics and patterns of program participation have important additional explanatory power. Finally, our examination of the NHANES data suggests an important role for both mental and physical health in determining the food security status of children.

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## I. Introduction

Access to healthful food during critical periods of fetal and child development is an important determinant of long-term health and economic well-being.[1] In this study, we examine households in the United States that are most likely to have children at risk of inadequate nutrition – those that report very low food security among their children. Although food insecurity in the United States is quite common (about 20 percent of households with children in 2012), very low food security among children is relatively uncommon (about 1.2 percent of households in 2012).[2] Even though households with very low food security among children make up a small percentage of households, the percent of households with this status has roughly doubled over the last decade. Further, these households account for a disproportionate share of children, as poor households tend to have more children,[3] and the children in these households are those for whom the risks of inadequate nutrition during critical periods of development are a real possibility. In this study, we examine the characteristics and correlates of households with very low food security among children. Among most low-income households, even those that report that they are food insecure, children appear to be insulated from food insecurity themselves. Here, we explore what publicly available data can tell us about households in the U.S. where the children live at the extremes of poverty.[4]

[1] See Currie (2009) for a review of the literature on the importance of early life incomes, and Hoynes, Schanzenbach and Almond (2012) for a specific example of the benefits of childhood food stamp receipt on reducing the likelihood of poor adult outcomes.

[2] These statistics come from http://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/key-statistics-graphics.aspx#children. Further, Coleman-Jensen et al. (2013) find that households reporting VLFS experience the status in only 7 months of the year, for a few days in each of those months.

[3] Table 1 shows that on average households with VLFS among children have 2.42 children; while for all households with incomes below 200% of the poverty line the average is 2.26.

[4] We are using the term "extremes of poverty" loosely, not the formal definition of "extreme poverty" defined by the World Bank as households living on $2 or less per person per day. Edin and Schaefer (2013) use this formal definition and find that 4.3 percent of non-elderly households with children in the U.S. were in this category in 2011.

Using 11 years of the Current Population Survey, plus data from the National Health and Nutrition Examination Survey, we describe these households in great detail. Although income is clearly an important part of the story, most households, even at very low-income-to-poverty ratios, do not have food insecure children.[5] Our goal in this paper is to describe what is different about those households that do. We are not attempting to provide a causal analysis of, for example, the impact of program participation or health status on the incidence of very low food security among children. However, we will present the correlations between a household reporting very low food security among children and a large list of household descriptors.

We proceed by first describing the data we use, explaining definitions of different types of food insecurity, and showing the prevalence of very low food insecurity among children. Focusing on data for households with children where the income-to-poverty ratio is less than 200% of the poverty threshold, we present summary statistics on participation in various public programs and household characteristics by different food security levels.

After establishing the correlates of food insecurity, we turn to regression analysis. Again, it is important to emphasize that this is not a causal analysis, but rather a "horse-race" style analysis to see which correlates of very low food security among children are statistically significant when income-to-poverty ratios and other covariates are held constant. The thought experiment here is that if income is the only thing that matters for determining children's food security, then even if income does a poor job of explaining the variation in children's very low food security status, nothing else should be systematically correlated with the outcome. Those

[5] When examining poverty measures, Wight et al. (2014) find that there is no difference in the effects of the traditional poverty measure and the supplemental poverty measure in households with VLFS status, suggesting that the broadened definition of income still does not capture why VLFS occurs in households without very low incomes.

things that remain robustly statistically significant suggest correlates of unmet need and may provide guidance for public policy aimed at addressing the extremes of poverty.

Our findings suggest that some household characteristics and patterns of program participation, even controlling flexibly for income-to-poverty, systematically predict very low food security among children. For example, controlling for household size, having a larger share of the household in the 13-to-18 age range is positively associated with very low food security among children, suggesting that rapidly growing teenage children may put greater stress on a household's ability to provide food security for them. Participation in programs like free and reduced priced lunch and supplemental nutrition assistance program (SNAP, formerly "food stamps") are positively correlated with very low food security among children, suggesting a selection story where these are struggling households that have already identified themselves as requiring assistance, but who continue to have unmet needs. Finally, our examination of the NHANES data suggests an important role for both mental and physical health in determining the food security status of children.

## II. Data Sources

### *A. The Current Population Survey*

Food insecurity is officially measured in the U.S. based on a supplement to the Current Population Survey (CPS). Since 2001, this supplement has been part of the December survey. Because the questions refer to the past twelve months, we consider the food security measure to refer to the calendar year of the survey. Food security is defined based on a battery of 18 questions (or 10 questions if there are no children in the household), which are listed in Appendix Tables 1a and 1b. Based on the answers to these questions, households are categorized as food secure or food insecure. Food insecure households are further broken down into those

suffering from very low food security. In addition to the overall food security status of the household, there are specific designations for the children in the household, based on the questions about the children. The children themselves may be food secure or food insecure and food insecure children may be suffering from very low food security. Appendix Table 2 shows how each of these six categories is defined. Very low food security among children (the topic of this paper) is clearly quite severe, with five or more of the eight questions specifically about children having to be answered in the affirmative to be so classified.

In order to analyze the predictors of very low food security among children, it is important to not only have data on the answers to the 18 food security questions from the December Supplement, but also to have good information on the household's income and program participation. Our goal in this paper is to understand what household characteristics – beyond income -- are correlated with children experiencing very low food security. In order to do this, we need to control for income, and then examine whether any additional household characteristics remain systematically correlated with very low food security among children. This exercise can help guide further research aimed at addressing food security.[6] While the December CPS supplement provides data on household food security status, it does not have detailed information on household income, and does not allow one to distinguish between sources of income. The March supplement to the CPS collects this information, in reference to the previous calendar year, and the CPS sampling frame allows us to match this March supplement to the December supplement for a subset of the sample. By design, a CPS household is interviewed for four consecutive months, then out of the sample for eight months, and then back in for four consecutive months. Thus, for households where December is the first of one of

[6] Gundersen, Kreider, and Pepper (2011) note that research addressing food security is extensive and has proved to be particularly beneficial for policymakers. Gundersen and Ziliak (2014) highlight some of these studies, underscoring the insights and implications provided to policymakers and program administrators.

their set of consecutive interview months, they will also be surveyed in March and the two surveys can be matched at the household level. Additionally, starting in 2002, the March supplement sample was expanded by asking the questions of the February and April sample households that were not also in the March sample, as well as some of the prior November sample. Matching on the household identifier across these months results in a sample of about 14,000 matched households per year.

We limit our sample to households with children and with income of 200 percent or less of the poverty line. Thus, our main analysis sample has about 1,800 observations per year. Although merging the December and March supplement data reduces the sample size, the data generated by matching is fundamental to our objective. [7] The limited income data available in the December CPS is at the family level and is reported in sixteen aggregated income categories (with the dollar ranges increasing as incomes increase). By matching to the March data we are able to create detailed income-to-poverty measures for the household, and have information on additional sources of income such as program participation.[8]

*B. National Health and Nutrition Examination Survey*

While the official measures of food insecurity come from the CPS supplements, the same battery of questions is asked in the much smaller National Health and Nutrition Examination Survey (NHANES), which since 1999 has been fielded over consecutive two-year periods (i.e.

[7] Other researchers have also matched across CPS supplements to match food security information with other information, despite the potential costs in sample size. Schmidt, Shore-Sheppard and Watson (2013) follow a similar framework, using both the December and March supplements to the 2001-2009 CPS data in order to examine how benefits from the safety net in aggregate affect low food security in families and very low food security among children. Wilde and Nord (2005) merge the CPS December 2001 and December 2002 food security supplements in order to control for household-level fixed effects while examining the relationship between FSP participation and food insecurity.

[8] In addition, for a separate subsample, we link respondents in the December CPS supplements to their records in the American Time Use Survey for 2002-2010, allowing us to examine whether time use varies systematically by household food security status in ways that may help explain why some households with low incomes are able to protect children's food security and others are not. Few differences were statistically significant. Additional results are available upon request.

1999-2000, followed by 2001-2002, etc.). The NHANES includes a range of different questionnaire modules, physical examinations, and a food diary, collectively used to evaluate the health and nutrition status of the country. While typically not everyone in the household is a part of the NHANES (and many children are sampled without any adult household members), the food security questionnaire is completed at the household level for all sample members. In particular, the status of children is ascertained whether or not the child is a sample member. Over half of the actual sample members are the children themselves. However, for our purposes we are most interested in information associated with the adults in the household that is unavailable in the CPS, such as the dietary data and the data derived from questionnaires on drug use and mental and physical health. Thus, we restrict our sample further to only those observations where the sample member is over 18. The result is a sample of about 7,000 observations. However, many of the questions and their samples change over time in the NHANES, meaning that for some variables we have much smaller samples.[9]

## III. Analysis Using the Current Population Survey

### *A. Descriptive Analysis*

As noted above, a child is classified as having very low food security (VLFS) if five or more of the food security questions about the child are answered in the affirmative. Essentially, then, it is impossible to be so classified unless there are extreme circumstances in the household such as the size of the child's meals being cut or the child being hungry, but with no more money for food. It is perhaps not surprising, then, that even among households with income at or below 200% of the poverty line, the rate of very low food security among children remains relatively low, averaging about 0.019 over our lower-income CPS sample. That average masks some

[9] For example, the depression screener was only given to all adults in the last three waves of the survey. Prior to that, only a half sample of 20 to 39 year olds was screened for depression.

important time variation, as rates during the Great Recession almost doubled from their previous level. The average also masks geographic variation, as shown in Figure 1. In several states, such as New Hampshire and Virginia, the rate of very low food security among children over this time period averages around 0.005, while in states such as Maryland and Rhode Island it is about 7 times higher, at over 0.036. As will be described in more detail below, state fixed effects are insignificant in a regression explaining whether a household contains a child with very low food security, while year fixed effects are significant. However, controlling for year has no real impact on the role of other explanatory variables. Note that the regression results reported below control flexibly for a household's income-to-poverty ratio, so it may be that the geographic variation we observe in Figure 1 is at least partially driven by differences in financial well-being across states.[10]

Table 1 begins the descriptive analysis by looking at characteristics such as demographics and rates of program participation for each of four samples. First is the full sample of households with children and income below 200% of the poverty line. Second is a subset of this sample made up of only households that are coded as being food insecure, followed by the subset with very low food security. Finally, we look at those households containing very low food secure children. Columns (1), (3), (5) and (7) present the means for these four samples, with the following columns giving the standard deviations. Looking across columns, the means give us insight into the characteristics associated with progressively more dire food security situations. For example, participation in the free/reduced price lunch program and in SNAP both increase sharply across the columns, as does receipt of energy assistance, SSI benefits and welfare. For these programs, participation is at least 50 percent higher, when moving from the full sample of

[10]See Bartfeld and Dunifon (2006) for a list of various state characteristics that appear to be linked to household food security status.

merely low-income households to the subsample of households containing a child with very low food security.

It is important to emphasize that these patterns do not tell us whether these safety net programs affect food security.[11] Rather, it is the case that take-up of these means-tested programs is higher among the households with the lowest resource levels, as proxied by the fact that the households are food insecure.[12] For means-tested programs that tend to be available to both low- and moderate-income households, the patterns look different: Medicaid participation increases a bit between all low-income households (column 1) and all low-income food insecure households (column 4), but then stays fairly constant across the more severe levels of food insecurity. Receipt of the Earned Income Tax Credit (EITC) is relatively flat across the first three samples, before increasing a bit for the households with a very low food secure child.[13] Note that participation in non-means-tested programs, such as unemployment compensation, workers compensation, social security, veterans' benefits, survivors' benefits or retirement benefits, does not systematically rise with the degree of food insecurity.

The rows in the lower half of Table 1 investigate the means of assorted demographic variables.[14] First, we see that while overall household size is not very different across samples, the number of teenagers is much higher in families with low food security children at 0.966 compared to just 0.656 for all food insecure households. Given the higher caloric needs of older children, this result may reflect the increased difficulty of avoiding hunger as children age while

[11] In fact, Schmidt et al. (2013) show that safety net programs played an important role in keeping many families food secure during the Great Recession.

[12] Interestingly, Gundersen et al. (2003) note that single-female headed families with children that have a higher propensity towards homelessness have higher levels of food insecurity, suggesting a possible relationship between unmet housing needs and food insecurity. Heflin et al. (2012) find that among low-income preschoolers, attending a child care center is associated with a reduction in the probability of VLFS.

[13] Note that EITC receipt is imputed in the CPS based the Census Bureau's tax model; the CPS does not ask households about EITC receipt.

[14] Coleman-Jensen, McFall and Nord (2013) presents a range of descriptive statistics on food insecurity in households with children in 2010-2011 that is complementary to our longer time period.

incomes remain the same. Looking at characteristics of the household head, we see several features that become more common across the samples. Households with very low food secure children are more likely to be headed by a female, by an African American, by a recent immigrant, by someone who is disabled, and by a high school dropout, but less likely to be headed by a homeowner or an individual who is neither black nor white.[15] Finally, potential workers in households with a low food secure child spend a larger fraction of the year looking for work and a lower fraction working. As was the case with program participation, these household characteristics may simply be correlated with resource availability, making it important to investigate their role in a regression framework, as we will do below.

At the bottom of Table 1, we can see that among this sample of low-income households, 35 percent are food insecure, 10 percent have very low food security, and just 1.9 percent have a very low food secure child. The fact that many households are able to protect their children from very low food security is made most clear by columns (3) and (5), where we see that just over 5 percent of food insecure households have children with very low food security, and even among very low food security households, under 19 percent have very low food security among their children.

A final look at summary statistics from the CPS data is shown in Table 2. Here, we present the food security status of low-income households with children by selected characteristics. This table provides many of the same take-away messages as the previous table. Food security status is much lower among households that receive free/reduced price lunch, that receive SNAP, and that receive Public Assistance/Welfare. Households with teenagers, those headed by a female, by a high school dropout, by an African American, or by a disabled person

[15] These results are similar to past findings on correlates of household food insecurity (versus very low food security among children) reviewed in Gundersen, Krieder and Pepper (2011).

also have worse food security outcomes, as do those not owning their own homes. Focusing specifically on very low food security among children, we often see a doubling (or more) of the rate across categories. For example, low-income households that do not participate in the school lunch program have a rate of 1.1 percent, while those that do have a rate of 2.6 percent. The pattern across those that do and do not receive SNAP is comparable (1.4 percent for SNAP non-recipients versus 2.6 percent for SNAP recipients).[16] Similarly, low-income households not on welfare have a rate of 1.7 percent, while for welfare recipients it is 3.3 percent. A very similar change is observed when comparing households that are not and are headed by a disabled person, doubling from 1.7 to 3.4.

It is important to emphasize that the results shown in these tables are simple correlations with no implication that receipt of certain safety net programs causes food insecurity. Rather, as before, we should look at these results as evidence that certain programs best capture the low resources and other issues that lead to problems maintaining food security, as do certain characteristics of the household head (such as disabled, or female).[17] Clearly, it will be important to turn to a multivariate framework to better investigate these associations, but first, we will briefly examine the relationship between income and food security.

Given that the definition of very low food security among children revolves mainly around a lack of resources, it is reasonable to assume that said resources should play an important role in determining food security status. Figures 2a and 2b graph the rate of very low food security among children by 20-point income-to-poverty rate bins for both of our data sets

[16] Research from Gregory and Coleman-Jensen (2013) find that SNAP households become 3.1 percentage points (12.4 percent) more likely to have food insecurity among children when prices rise by 1 standard deviation.
[17] In fact, Bartfeld and Dunifon (2006) find that when federal nutrition programs are more widely available and accessible through strong state food security infrastructure, and thus utilized more, food insecurity is less common.

(i.e. the CPS and the NHANES).[18] Broadly speaking, both figures tell a similar story— those below the poverty line have higher rates of very low food security among children (in the 2 to 4 percent range) and these rates decline to well below 1 percent for those with income twice the poverty line.[19] These figures make clear that it will be imperative to control for the income-to-poverty level in our exploration of what household characteristics are associated with this extreme child outcome.[20]

*B. Regression Analysis*

This research is aimed at addressing the following: how does one explain that even households with very similar measured access to income have very different food security outcomes among their children? If income is what matters, but income is measured with random error, then we might expect that variation in measured income would explain an unexpectedly small proportion of the variation in VLFS among children, but nothing else should systematically matter. Once we control for income-to-poverty ratios, those characteristics of households that are significantly related to VLFS among children are picking up unmeasured components either of resources or need. The results will – hopefully – help give insight into where to look to formulate policies to combat extreme hardship among children.

Table 3 presents multivariate regression analyses of the correlates of very low food security among children.[21] These are linear probability models where the dependent variable is

[18] See Gundersen, Kreider and Pepper (2011) for a related graph showing household-level very low food insecurity in 2009 by income-to-poverty ratio.
[19] Note that Figure 2a drops the 0 to 20% bin as there are many households with very low measured income, but with high assets, in this bin, leading to lower rates of VLSF for the children in this group than in the 20 to 40 bin.
[20] In these graphs and in the rest of the paper, we use the official poverty measure for resources and thresholds. Notably, this resource measure is cash, pre-tax family income and therefore does not include the value of in-kind programs such as SNAP and tax based assistance through the EITC.
[21] The data are 11 years of the December Current Population Survey matched to the subsequent March Current Population Survey data in order to combine food security status, income-to-poverty ratios, and program participation information. The data are restricted to households with children with income-to-poverty ratios below 200% of the poverty line.

equal to 1 if the household reports very low food security among its children, and 0 otherwise (the standard errors are robust to heteroskedasticity). We will refer to this outcome variable as VLFS among children. In each regression, income-to-poverty measures are held constant with dummy variables for nine income-to-poverty ratio bins (grouped by 20 percentage points, with zero to 20% of the poverty line as the omitted category). In regressions not shown, we find that when the income-to-poverty dummies are entered into the regression alone, they are jointly statistically significant, but explain less than 0.5% of the variation in VLFS among children. We also control for year dummies as the data span the years of the Great Recession, when all degrees of food insecurity increased; these controls significantly add to the explanatory power of the regressions.[22]

In the first set of results, we investigate the role of household size and composition in VLFS among children. The second set of results examines characteristics of the household head. The third column examines how program participation is correlated with VLFS among children. Finally, the last column includes all of these variables in order to see what household characteristics are most strongly correlated with VLFS among children.

The first column of regression results shows that, controlling for household size, having more children in the 13-to-18 year old age range significantly increases the probability that a household reports very low food security among its children.[23] The point estimate suggests that one additional child in this age range, holding constant household size, increases the probability of VLFS among children by 1 percentage point. As 1.9 percent of households in this sample

[22]Although Figure 1 shows that there are states with higher rates of VLFS among children, a complete set of state fixed effects are not jointly statistically significant when included. State fixed effects are jointly statistically significant correlates of food insecurity and even very low food security for households in this sample. However, they do not explain variation in very low food security among children. Thus, all of the regressions in the table include year dummies (with 2001 as the omitted group) but do not include state fixed effects.

[23] Other specifications examined whether age categories among adults were correlated with VLFS among children; 13-to-18 is the only age category that is significantly related to VLFS among children.

report VLFS among children, this is almost a 50% increase in the probability of being in this category.

The second column includes a set of dummy variables that control for characteristics of the head of household and for whether the household lives in a rural area. The summary statistics in Table 1 showed that households with female and disabled heads were more likely to have very low food security among children, but that may be expected as these households have lower incomes than other households. The results in this table show that even when comparing these households to households with similar income-to-poverty levels, the head of household being female or disabled are both statistically significantly and positively correlated with VLFS among children. While a female head is correlated with a 0.6 percentage point higher probability of VLFS among children, if the household head is disabled, there is a 1.6 percentage point higher probability – almost a doubling of the probability. Additionally, the household head being a recent immigrant is marginally statistically significant.[24] Finally, if the household head is a homeowner, the household is significantly less likely to report very VLFS among children. There are other characteristics that were correlated with VLFS among children in Table 2 – the head being a high school drop out, for example – that no longer appear significantly related to the outcome here, suggesting that the correlation with income was the main channel through which these are correlated with VLFS among children. Since other characteristics of the household head – like disability status – remain robustly statistically related to VLFS among children, these

[24] Balistreri (2012) reports complementary findings, noting the importance of family structure, household immigrant status, and caretaker disability status in predicting severe food insecurity among low-income households. Similarly, Cook (2013) finds that mother's foreign-born status is strongly positively associated with VLFS in children. Interestingly, Miller et al. (2014) find little difference in the probability of child food insecurity in households whose biological parents are cohabiting or whose biological mothers have repartnered versus single-mother families, when controlling for household income, family size, and maternal race, ethnicity, education and age, suggesting family structure at this level is not necessarily a significant indicator.

results suggest that income-to-poverty is not capturing the relationship between resources and food security requirements equally well across households of different types.

The third column examines the correlations between VLFS among children and program participation and labor force patterns among potential workers in the household. It is important to emphasize that we are not using experimental or quasi-experimental methodologies that would warrant interpreting the coefficients on program participation as causal.[25] Rather, we are interested in these coefficients as a way of understanding which households, conditional on observed income-to-poverty, have unmet needs. Many of the indicators for participation in public assistance programs are positively correlated with VLFS among children, even holding constant income and other program participation. In particular, households where the children receive free or reduced priced lunch are particularly likely to report VLFS among children. Households that receive SSI – suggesting disability or elderly poverty in the household – are statistically more likely to report VLFS among children. Households imputed to receive EITC are statistically more likely to report VLFS among children. Finally, conditional on income-to-poverty ratios, if the adults on average work a larger fraction of the year, the children are less likely to have very low food security.

The final column presents a "horse-race" regression among all of these different variables. Again, year dummies and income-to-poverty 20 percentage point bin dummies are included. Column (4) allows us to examine, for example, whether the correlation between household composition and VLFS among children for recent-immigrant headed households, for example, is simply because recent immigrants are more likely to have children in the 13-18 age range. Covariates that are statistically significant in the first three columns may simply be highly

[25] Carefully designed studies provide evidence that safety net programs improve material well-being of families. For example, the incidence of low birth weight is reduced by the EITC (Hoynes et al. 2012) and SNAP (Almond et al. 2011).

correlated with other household descriptors that are highly correlated with VLFS among children. The "horse-race" model allows us to see which covariates have the strongest conditional correlation with VLFS among children.

Household composition – in particular having more children age 13 to 18 in the house – continues to be statistically and strongly correlated with VLFS among children. The coefficient is only slightly lower than that in column 1, suggesting that having a child in this age range is not particularly correlated with the other included household descriptors. It is possible to imagine that a family might find that its current income and benefit levels are sufficient to insulate children from food insecurity when they are small, but when they hit the growth spurts of adolescence, the family's resources cannot keep up with food requirements.

Characteristics of the household head also remain statistically meaningfully correlated to VLFS among children in column (4). A household with a recent immigrant as the head is still significantly more likely to report VLFS among children.[26] Further, having a disabled household head remains positively correlated with VLFS among children, although the coefficient is about a third smaller; this is likely due to collinearity with the receipt of SSI benefits. If the household owns its own home, it continues to be less likely to suffer from VLFS among children.[27] Finally, female-headed households are statistically more likely to have VLFS among children, even when we control for this broad set of variables.

Turning to the coefficients on the program participation variables, we see that households that participate in free and reduced priced lunch are still more likely than other households to

[26] Research by Borjas (2004) shows that food insecurity among immigrants was affected by program eligibility changes for immigrants that came with welfare reform. Kaushal et al. (2013) focus on food insecurity among children (though not VLFS among children) and find that children in households with Mexican-born parents are about 3 to 4 percentage points more likely to be food insecure than other households, controlling for income-to-poverty ratios.

[27] Similarly noting the importance of residential status, Jacknowitz and Morrissey (2012) find that residential moves are associated with transitioning into food insecurity.

report VLFS among children, although the coefficient is about a fourth lower than in the previous column. The coefficients on receipt of public assistance and EITC, however, stay about the same size, remaining positively correlated with VLFS among children in column (4).

This exercise is pointing to unmeasured and unmet needs in some households. If, for example, poverty thresholds correctly adjust for family composition, then we would expect that once income-to-poverty ratios are held constant, there would be little role for a household with more 13-to-18 year old children to be more likely to have very low food security among those children. While income-to-poverty thresholds take into account the elderly, they do not account differently for teenagers. Similarly, programs such as SNAP account for the number, but not the age of children in the household, and do not expand to meet the greater food demands of growing teens. The fact that disability status of the head is positively correlated with VLFS among children, even when controlling for receipt of SSI, suggests that there are unmeasured and unmet needs in these households.[28] Benefit levels do not appear to adequately compensate for characteristics like disability.

The results in Table 3 cannot be thought of as telling us the causal impact of disability status or school lunches on food security. Nonetheless, the results do point to the types of households that are most likely to struggle to provide their children with food security, when compared to households with the same income to poverty ratios. In the next section, we turn to the National Health and Nutrition Examination Survey to glean insight into what some of these unmet and unmeasured (in the CPS) needs might be.[29] The NHANES is smaller which is particularly limiting here in our analysis of a fairly rare status, but it goes into more depth about

[28] Coleman-Jensen and Nord (2013) describe the strong positive relationship between adult food insecurity and disability.

[29] Gundersen and Garasky's (2012) research shows that households with greater financial management abilities have reduced incidences of food insecurity, perhaps proving financial management as one of these unmet needs.

mental and physical health, and related behaviors, that will give insight into these households at the extremes of poverty in the United States.

## IV. Analysis Using Alternate Data Sets

### *A. Descriptive Analysis Using the NHANES*

Table 4 is similar in spirit to Table 1, in that it presents characteristics of households with children that are below 200 percent of the poverty line, with columns (1) to (3) for the overall sample, columns (4) to (6) for food insecure households, columns (7) to (9) for very low food security households and columns (10) to (12) for households with very low food secure children. The sample used for Table 4, though, is derived from NHANES sampled households that interviewed an adult member, leaving us with a subset of all households and a much smaller analysis sample than that derived from CPS households. While a few basic characteristics are included to ensure that this sample is not very different from the larger CPS sample, the main focus here is on outcomes only measured in the NHANES. Recall that NHANES questionnaires vary over time in both the questions asked and the universe for those questions, resulting in wide variation in sample sizes across rows.

The first few rows of Table 4 focus on mental and physical health, and behaviors correlated with poor health outcomes. Here, it is clear that depression is highly correlated with food security outcomes.[30] While 10.6 percent of the adults in households in column (1) report being depressed, this rate increases to 23.8 percent in column (10).[31] This increase in depression is monotonic, with a rate of 15.8 percent in food insecure households and 21.1 percent in

[30] It is known, especially in the pediatrics literature, that children with a depressed mother (and father) are at greater risk for poor health, education, and behavioral outcomes (c.f. Kahn et. al. (2004) and cites therein). Noonan et al. (2014) also find that maternal depression leads to increased odds that children and households experience food insecurity, noting a stronger effect for more disadvantaged women. In our analysis of time use data, we found that adults in food insecure households spend significantly more time sleeping. Increased time reported sleeping can be a marker for depression (Tsuno et al. 2005)

[31] In the first three waves, only a half sample of 20 to 39 year-olds are asked about depression, while in the final three waves all adults are administered a 9-item depression screener.

households with very low food security. Also increasing monotonically is the number of days over the past month in which the household adult was kept from their usual activities by their mental or physical health, reaching almost 7 days for the households with very low food secure children, up from just over 2 days for the full sample. Similarly, the fraction reporting only fair or poor health (versus good, very good or excellent) almost doubles across the columns, increasing from 25.1 percent to 49.3 percent.[32] Recall that in the CPS results, a disabled household head was strongly associated with very low food security among children. Here, we see reinforcing information on the role of not only physical health, but also mental health.[33] These results provide evidence that the types of issues facing households in the extremes of poverty often go unmeasured in standard economics data sets.

In addition to providing information on physical/mental health and potential deleterious behaviors, the NHANES also includes 24-hour dietary recall, which lets us examine the nutrition status of the sample household member. Across the columns, there are small changes in total daily calories, with slightly lower calories reported consumed by adults in households with very low food security among children, along with a slightly lower percent of recommended nutrients.[34] Note that this group also eats a higher percentage of meals at home and a lower percentage at fast food restaurants, but at the same time, BMI is highest for this group.[35] The

[32] Siefert et al. (2004) find a relationship between food insufficiency and physical and mental health in a sample of welfare recipients, while Stuff et al. (2004) find this relationship for a sample of adults in the Lower Mississippi Delta region. Note that the later's interpretation is that adult food insecurity leads to poor adult health outcomes.
[33] Research from Jacknowitz and Morrissey (2012) shows that changes in maternal depression are associated with both entrances and exits into food insecurity.
[34] In fact, if Table 4 is repeated for a sample where the children are the NHANES sample members, calories increase across the columns from 1806 to 1992. However, the children are also older in the final column averaging 9.6 years old versus just 8.1 in the first column. This increase in average age is likely related to the CPS finding of households with older children being more likely to have food insecure children. At the same time, the percent of the recommended nutrients achieved is also highest in the final column, at almost 65 percent compared to about 63 percent in the other columns. Note, however, that all of these differences are small and the sample sizes are quite small in the final column.
[35] This is consistent with Bhattacharya, Currie and Haider (2004) who find that household food insecurity is not predictive of worse nutritional outcomes for children, but is for adults, where it predicts a lower Healthy Eating

impression given by these results is one of adults perhaps trying to protect the children, and thus "doing without" for themselves. Additionally, the fact that the adults in these households that are suffering from the extremes of child food insecurity are themselves the worst off nutritionally is consistent with the impression arrived at earlier that many of these households are likely to have unmeasured and unmet needs.

The questions in the next two rows of Table 4, reporting whether the respondents have someone on whom they can rely for emotional and financial support, are based on the smallest samples. In the first three waves of the NHANES, the questions were only asked of respondents age 60 and over (many of whom may no longer have children in the household). While the sample was expanded to those age 40 and over for the next two waves, the questions on social support were dropped entirely for the wave completed in 2010. Nonetheless, the pattern across the columns is intriguing. Not only does the likelihood of having someone for financial support drop monotonically across the columns, so does that for emotional support.[36] The former, while interesting, may not be overly surprising given that lack of financial resources is expected to be correlated with food insecurity. The latter result, however, is another indication of the type of nonfinancial issue that may impact a household's food security status. A lack of emotional support may be tightly linked with mental health, which as discussed further below, may have an important role to play. Consistent with this finding, Garasky and Stewart (2007) find that in low-income households where the father is a nonresident, children are less likely to experience aspects of food insecurity when the fathers are frequent visitors, suggesting a potentially

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Index, and higher probabilities both of being obese and being low in serum nutrients. In our time use analysis, we find that the most food insecure households on average spend more time in food preparation and other household activities. Time spent shopping, and in particular time spent shopping for food, decreases as food insecurity increases in severity.

[36] This idea is somewhat comparable to Nepomnyaschy et al.'s (2014) finding that nonresident father involvement [in the child rearing] is associated with reduced child food insecurity in early and middle childhood, suggesting that additional support, outside of normal child support requirements, is beneficial to children's welfare.

unobserved social benefit of nonresident father involvement to children's well-being.[37] Powers (2013) explores the relationships among parenting, the parent-child relationship, and children's very low food security, finding that mothers in households experiencing any degree of food insecurity have a relatively negative outlook on their parental role and specifically, the mother-child relationship.[38]

The next several rows focus on drug and alcohol use and abuse.[39] Prior work has found that adult smoking is independently associated with food insecurity and severe food insecurity in children (Cutler-Triggs et al., 2008), and that low-income food insecure families headed by single-mothers are more likely to report maternal depression and substance abuse than their food secure counterparts (Gundersen and Ziliak, 2014). In our analysis, broadly speaking, drugs and alcohol do not seem to be strongly correlated with food security. For example, the rate of cocaine use over the past year is about 2 percent for each of the samples, while reported use of meth in the past 30 days is very low for all groups, and actually zero for the households with very low food security children. That said, while use of heroin in the past 30 days is also very low for all groups, it increases more than ten-fold across the columns, starting at 0.1 percent for the overall sample, rising to 0.2 percent for food insecure and very low food security households, before reaching 1.6 percent for households with very low food security children. While reporting smoking pot in the last 30 days is much more common – 13.8 percent for the sample overall – it

[37] Garasky and Stewart use data from the 1997 National Survey of America's Families. and find that while father visitation has a consistently negative impact on selected indicators of food insecurity, the same is not found for receipt of child.

[38] Once controlling for problems associated with parental outlook (e.g. mental and physical health), however, this finding disappears, suggesting mental and physical health play a compelling role in child food security status.

[39] Note these refer to current drug use, which is arguably most applicable for current food security status. If we look at ever having used these substances, we see the same relative patterns across columns, but the rates are much higher. For example, having ever used heroin increases to 2.3 percent for all households under 200% of the poverty line, and to 7.8 percent for households with VLFS among children.

does not rise monotonically with more severe levels of food insecurity, peaking at 23 percent for households with very low food security.

Further, a household adult is much more likely to have been to a drug treatment or rehabilitation program in households with very low food security children. Recall that the substance use results were referring only to use during the last 30 days in most cases, while we are now looking at having ever been to rehab in the past. In the full sample (column 1), 6.5 percent of households report an adult having been to rehabilitation, and this increases to 8.6 percent for food insecure households, 11.5 percent for very low food security and reaches 17.0 percent for households with very low food security among children.[40]

The final rows look at many of the same variables as in Table 1, showing very similar results using this alternate dataset. Most importantly, the fraction of the overall sample that has very low food security children is almost identical at 1.9 percent in the CPS vs. 1.7 percent in NHANES. While levels are not identical, similar correlations are seen for SNAP across tables, with receipt increasing as food security status worsens. Overall, then, while the NHANES sample is generally smaller than the CPS, it does not seem to differ greatly in the basic demographics, reinforcing the validity of using the NHANES to draw conclusions about what unmeasured characteristics might be driving some of the CPS results.

Table 5 is parallel to Table 2, but again using the NHANES sample adults. As was the case with the CPS, this table reinforces the findings of the prior table. For example, the adult not being in good health nearly triples the probability of the household having a very low food security child, as does the adult being depressed. While only 1.6 percent of households where the adult has emotional support have very low food security among children, that increases to 6.2

[40] The fraction reporting having been to rehab is well below the fraction reporting having ever used, for example, cocaine (33 percent for the households with VLFS among children).

percent with no emotional support. Interestingly, the results are less stark for financial support, where the rate increases from 1.2 percent to 3.9 percent. Viewing the data from this perspective highlights the fact that the relationship between drug use and food insecurity is highly varied. Food insecurity is present among 32.4 percent of households when the adult has not smoked pot in the past month, while it is 43.9 percent are when the adult has smoked. However, the rate of very low food security among children varies little by whether the parent reported smoking pot. For completeness, results are presented for reported use of other drugs, but note from the sample sizes that these are rare occurrences and thus quite imprecise.[41] Finally, we again see that the adult having been to rehab is associated with much higher rates of very low food security among the children, at 3.4 percent compared to 1.2 percent.

Recall from Figure 2b that like in the CPS, very low food security among children in the NHANES declines sharply as the household's income-to-poverty ratio increases. Thus, it is important to keep in mind that even though many of the characteristics explored above are not directly tied to income levels (as many of the CPS program participation variables were), they may still be highly correlated. In that case, these characteristics may still be proxying for income. Figure 3 shows the means of selected NHANES variables by 50 percentage point income-to-poverty bins (we use fewer bins due to the smaller sample sizes in the NHANES). Interestingly, the social support variables that were so highly correlated with food security status do not seem very positively related to income.[42] As for physical and mental health, the fraction suffering from depression declines somewhat with income. However, being in less than good health and having days of inactivity due to either mental or physical health problems are both quite a bit more

[41] Note that all reported means use the sampling weights, making them not necessarily exactly divisible by the sample sizes.
[42] Remember that as described above, the questions on financial and emotional support are not asked for the full sample; this may affect the interpretation of these findings.

stable over the income groups. Finally, having been to rehab does not appear to have a completely monotonic relationship with income class. Rather, it seems to rise a bit across the two groups below the poverty line, before declining across the two groups above the poverty line.

*B. Regression Analysis Using the NHANES*

The correlation between some of these variables and income makes clear that it is important to control for the income-to-poverty ratio. Unfortunately, we cannot follow the exact procedures from Table 3 that we used with the CPS data and run a "horse race" to see which variables are most correlated with very low food security among children, conditional on income. Because the NHANES changes questions and samples over time, a model with all of our variables included together has few observations. Instead, we carry out the exercise presented in Table 6. Each column reports a regression with very low food security among children as the binary dependent variable. The regressions in columns (1) through (9) each control for a set of 9 income-to-poverty bin dummies (representing 20 percentage point ranges of the household's income-to-poverty ratio), year dummies, household size, and dummies for the sampled adult in the household being African-American, a high school dropout, a US citizen, a homeowner, and employed, along with the NHANES variable shown on the left. Across each of these columns, we add to the basic controls one variable at a time capturing the health and behavioral variables discussed above.

Starting with the first five columns, we see that when controlling for these baseline income and demographic variables, poor health and lack of social support for the household adult are significantly related to the probability that there is very low food security among the children in the household. In columns (6) to (9) we see that none of the drug-use variables, including having been to rehab, significantly predict VLFS. The point estimate on heroin use,

though, continues to be extremely large – an increase in very low food security among children of 28 percentage points is predicted for households with an adult reporting heroin use, but is very imprecisely estimated, making it not significantly different than zero. Finally, column (9) shows that receiving SNAP is a significant predictor of very low food security among children; as discussed above we interpret this as likely to be capturing unobserved aspects of the family's resources. In fact, controlling for either health, or social support, or drug use, as is done in columns (10) to (12) wipes out the predictive power of SNAP receipt.

Column (10) provides a horse race among the available health variables for the subset of observations for which we observe these variables. When the poor health indicator, days of inactivity and the depression indicator are included together, the point estimates for the former two drop almost in half, losing significance. There is very little change for depression, however, which maintains its significant correlation with very low food security among children.[43] Moving to the social support variables in the next column, both point estimates are slightly reduced when included together, and individually their significance drops to the 10 percent level. However, the two variables are still jointly significant at better than the 1 percent level. In the final column, we include the drug use variables together, whose point estimates are little changed and thus remain insignificant (both individually and jointly).[44] It is also worth noting that in these last three columns none of the demographic variables are significant, other than being employed being significantly negative at the 10% level in the final column (coefficients not shown).

[43] Note that even though we are better controlling for other attributes of the child's household, we are still not making claims of causality. It may, in fact, be the case that it is an inability to meet the child's nutritional needs has resulted in the adult becoming depressed, rather than the other way around. Note Powers (2013) also discusses this directional uncertainty in her study of parenting and very low food security among children.
[44] The results for columns (10) to (12) are essentially identical if the SNAP variable is excluded.

While Table 6 is correlational and not causal, it may provide some insight into the types of household characteristics that are likely to have unobserved and unmet needs. In particular, there is strong evidence that good mental health, and social support structures more broadly, may play an important role in keeping children out of very low food security status.[45] While the NHANES sample sizes are too small (and the behaviors too rare) to draw statistically significant conclusions about serious drug abuse, the coefficients point strongly in the direction of this being highly correlated with VLFS among children, conditional on the income to poverty ratio. Thus, it may well be the case that an emphasis on adult mental health and well-being (which includes building social support networks and addressing addiction issues) could have beneficial spillover effects for children's food security status.

## V. Conclusion

Very low food security among children in the United States is, thankfully, a rare occurrence with about 1.9% of low-income households with children (<200% of poverty threshold) meeting the criteria for this categorization. Low income is clearly highly correlated with very low food security among children, but even within narrow income-to-poverty bands, very low food security status among children varies. This paper is an attempt to move beyond measured income-to-poverty to understand the unmeasured and unmet needs of households that are correlated with this extreme manifestation of poverty. We use two different types of data to examine this question: Current Population Survey data (matched December to March) and National Health and Nutrition Examination Survey data.

[45] Consistent with this, Martin et al. (2004) find that after controlling for household-level SES factors, households with higher levels of social capital are less likely to experience food insecurity, suggesting social needs are tangible and important factors that impact food security status.

A few clear paths for future research and policy analysis fall out of this investigation. First, the data sets that we currently have are likely inadequate to address questions like the causal impact of a policy change on very low food security among children (even if a robust empirical strategy for establishing a causal relationship were to present itself). The sample sizes of these households are simply too small to likely allow one to be able to say anything with statistical precision even about quite large effect sizes. Data collection for a targeted group will likely need to be a piece of any policy or program evaluation plan.

Despite the fact that the sample sizes for households with VLFS among children are small, we do have enough power to distinguish some clear correlates of this status, and these correlates may be used to inform policy. It seems clear that households' risk for very low food security among children increase as some children in the household age into their teenage years. Note that these data do not tell us *which* children in the household are suffering from very low food security. It may be that as older siblings become teenagers, younger siblings who are developmentally vulnerable to poor outcomes due to inadequate nutrition, are the ones suffering from very low food security. In any case, the fact that income-to-poverty thresholds and program benefit formulas do not take into account the age of the children in the household are issues deserving attention.

Another point that emerges is that households that have very low food security among children are more likely to be participating in various safety-net programs than other households with similar income-to-poverty ratios and other characteristics. Without more detailed information on characteristics that determine eligibility we cannot say for certain that these households are navigating the complicated safety net and getting all benefits to which they are entitled. However, the results suggest that these are households accessing the safety net, yet there

is something happening in these households such that these benefits (combined with their income) are not sufficient to meet their food needs.

A complete understanding of what that "something" is cannot be determined with currently available data sets. However, each of the data sets analyzed in this paper points to the fact that physical and mental health (and their potential correlates of drug and alcohol use and addiction), are complicit in moving a household from one that is merely low-income to one that is low-income and cannot adequately provide the basics for its children.

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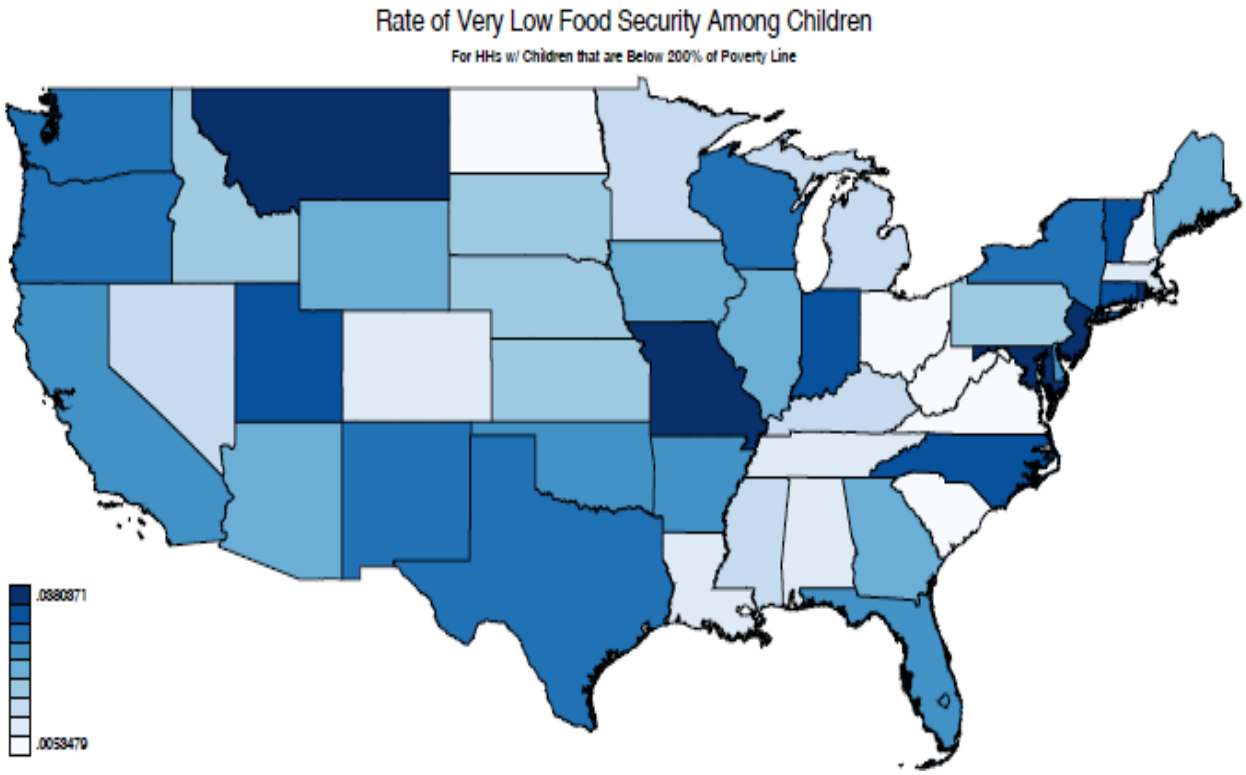
Figure 1


Rate of Very Low Food Security Among Children
For HHs w/ Children that are Below 200% of Poverty Line
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.0058479

Figure 2a

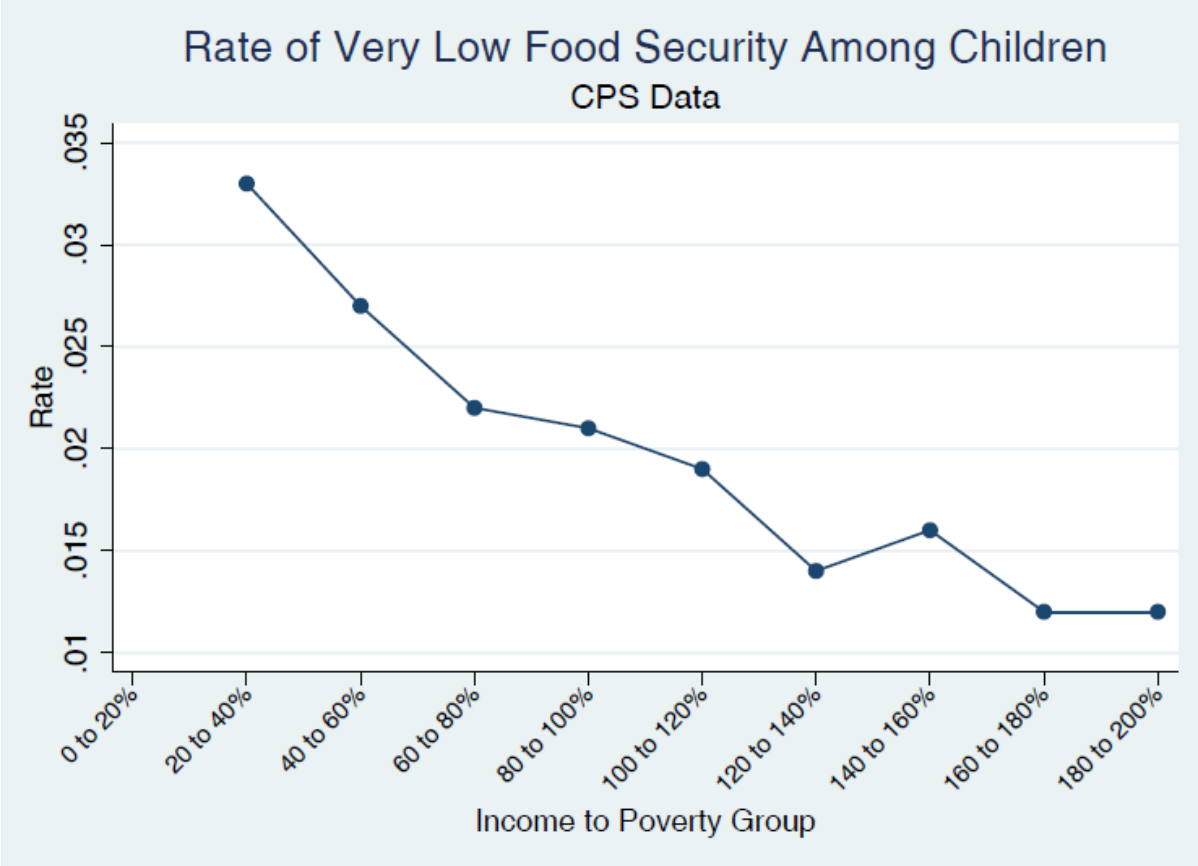


Figure 2b

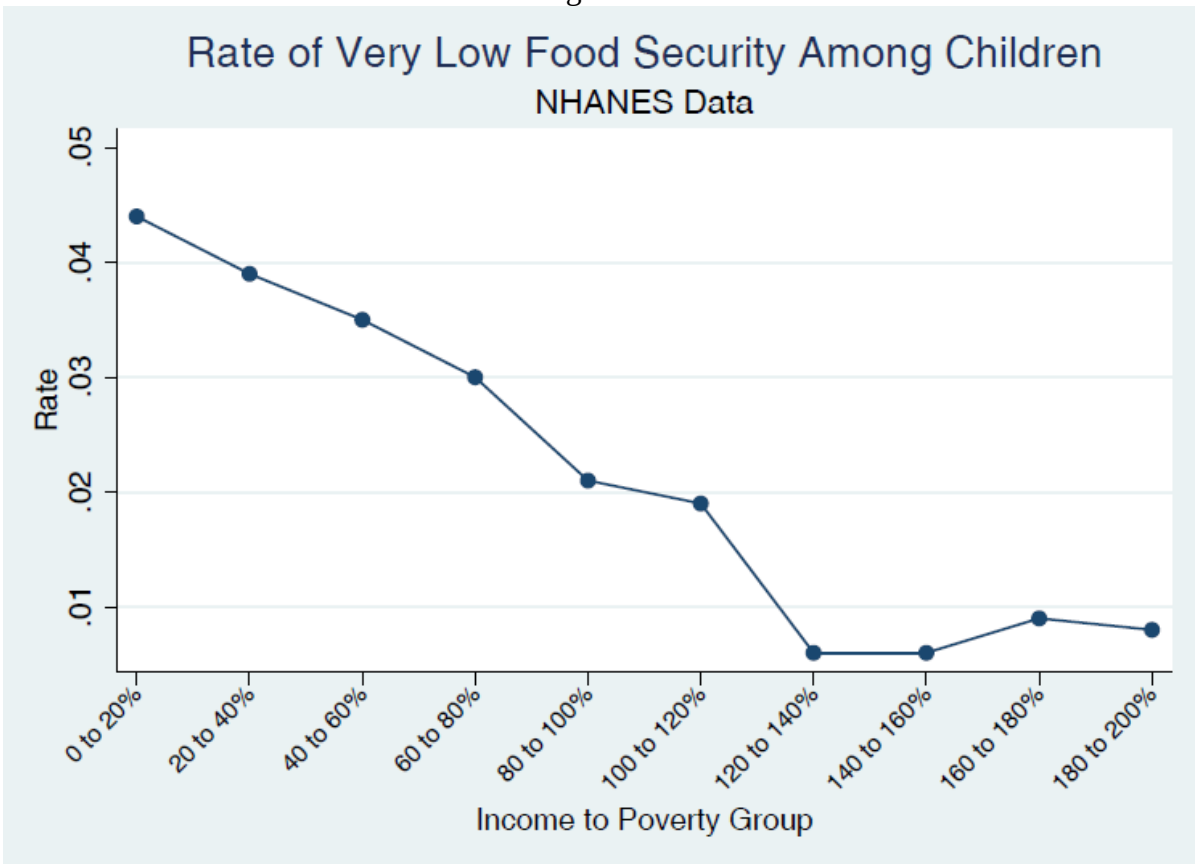

Figure 3

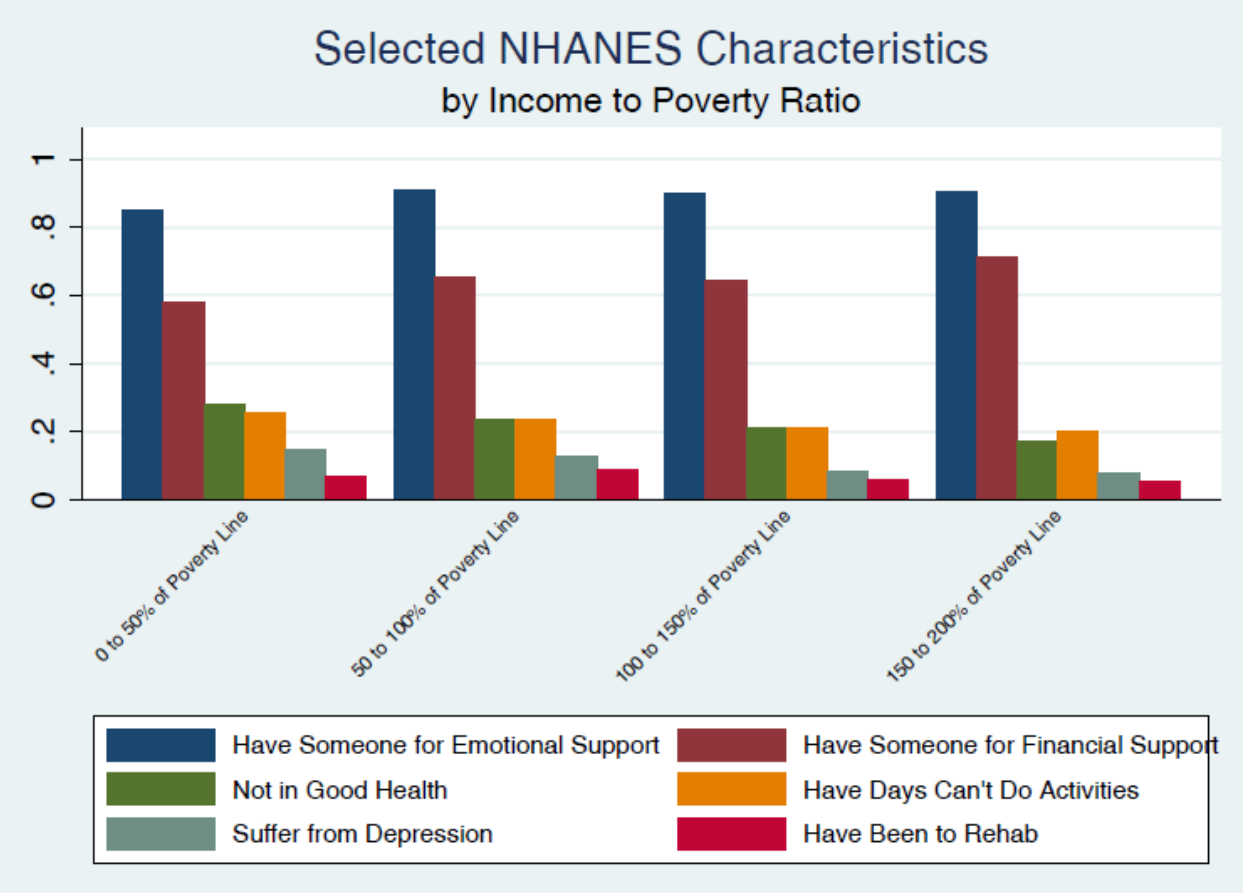
Selected NHANES Characteristics
by Income to Poverty Ratio
0
.2
.4
.6
.8
1
0 to 50% of Poverty Line
50 to 100% of Poverty Line
100 to 150% of Poverty Line
150 to 200% of Poverty Line
Have Someone for Emotional Support
Have Someone for Financial Support
Not in Good Health
Have Days Can't Do Activities
Suffer from Depression
Have Been to Rehab

Table 1: Characteristics of CPS Households with Children and Below 200% of Poverty Line

| | All Households < 200% of Poverty Line | | All Food Insecure Households | | All Households with Very Low Food Security | | Households with Very Low Food Secure Kids | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Receives Free/Reduced Price Lunch | 0.501 | 0.500 | 0.618 | 0.486 | 0.657 | 0.475 | 0.716 | 0.451 |
| Receives SNAP | 0.344 | 0.475 | 0.480 | 0.500 | 0.514 | 0.500 | 0.500 | 0.501 |
| Receives Energy Assistance | 0.097 | 0.297 | 0.139 | 0.346 | 0.163 | 0.370 | 0.152 | 0.360 |
| Receives Unemployment Compensation | 0.100 | 0.300 | 0.121 | 0.326 | 0.128 | 0.335 | 0.122 | 0.327 |
| Receives Workers' Compensation | 0.013 | 0.113 | 0.018 | 0.134 | 0.019 | 0.136 | 0.022 | 0.147 |
| Receives Social Security | 0.127 | 0.332 | 0.138 | 0.345 | 0.156 | 0.363 | 0.149 | 0.357 |
| Receives SSI | 0.074 | 0.262 | 0.104 | 0.306 | 0.126 | 0.332 | 0.135 | 0.342 |
| Receives Public Assistance/Welfare | 0.088 | 0.284 | 0.129 | 0.335 | 0.138 | 0.345 | 0.159 | 0.366 |
| Receives Veterans' Benefits | 0.007 | 0.085 | 0.007 | 0.085 | 0.010 | 0.102 | 0.001 | 0.026 |
| Receives Survivors' Benefits | 0.005 | 0.070 | 0.005 | 0.067 | 0.007 | 0.085 | 0.003 | 0.052 |
| Receives Disability Benefits | 0.013 | 0.112 | 0.018 | 0.134 | 0.017 | 0.129 | 0.012 | 0.109 |
| Receives Retirement Benefits | 0.018 | 0.133 | 0.011 | 0.106 | 0.011 | 0.104 | 0.017 | 0.128 |
| Receives Education Benefits | 0.076 | 0.265 | 0.082 | 0.274 | 0.078 | 0.268 | 0.068 | 0.252 |
| Receives Financial Benefits | 0.025 | 0.156 | 0.036 | 0.185 | 0.047 | 0.211 | 0.040 | 0.196 |
| Receives Medicaid | 0.587 | 0.492 | 0.704 | 0.456 | 0.733 | 0.442 | 0.713 | 0.453 |
| Receives Health Insurance | 0.443 | 0.497 | 0.359 | 0.480 | 0.345 | 0.475 | 0.350 | 0.478 |
| Receive EITC | 0.645 | 0.479 | 0.640 | 0.480 | 0.622 | 0.485 | 0.689 | 0.464 |
| # of Children Under Age 5 | 0.607 | 0.803 | 0.595 | 0.803 | 0.520 | 0.774 | 0.443 | 0.811 |
| # of Children Age 5 to 12 | 1.025 | 1.022 | 1.055 | 1.031 | 1.062 | 1.029 | 1.014 | 1.051 |
| # of Children Age 13 to 18 | 0.626 | 0.838 | 0.656 | 0.853 | 0.726 | 0.868 | 0.966 | 0.941 |
| Total Household Size | 4.275 | 1.793 | 4.228 | 1.812 | 4.132 | 1.738 | 4.298 | 1.751 |
| Live in Rural Area | 0.212 | 0.409 | 0.198 | 0.398 | 0.200 | 0.400 | 0.159 | 0.366 |
| Household Head is Female | 0.629 | 0.483 | 0.698 | 0.459 | 0.737 | 0.440 | 0.755 | 0.431 |
| Household Head is Black | 0.246 | 0.431 | 0.286 | 0.452 | 0.276 | 0.447 | 0.321 | 0.467 |
| Household Head is Other Nonwhite | 0.061 | 0.240 | 0.052 | 0.221 | 0.045 | 0.208 | 0.050 | 0.218 |
| Household Head is Recent Immigrant | 0.036 | 0.186 | 0.039 | 0.194 | 0.039 | 0.193 | 0.064 | 0.244 |
| Household Head is Disabled | 0.083 | 0.276 | 0.124 | 0.330 | 0.159 | 0.365 | 0.153 | 0.361 |
| Household Head is a Homeowner | 0.434 | 0.496 | 0.330 | 0.470 | 0.312 | 0.463 | 0.282 | 0.451 |
| Household Head is HS Dropout | 0.269 | 0.443 | 0.303 | 0.460 | 0.277 | 0.448 | 0.324 | 0.469 |
| Fraction of the Year Looking for Work | 0.044 | 0.120 | 0.055 | 0.130 | 0.059 | 0.132 | 0.059 | 0.119 |
| Fraction of the Year Working | 0.478 | 0.317 | 0.445 | 0.327 | 0.420 | 0.337 | 0.389 | 0.322 |
| Household is Food Insecure | 0.348 | 0.476 | 1.000 | 0.000 | 1.000 | 0.000 | 1.000 | 0.000 |
| Household has Very Low Food Security | 0.100 | 0.300 | 0.287 | 0.452 | 1.000 | 0.000 | 1.000 | 0.000 |
| Children have Very Low Food Security | 0.019 | 0.135 | 0.053 | 0.224 | 0.185 | 0.389 | 1.000 | 0.000 |
| Sample size | 20,022 | | 6,890 | | 2,021 | | 372 | |

Table 2: Food Security Status of CPS Households with Children and Below 200% of Poverty Line by Selected Characteristics

| | **Don't Receive Free/ Reduced Price Lunch** | | **Do Receive Free/ Reduced Price Lunch** | | **Don't Receive SNAP** | | **Do Receive SNAP** | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev |
| Household is Food Insecure | 0.266 | 0.442 | 0.430 | 0.495 | 0.276 | 0.447 | 0.480 | 0.500 |
| Household has Very Low Food Security | 0.069 | 0.253 | 0.131 | 0.337 | 0.074 | 0.262 | 0.146 | 0.356 |
| Child has Very Low Food Security | 0.011 | 0.102 | 0.026 | 0.160 | 0.014 | 0.118 | 0.026 | 0.162 |
| Number of Observations | 10,232 | | 9,790 | | 13,308 | | 6,714 | |
| | **Don't Receive EITC** | | **Do Receive EITC** | | **Don't Receive Public Assist/Welfare** | | **Do Receive Public Assist/Welfare** | |
| | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev |
| Household is Food Insecure | 0.352 | 0.478 | 0.345 | 0.476 | 0.333 | 0.471 | 0.506 | 0.500 |
| Household has Very Low Food Security | 0.106 | 0.308 | 0.096 | 0.295 | 0.094 | 0.292 | 0.155 | 0.362 |
| Child has Very Low Food Security | 0.016 | 0.126 | 0.020 | 0.139 | 0.017 | 0.129 | 0.033 | 0.179 |
| Number of Observations | 7,194 | | 12,828 | | 18,138 | | 1,884 | |
| | **Household Contains No Teenagers** | | **Household Contains Teenagers** | | **Household Head is Male** | | **Household Head is Female** | |
| | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev |
| Household is Food Insecure | 0.335 | 0.472 | 0.364 | 0.481 | 0.283 | 0.450 | 0.386 | 0.487 |
| Household has Very Low Food Security | 0.088 | 0.283 | 0.116 | 0.320 | 0.071 | 0.256 | 0.117 | 0.321 |
| Child has Very Low Food Security | 0.012 | 0.108 | 0.027 | 0.162 | 0.012 | 0.110 | 0.022 | 0.147 |
| Number of Observations | 11,278 | | 8,744 | | 7,526 | | 12,496 | |
| | **Household Head Finished High School** | | **Household Head is HS Dropout** | | **Household Head is White** | | **Household Head is Black** | |
| | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev |
| Household is Food Insecure | 0.332 | 0.471 | 0.392 | 0.488 | 0.333 | 0.471 | 0.404 | 0.491 |
| Household has Very Low Food Security | 0.099 | 0.298 | 0.103 | 0.304 | 0.098 | 0.297 | 0.112 | 0.315 |
| Child has Very Low Food Security | 0.017 | 0.130 | 0.022 | 0.148 | 0.017 | 0.129 | 0.024 | 0.153 |
| Number of Observations | 15,135 | | 4,887 | | 14,657 | | 3,866 | |
| | **Household Head Is Not Disabled** | | **Household Head Is Disabled** | | **Household Head Is Not a Homeowner** | | **Household Head Is a Homeowner** | |
| | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev |
| Household is Food Insecure | 0.333 | 0.471 | 0.521 | 0.500 | 0.412 | 0.492 | 0.265 | 0.441 |
| Household has Very Low Food Security | 0.092 | 0.289 | 0.191 | 0.393 | 0.121 | 0.326 | 0.072 | 0.258 |
| Child has Very Low Food Security | 0.017 | 0.130 | 0.034 | 0.182 | 0.023 | 0.151 | 0.012 | 0.109 |
| Number of Observations | 18,230 | | 1,643 | | 10,823 | | 9,199 | |

Table 3: Correlates of Very Low Food Security Among Children
in CPS Households Below 200% of Poverty Line

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| # of Children Under Age 5 | -0.001 | | | -0.002 |
| | (0.002) | | | (0.002) |
| # of Children Age 5 to 12 | 0.002 | | | -0.001 |
| | (0.002) | | | (0.002) |
| # of Children Age 13 to 18 | 0.010*** | | | 0.008*** |
| | (0.002) | | | (0.002) |
| Total Household Size | -0.001 | | | 0.000 |
| | (0.001) | | | (0.001) |
| Household Head is Black | | 0.004 | | 0.001 |
| | | (0.003) | | (0.003) |
| Household Head is Other Nonwhite | | -0.002 | | -0.003 |
| | | (0.004) | | (0.004) |
| Household Head is Recent Immigrant | | 0.014* | | 0.016* |
| | | (0.008) | | (0.009) |
| Household Head is Female | | 0.006*** | | 0.005** |
| | | (0.002) | | (0.002) |
| Household Head is Disabled | | 0.016*** | | 0.011** |
| | | (0.005) | | (0.006) |
| Live in Rural Area | | -0.004 | | -0.004* |
| | | (0.002) | | (0.002) |
| Household Head is a Homeowner | | -0.007*** | | -0.007*** |
| | | (0.002) | | (0.002) |
| Household Head is HS Dropout | | 0.003 | | 0.000 |
| | | (0.003) | | (0.003) |
| Receives Medicaid | | | -0.001 | -0.000 |
| | | | (0.003) | (0.003) |
| Receives Free/Reduced Price Lunch | | | 0.012*** | 0.009*** |
| | | | (0.002) | (0.002) |
| Receives SNAP | | | 0.003 | 0.002 |
| | | | (0.003) | (0.003) |
| Receives Energy Assistance | | | 0.002 | 0.003 |
| | | | (0.004) | (0.004) |
| Receives Unemployment Compensation | | | 0.003 | 0.005 |
| | | | (0.004) | (0.004) |
| Receives Workers' Compensation | | | 0.015 | 0.014 |
| | | | (0.012) | (0.012) |
| Receives Social Security | | | 0.001 | 0.001 |
| | | | (0.004) | (0.004) |
| Receives SSI | | | 0.010* | 0.007 |
| | | | (0.006) | (0.006) |
| Receives Public Assistance/Welfare | | | 0.009* | 0.009* |
| | | | (0.005) | (0.005) |
| Receives Veterans' Benefits | | | -0.019*** | -0.017*** |
| | | | (0.003) | (0.003) |

(Continued)

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Receives Survivors' Benefits | | | -0.011 | -0.010 |
| | | | (0.008) | (0.008) |
| Receives Disability Benefits | | | -0.005 | -0.008 |
| | | | (0.010) | (0.011) |
| Receives Retirement Benefits | | | 0.002 | 0.007 |
| | | | (0.008) | (0.008) |
| Receives Education Benefits | | | -0.003 | -0.003 |
| | | | (0.004) | (0.004) |
| Receives Health Insurance | | | 0.001 | 0.002 |
| | | | (0.003) | (0.003) |
| Receives Financial Benefits | | | 0.008 | 0.009 |
| | | | (0.009) | (0.009) |
| Receive EITC | | | 0.006** | 0.005** |
| | | | (0.003) | (0.003) |
| Fraction of the Year Working | | | -0.011** | -0.004 |
| (per potential worker) | | | (0.005) | (0.005) |
| Fraction of the Year Looking for Work | | | 0.001 | 0.006 |
| (per potential worker) | | | (0.010) | (0.010) |
| Constant | 0.006 | 0.001 | 0.003 | -0.005 |
| | (0.006) | (0.006) | (0.006) | (0.007) |
| Observations | 19,873 | 19,873 | 19,873 | 19,873 |
| R-squared | 0.008 | 0.008 | 0.009 | 0.014 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All models include dummies for 20 percentage point income/poverty ratio bins and year dummies.

Table 4: Characteristics of NHANES Households with Children and Below 200% of Poverty Line

| | All Households < 200% of Poverty Line | | | All Food Insecure Households | | | All Households with Very Low Food Security | | | Households with Very Low Food Secure Kids | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | Std Dev | N | Mean | Std Dev | N | Mean | Std Dev | N | Mean | Std Dev | N |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| Suffering from depression? | 0.106 | 0.307 | 4,430 | 0.158 | 0.365 | 1,617 | 0.211 | 0.409 | 466 | 0.238 | 0.428 | 94 |
| Days inactive due to health problems | 2.26 | 6.38 | 5,216 | 2.94 | 7.22 | 1,869 | 3.68 | 8.18 | 546 | 6.69 | 10.84 | 99 |
| Health is not good? | 0.251 | 0.434 | 5,226 | 0.329 | 0.470 | 1,873 | 0.346 | 0.476 | 547 | 0.493 | 0.502 | 99 |
| Current BMI | 29.1 | 7.3 | 6,725 | 29.4 | 7.7 | 2,358 | 29.8 | 8.7 | 687 | 30.6 | 7.8 | 138 |
| Daily calories (from food diary) | 2,187 | 1,016 | 6,470 | 2,176 | 1,009 | 2,280 | 2,192 | 976 | 663 | 2,083 | 1,089 | 131 |
| Percent of meals eaten at home | 72.65 | 26.42 | 6,470 | 74.83 | 26.13 | 2,280 | 74.48 | 27.06 | 663 | 75.38 | 31.40 | 131 |
| Percent of meals from fast food | 8.56 | 13.96 | 6,470 | 8.60 | 13.66 | 2,280 | 8.34 | 13.00 | 663 | 7.69 | 14.22 | 131 |
| Percent of recommended nutrients | 62.70 | 33.28 | 7,067 | 61.57 | 33.25 | 2,465 | 62.17 | 32.88 | 723 | 61.74 | 34.12 | 146 |
| Have someone for financial support? | 0.657 | 0.475 | 1,641 | 0.522 | 0.500 | 554 | 0.401 | 0.492 | 170 | 0.360 | 0.486 | 42 |
| Have someone for emotional support? | 0.898 | 0.302 | 1,646 | 0.870 | 0.336 | 556 | 0.839 | 0.368 | 171 | 0.699 | 0.464 | 42 |
| Ever been to rehab? | 0.065 | 0.247 | 2,724 | 0.086 | 0.280 | 1,031 | 0.115 | 0.319 | 284 | 0.170 | 0.380 | 49 |
| Smoked pot in last 30 days? | 0.138 | 0.345 | 2,724 | 0.179 | 0.383 | 1,031 | 0.232 | 0.423 | 284 | 0.175 | 0.384 | 49 |
| Used cocaine in last year? | 0.022 | 0.147 | 4,990 | 0.023 | 0.150 | 1,760 | 0.021 | 0.143 | 532 | 0.025 | 0.156 | 102 |
| Used heroin in last 30 days? | 0.001 | 0.027 | 2,870 | 0.002 | 0.039 | 1,075 | 0.002 | 0.048 | 297 | 0.016 | 0.127 | 55 |
| Used meth in last 30 days? | 0.005 | 0.068 | 2,870 | 0.002 | 0.047 | 1,075 | 0.003 | 0.053 | 297 | 0.000 | 0.000 | 55 |
| Number of drinks on days drink? | 2.428 | 3.263 | 5,663 | 2.509 | 3.248 | 1,963 | 2.261 | 3.004 | 586 | 2.481 | 3.011 | 109 |
| Received SNAP? | 0.330 | 0.470 | 7,064 | 0.451 | 0.498 | 2,463 | 0.464 | 0.499 | 722 | 0.553 | 0.499 | 146 |
| Currently employed? | 0.611 | 0.487 | 7,067 | 0.551 | 0.497 | 2,465 | 0.528 | 0.500 | 723 | 0.474 | 0.501 | 146 |
| Currently married? | 0.636 | 0.481 | 6,874 | 0.588 | 0.492 | 2,399 | 0.563 | 0.496 | 705 | 0.477 | 0.501 | 137 |
| Never married? | 0.188 | 0.391 | 6,874 | 0.214 | 0.410 | 2,399 | 0.202 | 0.402 | 705 | 0.167 | 0.375 | 137 |
| High school dropout? | 0.387 | 0.487 | 6,883 | 0.479 | 0.500 | 2,389 | 0.454 | 0.498 | 702 | 0.498 | 0.502 | 138 |
| Homeowner? | 0.468 | 0.499 | 5,644 | 0.356 | 0.479 | 1,872 | 0.394 | 0.489 | 554 | 0.312 | 0.465 | 121 |
| US citizen? | 0.773 | 0.419 | 7,056 | 0.719 | 0.450 | 2,462 | 0.788 | 0.409 | 722 | 0.779 | 0.416 | 146 |
| Black? | 0.182 | 0.386 | 7,067 | 0.190 | 0.392 | 2,465 | 0.215 | 0.411 | 723 | 0.299 | 0.459 | 146 |
| Household size | 4.52 | 1.45 | 7,067 | 4.69 | 1.52 | 2,465 | 4.56 | 1.47 | 723 | 4.42 | 1.54 | 146 |
| Income/Poverty ratio | 1.084 | 0.51 | 7,067 | 0.942 | 0.485 | 2,465 | 0.938 | 0.507 | 723 | 0.776 | 0.513 | 146 |
| Household is food insecure? | 0.310 | 0.462 | 7,067 | 1.000 | 0.000 | 2,465 | 1.000 | 0.000 | 723 | 1.000 | 0.000 | 146 |
| Household has very low food security? | 0.101 | 0.302 | 7,067 | 0.328 | 0.470 | 2,465 | 1.000 | 0.000 | 723 | 1.000 | 0.000 | 146 |
| Children have very low food security? | 0.017 | 0.130 | 7,067 | 0.056 | 0.230 | 2,465 | 0.170 | 0.376 | 723 | 1.000 | 0.000 | 146 |

Note: only observations of adult sample members used.

Table 5: Food Security Status of NHANES Households with Children and Below 200% of Poverty Line by Selected Characteristics

| | **Health Good** | | **Health Not Good** | | **Not Depressed** | | **Depressed** | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev |
| Household is Food Insecure | 0.291 | 0.454 | 0.426 | 0.495 | 0.307 | 0.461 | 0.488 | 0.500 |
| Household has Very Low Food Security | 0.093 | 0.290 | 0.147 | 0.354 | 0.090 | 0.286 | 0.203 | 0.403 |
| Child has Very Low Food Security | 0.010 | 0.098 | 0.028 | 0.165 | 0.014 | 0.119 | 0.038 | 0.191 |
| Number of Observations | 3,679 | | 1,547 | | 3,953 | | 477 | |
| | **Have Nobody for Emotional Support** | | **Have Someone for Emotional Support** | | **Have Nobody for Financial Support** | | **Have Someone for Financial Support** | |
| | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev |
| Household is Food Insecure | 0.408 | 0.493 | 0.310 | 0.462 | 0.445 | 0.497 | 0.254 | 0.435 |
| Household has Very Low Food Security | 0.173 | 0.379 | 0.102 | 0.303 | 0.189 | 0.392 | 0.066 | 0.249 |
| Child has Very Low Food Security | 0.062 | 0.242 | 0.016 | 0.127 | 0.039 | 0.195 | 0.012 | 0.107 |
| Number of Observations | 199 | | 1,447 | | 551 | | 1,090 | |
| | **Did Not Smoke Pot Past 30 Days** | | **Smoked Pot Past 30 Days** | | **Did Not Use Cocaine Past Year** | | **Used Cocaine Past Year** | |
| | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev |
| Household is Food Insecure | 0.324 | 0.468 | 0.439 | 0.497 | 0.310 | 0.462 | 0.324 | 0.470 |
| Household has Very Low Food Security | 0.084 | 0.278 | 0.159 | 0.366 | 0.104 | 0.306 | 0.098 | 0.299 |
| Child has Very Low Food Security | 0.012 | 0.111 | 0.016 | 0.127 | 0.018 | 0.132 | 0.020 | 0.141 |
| Number of Observations | 2,380 | | 344 | | 4,893 | | 97 | |
| | **Did Not Use Heroin Past 30 Days** | | **Used Heroin Past 30 Days** | | **Did Not Use Meth Past 30 Days** | | **Used Meth Past 30 Days** | |
| | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev |
| Household is Food Insecure | 0.338 | 0.473 | 0.722 | 0.548 | 0.339 | 0.474 | 0.161 | 0.384 |
| Household has Very Low Food Security | 0.095 | 0.294 | 0.302 | 0.562 | 0.096 | 0.294 | 0.058 | 0.243 |
| Child has Very Low Food Security | 0.013 | 0.115 | 0.302 | 0.562 | 0.014 | 0.116 | 0.000 | 0.000 |
| Number of Observations | 2,867 | | 3 | | 2,858 | | 12 | |
| | **Have Never Been in Rehab** | | **Have Been in Rehab** | | **Under 5 Drink Daily Average** | | **5+ Drink Daily Average** | |
| | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev | Mean | Std Dev |
| Household is Food Insecure | 0.332 | 0.471 | 0.446 | 0.499 | 0.305 | 0.460 | 0.329 | 0.470 |
| Household has Very Low Food Security | 0.090 | 0.286 | 0.166 | 0.373 | 0.105 | 0.307 | 0.096 | 0.294 |
| Child has Very Low Food Security | 0.012 | 0.107 | 0.034 | 0.181 | 0.016 | 0.126 | 0.021 | 0.143 |
| Number of Observations | 2,555 | | 169 | | 4,742 | | 921 | |

Note: only observations of adult sample members used.

Table 6: Correlates of Very Low Food Security Among Children
in NHANES Households Below 200% of Poverty Line

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Health is not good | 0.014*** | | | | | | | | | 0.008 | | |
| | (0.005) | | | | | | | | | (0.005) | | |
| Days inactive due | | 0.001*** | | | | | | | | 0.000 | | |
| to health problems | | (0.000) | | | | | | | | (0.001) | | |
| Depressed | | | 0.020** | | | | | | | 0.018** | | |
| | | | (0.009) | | | | | | | (0.008) | | |
| Have someone for | | | | -0.042** | | | | | | | -0.035* | |
| emotional support | | | | (0.018) | | | | | | | (0.018) | |
| Have someone for | | | | | -0.025** | | | | | | -0.020* | |
| financial support | | | | | (0.010) | | | | | | (0.010) | |
| Smoked pot | | | | | | 0.003 | | | | | | 0.001 |
| in last 30 days | | | | | | (0.007) | | | | | | (0.007) |
| Used heroin | | | | | | | 0.280 | | | | | 0.263 |
| in last 30 days | | | | | | | (0.262) | | | | | (0.263) |
| Ever been to rehab | | | | | | | | 0.021 | | | | 0.018 |
| | | | | | | | | (0.013) | | | | (0.013) |
| Received SNAP | | | | | | | | | 0.010** | 0.002 | 0.009 | -0.005 |
| | | | | | | | | | (0.005) | (0.005) | (0.013) | (0.005) |
| Observations | 5,062 | 5,052 | 4,248 | 1,645 | 1,640 | 2,677 | 2,823 | 2,677 | 6,870 | 3,596 | 1,640 | 2,658 |
| R-squared | 0.013 | 0.015 | 0.014 | 0.037 | 0.036 | 0.007 | 0.012 | 0.009 | 0.013 | 0.018 | 0.041 | 0.013 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All regressions include 20 percentage point income/poverty bin dummies, year dummies, household size and dummies for the sample adult being African-American, a high school dropout, a US citizen, a homeowner, and employed

Appendix Table 1a: Food Security Questionnaire (All Households)

1. "We worried whether our food would run out before we got money to buy more." Was that often, sometimes, or never true for you in the last 12 months?
2. "The food that we bought just didn't last and we didn't have money to get more." Was that often, sometimes, or never true for you in the last 12 months?
3. "We couldn't afford to eat balanced meals." Was that often, sometimes, or never true for you in the last 12 months?
4. In the last 12 months, did you or other adults in the household ever cut the size of your meals or skip meals because there wasn't enough money for food? (Yes/No)
5. (If yes to question 4) How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?
6. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food? (Yes/No)
7. In the last 12 months, were you ever hungry, but didn't eat, because there wasn't enough money for food? (Yes/No)
8. In the last 12 months, did you lose weight because there wasn't enough money for food? (Yes/No)
9. In the last 12 months did you or other adults in your household ever not eat for a whole day because there wasn't enough money for food? (Yes/No)
10. (If yes to question 9) How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

Appendix Table 1b: Food Security Questionnaire (Households with Children)

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

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

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

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

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

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

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

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

Appendix Table 2: Food Security Categories for Households with Children

| Category | Definition |
|---|---|
| ***Food Secure Households*** (with or without children) | 0-2 of the total questions answered in the affirmative |
| ***Food Insecure Households*** (with or without children) | 3+ of the total questions answered in the affirmative |
| ***Very Low Food Security Households*** (with children) | 8+ of the 18 total questions answered in the affirmative |
| ***Households with Food Secure Children*** | 0-1 of the 8 questions about children answered in the affirmative |
| ***Households with Food Insecure Children*** | 2+ of the 8 questions about children answered in the affirmative |
| ***Households with Very Low Food Security among Children*** | 5+ of the 8 questions about children answered in the affirmative |