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Understanding Persistence and Change Using Linked Current Population Survey Data

Our paper examines the prevalence and determinants of children's transitions into and out of food insecurity since 2001. We use longitudinally linked data from the Food Security Supplements to the Current Population Surveys to estimate one-year transition probabilities of entry and exit from food insecurity. Our results indicate that child hunger is typically short-lived, but children experiencing very low food security frequently experience multiple consecutive years of food insecurity. We demonstrate large demographic and socioeconomic differences in rates of entry into very low food security and persistence in children's food insecurity. Income and employment shocks are important predictors of child hunger transitions. Finally, we find that the Great Recession increased the likelihood that children entered into and persisted in food insecurity among children.

Executive Summary

Because of a lack of nationally representative longitudinal data on children's food insecurity in the United States, we know very little about the dynamics of movements into or out of food insecurity among children, the duration of food insecurity among children, and the policy levers which affect movement. Using longitudinally linked data from the Current Population Survey (IPUMS-CPS), we estimate one-year transition rates of exits and entry into very low food security status. In other words, we ask how common is it for children to become food insecure, and once food insecure, to remain food insecure. Next, we examine the demographic and economic determinants of food insecurity entry and exit.

Our analysis shows that on average, 5% of previously food secure children newly entered food insecurity each year, experiencing reductions in the quality or quantity of food they consumed. This includes nearly 1 percent who entered very low food security among children, in the food intake of at least one child was reduced or disrupted. Among all food insecure children, 40% overall persisted in food insecurity the following year. Nearly one-fifth of households experiencing very low food insecurity among children persisted in this status for a second consecutive year. Both the prevalence and persistence in very low food security among children increased during the Great Recession.

Although experiencing multiple years of very low food security is unusual, children who experience very low food security commonly experience multiple years of food insecurity. About half of households that newly entered very low food security experienced low food security the previous year. Likewise, about half of households that exit very low food security still experience low food security the second year. Thus, this group of children appears to be at risk of experiencing persistent food access problems, which may have important consequences

for child health and well-being.

We find that children in disadvantaged populations (by socioeconomic status, family structure, race and ethnicity) have significantly higher probabilities of entering into and persisting in food insecurity than more advantaged children. We found fewer demographic and socioeconomic differences in exiting food insecurity, perhaps because of the selected population that becomes food insecure. Finally, negative income and employment shocks predict entry into very low food security among children.

Persistent child hunger is thankfully rare in the United States, a smaller population of children will experience it. Those who do are at high risk of experiencing multiple years of food insecurity. More research is necessary to understand the impact of prolonged food insecurity on child health and well-being.

Introduction

Material hardship, whether families can meet their basic needs for food, shelter, medical care, and clothing, is a concept distinct from family income and the cross-sectional correlation between income poverty and hardship is relatively weak (Mayer and Jencks 1989). Since Mayer and Jencks' 1989 critique of the lack of regular statistics on material hardship, the data available to study food hardship improved substantially with the regular collection of food security data in the Current Population Survey. A large literature has developed using *cross-sectional* data to model the policy, economic, household, and individual correlates of food insecurity status during childhood. Because longitudinal data on food insecurity remains scarce, however, we know very little about the dynamics of movements into or out of food insecurity among children, the duration of food insecurity among children, nor which policy levers affect movement. Most studies that do consider these issues utilize data that are not nationally representative, have small samples, and/or focus on entire households (not mainly children). All predate the Great Recession of 2007 to 2009. Just as our understanding of poverty dynamics was transformed by the availability of longitudinal data like PSID and SIPP, we hope that the use of longitudinal data to study children's food insecurity will offer new insights into the factors that place children into and that lift them out of food insecurity.

Our paper examines the prevalence and determinants of children's transitions into and out of food insecurity since 2001. We use longitudinally linked data from the Food Security Supplements (FSS) to the Current Population Surveys (CPS) to describe and model the correlates of persistence and change in children's food insecurity. (1) We estimate one-year transition probabilities of entry and exit from food insecurity for each year between 2001 and 2010. (2) We analyze the demographic and socio-economic determinants of entrance into and persistence in

children's food security status. (3) We analyze the impact of economic shocks on children's chances of entering into and exiting food insecurity.

Background

In 2011, most children in the United States (78%) lived in households with no food access problems; the remainder lived in households in which the quality or quantity of food consumed by household members was limited for financial reasons (Coleman-Jenson et al. 2012). Even in food insecure households, adults typically try to protect the food consumption of children. About 850,000 children in 2011, however, lived in a household experiencing very low food security among children, meaning that the food intake of children was reduced or eating patterns disrupted at some point during the year. Although down from the peak of 1.1 million children at the height of the Great Recession, this is still double the number of children who experienced very low food security in 2006 (Coleman-Jenson et al. 2012).

In most households where children experience very low food security, at least one child did not eat enough, went hungry, or skipped meals, and in nearly 60% of these households, children skipped meals during three or more months (Nord 2009). Food insecurity has important negative consequences for the health, educational outcomes, and psychological well-being of children (Alaimo, Olson, and Frongillo 2001, 2002; Bronte-Tinkew et al. 2007; Cook and Frank 2008; Jyoti, Frongillo, and Jones 2005; Skalicky et al. 2005; Weinreb et al. 2002; Winicki and Jemison 2003). Just like persistent poverty has been shown to be more detrimental to children than short spells of poverty (Duncan, Brooks-Gunn, and Klebanov 1994; Korenman, Miller, and Sjaastad 1995), and prolonged food insecurity particularly harmful to child health (Ryu and Bartfeld 2012).

Although there is a large literature on the prevalence of food insecurity among children, much less is known about the *rates* or *processes* of entering and exiting childhood food insecurity and the durations of children's exposure to food insecurity. Few studies make use of *longitudinal* data on children's food insecurity; those that do, tend to utilize data on children in local or selective samples. Ribar and Hamrick (2003) provide an important exception. Using data from the 1993 Survey of Income and Program Participation and the follow-on Survey of Program Dynamics, they examined household-level food security transitions between 1995 and 1997. They found that 3% of children living in food *secure* households in 1995 lived in food *insecure* households in 1997, while 77% of children who were in food *insecure* households in 1995 exited that status by 1997. Only 2% of children in the entire population lived in food insecure households at both time points. The SIPP food security questions, however, describe the food intake of entire households, rather than children, and these estimates date to a period of economic prosperity.

Ryu and Bartfeld (2012) provide a second exception. Using longitudinal data from the Early Longitudinal Study-Kindergarten Cohort (1998-2007), they find that about 21% of the sample experienced household food insecurity at least once across the 5 interviews. Of these, half experienced only one spell of food insecurity and another quarter experienced two spells. Even using a much less severe measure of food insecurity than in the Ribar and Hamrick study, it was unusual for households to experience prolonged periods of food insecurity.

Two additional studies, both focused on former welfare recipients in the late 1990s and early 2000s, demonstrate that persistent and severe food insecurity is a significant problem for disadvantaged families (Heflin 2006; London and Scott 2005). Among welfare-leavers in four cities, London and Scott (2005) found that 30 percent of households experiencing "food

insecurity with hunger” in 1998 remained very food insecure in 2001. In a Michigan-based survey of mothers receiving cash welfare in 1997, Heflin (2006) found that nearly 30% of these mothers experienced at least two spells of food insufficiency between 1997 and 2004. Although these studies represent a valuable contribution to the food security literature, they are also limited in important respects. First, they do not focus specifically on food insecurity among children. Second, they use geographically restricted samples. Finally, these studies were conducted over short periods of time and use different questions. They cannot, therefore, be used to examine trends in food security dynamics, or to assess the impact of changes in macroeconomic conditions, like the Great Recession, on the food insecurity entry and persistence.

Economic resources are among the most important determinants of food insecurity. About half of households with very low food security among children have below-poverty level family incomes (Coleman-Jenson et al. 2011). Transitions into and out of food insecurity are associated with changes in income or poverty status (Heflin and Butler Forthcoming; Heflin, Corcoran, and Siefert 2007; London and Scott 2005; Ribar and Hamrick 2003). Food hardship is particularly sensitive to short-term poverty spells, as well as long-term poverty spells (Iceland and Bauman 2007). The overlap between children's food insecurity and poverty is only partial. About one-quarter of the households with very low food security among children have incomes above 185% of the poverty line. Conversely, most poor children live in food secure households (Cook and Frank 2008). One important explanation for the relative weakness of this relationship is that changes to family incomes may precipitate food insecurity, even among families whose earnings are generally above poverty levels. Negative income shocks—combined with limited savings—are important predictors of food insufficiency and food security transitions, even after controlling for average income (Gundersen and Gruber 2001; Gundersen, Kreider, and Pepper

2011; Heflin et al. 2007; Heflin, London, and Scott 2011; Heflin 2006; Iceland and Bauman 2007; Leete and Bania 2009; Ribar and Hamrick 2003). Changing economic need, measured by the number of children and adults in the household, is also associated with food security transitions (Heflin and Butler Forthcoming; Heflin et al. 2007; Hernandez and Pressler 2012; London and Scott 2005).

In addition to economic resources, food insecurity is related to children's demographic characteristics. Children in single-parent families are at greater risk of being food insecure than children with married parents, while children with cohabiting parents fall in-between (Coleman-Jenson et al. 2011; Cook and Frank 2008; Kennedy and Fitch 2012; Manning and Brown 2006). Black and Hispanic children have higher food insecurity rates than White non-Hispanic children (Coleman-Jenson et al. 2011). More limited evidence suggests that these disadvantaged groups are also more likely to become and remain food insecure (London and Scott 2005; Ribar and Hamrick 2003). Food insecurity is more common in the Southern and Western U.S. and in central cities (Bartfeld and Dunifon 2006; Coleman-Jenson et al. 2011).

Our paper significantly supplements these studies by making use of *longitudinally linked* data from the Food Security Supplement (FSS) to the Current Population Survey (CPS). The large, nationally-representative CPS samples are ideal for studying trends in food insecurity, including during the Great Recession. By linking across FSS-years, our study provides critical data and trends on the extent of poverty and other characteristics of children experiencing prolonged food insecurity. Because the CPS is continuously fielded, our study provides an important benchmark for studying trends in children's food security going forward.

Research questions

Our paper will address the following questions:

- What percentage of children transition into very low food insecurity among children during a one-year period? What percentage of children who experience very low food insecurity in one year persist in that status the next year?
- Which socioeconomic and demographic groups of children are most at risk of entering food insecurity, which are most likely to leave that status, and which are most likely to persist in that status across consecutive years?
- What is the impact of changes in income, poverty status, and employment on children's chances of entering, exiting, and persisting in food insecurity?
- What is the impact of changes in family structure on children's chances of entering, exiting, and persisting in food insecurity?
- What is the impact of the Great Recession on entry, exit, and persistence of food insecurity among children?

Data and methods

Data

Our primary data source is the 2001-2010 Food Security Supplement (FSS) to the Current Population Survey (CPS) now available from IPUMS-CPS.² The FSS is the source of annual data on household and child food security in the United States, with data each year on about 25,000 children under age 18. The food security questions are shown in the Appendix. The FSS includes a categorical indicator of family income; measures of federal food and nutrition program participation; information on family members' labor force statuses, educational attainments, and demographic characteristics; and household geographic information. Household rosters are updated monthly and can be used to capture changes in family composition over time.

Our analysis takes advantage of the infrequently used longitudinal design of the CPS, in which members of sampled housing units are interviewed 8 times across 16 months. By design, half of all individuals who are interviewed in one December FSS are eligible to be interviewed in the December FSS the following year. We use CPS FSS files that have been linked across adjacent Decembers to cross-classify children's very low and low food security status in

² Prior to 2001, the FSS survey administration month changed yearly and linking across year is not possible.

consecutive years between 2001 and 2010 and to identify the characteristics of children most at risk of entering and remaining in food insecurity statuses in those years. These files are in development as part of the IPUMS-CPS project at the Minnesota Population Center (MPC) (Drew, Flood, and Warren 2013).

Measures

Food insecurity: Food insecurity in the CPS is measured at the household level and is based on responses to 10 questions about the food consumption of adults in the household and the household food budget and 8 questions about children’s food consumption.³ These questions are listed in the Appendix. Our analyses use the following USDA-defined categories of food insecurity:

- Low household food security: indicates “reduced quality, variety, or desirability of diet” (3-7 food insecure conditions in households with children)
- Very low household food security: indicates food intake of at least one household member was reduced or their eating patterns were disrupted (8+ food insecure conditions reported in households with children)
- Low food security among children: reduced quality, variety, or desirability of children’s diet (2-4 child food insecure conditions reported)
- Very low food security among children: indicates that the food intake of children was reduced or eating patterns disrupted at some point during the year (5+ child food insecurity conditions reported)

Social and demographic characteristics: children’s age, family structure (married, cohabiting, single) and size, race/ethnicity and parental education. Parental education is reported as the maximum education for children living with two parents; the household head’s education is used when a child lives with no parents.

Economic resources:

³ Households with incomes above 185% of the poverty line are asked two screening questions and if they report no food access problems, they are skipped out of the remaining questions and assumed to be food secure.

- Income is a categorical measure that is collected in interview months 1 and 5, or up to 3 months before the December FSS. It includes the income of all persons related to the householder from the 12 months prior to that interview.
- We calculate income-to-needs, or poverty status, based on the mid-point of the income category and the poverty thresholds for the family size of persons related by blood or marriage. We then categorize households as below the poverty line for their family size, 100-133% of poverty, 133-185%, and above 185% of poverty.

Analytic strategy

We cross-classify children's food security status in consecutive Decembers. Using these cross-classifications, we describe the rate at which children transition into very low food security status, the rate at which they persist in that status over time, and the rate at which they exit that status. We do this for adjacent Decembers between 2001 and 2010. Next, we produce separate cross-tabular estimates for groups defined by the demographic and socioeconomic characteristics of children and families. Because our dependent variable is measured at the household level, our analyses are either conducted with the household as the unit of analysis or adjust for the clustering of children within households.

To address sample attrition, our estimates are weighted using post-stratification raking weights that adjust the linked sample to be representative of the population as a whole based on based on the geographic region, gender, age, educational attainment, race and ethnicity, marital status, and the presence of children in the household (Izrael, Hoaglin, and Battaglia 2004).

We then estimate multivariate logistic models predicting (1) transitions *into* very low food security by Year 2 among children who were food secure in Year 1 and (2) transitions *out* of very low food security by Year 2 among children who were very low food secure in Year 1. These models include the socioeconomic and demographic characteristics of children and their families as covariates, and will allow us to assess whether food security transitions vary significantly across demographic and socioeconomic subgroups. For these analyses, we pool observations across years and include temporal covariates that will allow us to make inferences about change over time in rates of movement into and out of very low food security status. Among other things, this allows us to examine how persistence and change in very low food security status changed during the Great Recession.

To assess the impact of changes in income and in economic needs, we will estimate a fixed effect model of persistence and change in food security status. This model will effectively account for all unobserved and unchanging attributes of families and households that might induce spuriousness in associations described above. It allows us to examine the impact of *changes* across adjacent years in poverty status, in family income, and in parents' employment statuses, and in family structure on child hunger. Our models adjust for the clustering of children within the household.

Results

Table 1 presents linking rates and sample sizes across consecutive Food Security Supplements (FSS) between 2001 and 2010. This sample includes households that first participated in the FSS in the years 2001-2009 and were (by design) eligible to participate in the FSS in the following year (2002-2010). Links are based on the longitudinal identifiers in

development at the MPC and require an exact match on sex and a match within one year of expected age. The first column presents the percent of households that participated in the FSS in Year 1 that completed the December basic monthly employment survey. The second column reports the percent that also completed the FSS in Year 2. The final column reports the number of households with children that match in two consecutive FSS.

[Table 1 here]

Sample attrition can occur at two points. First, when respondents are recruited for the basic monthly employment survey, respondents may be lost to follow up either because they have moved or do not respond to the survey. In addition, about 15 percent of December basic monthly respondent refuse to answer the FSS supplement after completing the basic monthly survey. We matched 67% of eligible households with children in the following FSS; most of the attrition occurs at the time of the basic monthly survey where 76% of households match. FSS match rates were higher in food secure households (68%) than in households with low and very low food security among children (53-57%). The differential attrition among food insecure households occurs almost entirely from loss to follow-up to the basic monthly and appears to be largely unrelated to the FSS itself. The estimates in Table 1 are unweighted; all subsequent analyses uses weights that adjust for sample attrition.

Food Security Transitions

Using our linked sample, we next estimate the probability that a child in a food secure household in Year 1 would enter low food security by Year 2. We also estimate the probability that child in a food secure or low food security household would enter into very low food security. Table 2 Panel A presents the cross-tabulation of food security statuses across two

consecutive years for the period 2001-2010 and demonstrates that food insecurity is a persistent state for many children.

[Table 2 here]

On average between 2001 and 2010, of households classified as food secure among children in first year, 5% transitioned into low food security among children and 0.3% transitioned into very low food security among children. Among households with low food security among children at their first interview, 62% transitioned out of food insecurity by the next year, 34% remained in low food insecurity, while the remaining 4% transitioned into deeper food hardship. Only 32% households with very low food security among transitioned out of food insecurity entirely by the second year, while about 19% remained in very low food security.

Next, for households with a given food security status at the second interview, we examine the distribution of initial food security statuses. (See Panel B of Table 2). Of households that were very low food secure among children in Year 2, 39% were food secure in Year 1, while 42% were low food secure and 19% were very low food secure. Thus, although it unusual for households to experience multiple consecutive years of *very low food security* among children, households experiencing very low food security commonly experience two consecutive years of *food insecurity* among children.

Trends in Food Security Entry and Persistence

Figure 1 shows the trends in these probabilities of newly entering food insecurity between 2001 and 2010. There was a marked increase (near doubling) of the likelihood that a household with children newly enters both low food security and very low food security among children after 2007, when the Great Recession began.

Table 3 repeats the analysis shown in Panel A of Table 2 separately for households first interviewed in 2001-2006 and 2007-2009. Before the recession, about half of households experiencing very low food security among children transitioned into food security by the second interview. This had decreased to just 34% by the recession/recovery period. Thus, it became significantly more difficult for households experiencing very low food security among children to escape food insecurity entirely during the recession.

[Figure 1 here]

[Table 3 here]

Demographic and Socioeconomic Differentials

The probability of entering into and exiting from food insecurity varies widely by children's socioeconomic and demographic characteristics (see Table 4). Note, the first column of this table combines low and very low food insecurity among children, while the second column examines only very low food security among children. Estimates here are presented from the perspective of the child, rather than the household.

[Table 4 here]

The socioeconomic results are striking and in the expected direction. Among children in a household with below-poverty income, 18 percent newly entered in food insecurity among children the next year. Of these, 2 percent entered into very low food security. Children with near poverty incomes also have high rates of food in security entry: 10-15 percent of children, with household incomes between 100-185% poverty entered into food insecurity, including 1 percent entering into very low food security among children. For children in middle income families, entry rates are much lower, 3 percent and 0.2 percent respectively. Educational differences are also quite large. Among children whose parents have less than a high school

degree, 15 percent newly entered food insecurity and over 2 percent entered very low food insecurity.

We find large differences by family structure and race and ethnicity. Just 4% percent of the children of married parents entered into child food insecurity, compared to 11% and 12% of children in cohabiting and single-parent families respectively. Living with a grandparent is protective for children in single-parent families. Black, Hispanic, and American Indian children have elevated food insecurity incidence risks compared to Non-Hispanic White children. African-American children have particularly high rates, nearly 2 percent, of entry into very low food security.

Finally, we examine differences in the rates of persisting in low or very low food insecurity by family structure, socioeconomic status, and race and ethnicity. In general more disadvantaged groups—those most likely to enter food insecurity—appear more likely to persist in food insecurity across two consecutive years. We see this across family structure (single parents vs. married parents), parental education (between college graduates and everyone else), income-to-needs, and race. The one exception is for Hispanics who are more likely to exit food security than non-Hispanics. However, a significant minority of children experience multiple years of childhood food insecurity even in advantaged families: 36% of children with married parents and 34% of children with a college-educated parent(s) will remain in a household with low or very low food security among children in two consecutive years (compared to 40% of the population as a whole).

Note that the characteristics we show in Table 3 reflect those of the family at the first interview. Families earning more than 185% of the poverty line who enter into food insecurity the following year may in fact have experienced a decline in income by the following year.

Likewise, a two-parent family could experience parental separation between the two interviews. Our multivariate analyses address these changes in family structure and income that can impact food insecurity dynamics.

Multivariate results

As discussed earlier, we first use logistic regression models to examine the relationship between unchanging characteristics of children and their families and their chances of entering into and persisting in very low food insecurity. We also compare the pre-recessionary and recessionary periods to gauge the impact of the recession on child hunger. Finally, we turn to fixed effects models to estimate the impact of changes in family economic circumstances and living arrangements on child hunger.

Table 5 presents the results of models predicting entry into very low food security among children who were either food secure or low food secure during the first interview. Model 1 includes key social and demographic indicators, but excludes measures of income and employment. Older children are most at risk of having their household become very low food secure as are those whose parents have less than a high school degree. Family structure and race differences are large and consistent with the descriptive statistics. And we find a strong period effect—the risk of entering into very low food insecurity increased significantly after 2006. These findings are robust to the inclusion of income and employment controls from Year 1 (Model 2) and Year 2 (Model 3).

In contrast, we find few significant differences in the likelihood that children will exit very low food insecurity (see Table 6). In Model 1, which does not control for income, older children are less likely to exit than younger children. Children with single mothers are more likely exit than children with married parents. (This finding, however, does not hold up in

univariate statistics, and only appears after controls for parental education). Although Asians and Pacific Islanders appear less likely to exit very low food insecurity, the number of cases is extremely small. These results in Model 1 generally persist after including controls for income and employment in both waves. Lower income families are much less likely to exit very low food insecurity among children.

Finally, Table 7 presents results from a fixed effects model estimating changes in very low food security status among children. This model estimates the impact of changes in income-to-needs, in employment, and in family structure on very low food security among children. In doing so, it controls for all unchanging and unobserved characteristics of children and families that place them at risk of entering into food insecurity.

Changes in economic circumstances were strong predictors of changes in very low food security among children. An increase in the number of adults working full time decreased the likelihood that a child would experience child hunger ($p < .10$), while incomes below and near poverty were both associated with increased likelihoods of entering into very low food security among children. Changes in household composition also affected child food security. An increase in the number of children in the household was associated with an increased likelihood of entering very low food security among children. Parent union dissolution, however, did not have a significant impact on food insecurity.

Receipt of SNAP Benefits

A systematic analysis of the impact of policy on child food insecurity is beyond the scope of this paper. However, it is worth examining whether the children who experience multiple years of very low food insecurity are receiving benefits from the Supplemental Nutrition

Assistance Program. In fact, many do not; just 52 percent of households received SNAP benefits at some point in the year prior to their first interview and 46 percent in the year prior to their second interview; this varied from nearly 70% of families with incomes below poverty to about 30 percent of families with incomes above 185% of poverty in the past year. SNAP receipt increased between the pre-recession and recession/recovery period due to the expansion of SNAP benefits under the American Recovery and Reinvestment Act of 2009 (ARRA).

Discussion

Unlike most longitudinal data on food security, the CPS provides nationally representative and up-to-date data on the dynamics of children's food insecurity. These annual data will allow scholars to track important trends over time. In our analysis of the decade, we find both promising and disturbing news about food insecurity. Extreme food insecurity, measured by very low food security among children, is extremely rare; in most years, only about half of one percent of households with children newly enters this most at-risk status. Only about 20 percent of households experiencing very low food security among children persist in this status for two consecutive years. Many children in very low food security households, however, continue to face food security problems. Less than half of the children experiencing the most severe forms of food hardship (skipping meals, reduced quantity of food served, going hungry) are able to exit food security entirely within one year. We also find that the Great Recession exacerbated food security problems. During the Great Recession, the percent of children in households with very low food security among children peaked at one percent (twice the percentage prior to the recession). Moreover, the Great Recession decreased the probability that households experiencing very low food security were able to become food secure a year later.

We find expected but troubling results when examining the correlates and determinants of food insecurity transitions; children from disadvantaged backgrounds face more food security problems than those with other advantages. There are large differences by socioeconomic status, family structure, and race and ethnicity in the likelihood that a child will enter and exit from food insecurity. Income and employment shocks predict entry into very low food insecurity among children. Children whose parents have less than a high school degree, with family incomes below poverty, or who are African American have the highest risks, about a 2 percent chance of entering into very low food security the following year. The differences in exiting food security are smaller – perhaps reflecting the selectivity of those who become food insecure. Nevertheless, more disadvantaged families typically have more difficulty exiting low food security. Finally, our fixed effects models show that income and employment shocks are important determinants of changes in food security status. This may have become particularly important during the Great Recession, as it became more difficult for families to adjust their budgets by selling their homes and moving to more affordable housing.

These results provide important information on the frequency at which children experience food insecurity. A two percent risk in a single year is quite small, but over childhood, can accumulate to a more substantial risk of exposure to child hunger. The CPS data will also us to continue to monitor these risks.

Conclusion

Child hunger is a rare and generally short-lived, but a substantial minority of children, about 20 percent, experience multiple years of child hunger. An even larger group of children cycle between low food insecurity and very low food security status. When analyzing

persistence, we find that about half of the households that enter very low food insecurity were low food insecure the previous year. We also find that about half of the households that exit very low food insecurity continue to experience low food insecurity at the time of the second interview. Thus, there is a critical population of children exposed to multiple years of food insecurity including at least one in which their food intake was limited or disrupted. This population grows even larger if we include the children who experience multiple years of low food security.

Like prolonged poverty, persistent food insecurity appears to be particularly consequential for child well-being (Ryu and Bartfeld 2012). Our study identifies broadly the children and families most at risk of entering and persisting in food insecurity. The children most at risk are those in households who are already experiencing low food security; about 4 percent of these children will experience very low food insecurity the next year. Our results point to the importance of further research on the causes and consequences of persistent food insecurity.

Bibliography

- Alaimo, Katherine, Christine M. Olson, and Edward A. Frongillo. 2001. "Food Insufficiency and American School-Aged Children's Cognitive, Academic, and Psychosocial Development." *Pediatrics* 108(1):44–53.
- Alaimo, Katherine, Christine M. Olson, and Edward A. Frongillo. 2002. "Family Food Insufficiency, but Not Low Family Income, Is Positively Associated with Dysthymia and Suicide Symptoms in Adolescents." *The Journal of Nutrition* 132(4):719–725.
- Bartfeld, Judi, and Rachel Dunifon. 2006. "State-level Predictors of Food Insecurity Among Households with Children." *Journal of Policy Analysis and Management* 25(4):921–42.
- Bronte-Tinkew, Jacinta, Martha Zaslow, Randolph Capps, Allison Horowitz, and Michelle McNamara. 2007. "Food Insecurity Works through Depression, Parenting, and Infant Feeding to Influence Overweight and Health in Toddlers." *The Journal of Nutrition* 137(9):2160–2165.
- Coleman-Jenson, Alisha, Mark Nord, Margaret Andrews, and Steven Carlson. 2011. *Household Food Security in the United States, 2010*. Washington, DC: U.S. Dept. of Agriculture, Economic Research Service. Retrieved (<http://www.ers.usda.gov/Publications/err108/err108.pdf>).
- Coleman-Jenson, Alisha, Mark Nord, Margaret Andrews, and Steven Carlson. 2012. *Household Food Security in the United States, 2011*. Washington, DC: U.S. Dept. of Agriculture, Economic Research Service. Retrieved (<http://www.ers.usda.gov/publications/err-economic-research-report/err141.aspx>).
- Cook, John T., and Deborah A. Frank. 2008. "Food Security, Poverty, and Human Development in the United States." *Annals of the New York Academy of Sciences* 1136(1):193–209.
- Drew, Julia A. Rivera, Sarah Flood, and John Robert Warren. 2013. *Making Full Use of the Longitudinal Design of the Current Population Survey: Methods for Linking Records Across 16 Months*. Minneapolis, MN: University of Minnesota.
- Duncan, Greg J., Jeanne Brooks-Gunn, and Pamela Kato Klebanov. 1994. "Economic Deprivation and Early Childhood Development." *Child Development* 65(2):296–318.
- Gundersen, Craig, and Joseph Gruber. 2001. "The Dynamic Determinants of Food Insecurity." Pp. 92–110 in *Second Food Security Measurement and Research Conference*, vol. II, *ERS Food Assistance and Nutrition Report*, edited by Margaret Andrews and Mark Prell. USDA.
- Gundersen, Craig, Brent Kreider, and John Pepper. 2011. "The Economics of Food Insecurity in the United States." *Applied Economic Perspectives and Policy* 33(3):281–303.
- Heflin, Colleen M. 2006. "Dynamics of Material Hardship in the Women's Employment Study." *Social Service Review* 80(3):378–97.

- Heflin, Colleen M., and J. S. Butler. Forthcoming. "Why Do Women Enter and Exit from Material Hardship?" *Journal of Family Issues*.
- Heflin, Colleen M., Mary E. Corcoran, and Kristine A. Siefert. 2007. "Work Trajectories, Income Changes, and Food Insufficiency in a Michigan Welfare Population." *Social Service Review* 81(1):3.
- Heflin, Colleen M., Andrew S. London, and Ellen K. Scott. 2011. "Mitigating Material Hardship: The Strategies Low-Income Families Employ to Reduce the Consequences of Poverty." *Sociological Inquiry* 81(2):223–46.
- Hernandez, Daphne C., and Emily Pressler. 2012. "Maternal Union Transitions and Household Food Insecurity: Differences by Race and Ethnicity." *Journal of Family Issues*. Retrieved September 21, 2012 (<http://jfi.sagepub.com/content/early/2012/06/17/0192513X12449134.abstract>).
- Iceland, J., and K. J. Bauman. 2007. "Income Poverty and Material Hardship: How Strong Is the Association?" *Journal of Socio-Economics* 36(3):376–96.
- Izrael, D., D. C. Hoaglin, and M. P. Battaglia. 2004. "To Rake or Not to Rake Is Not the Question Anymore with the Enhanced Raking Macro." in *Proceedings of the Twenty-Ninth Annual SAS Users Group International Conference*. Retrieved January 7, 2013 (<http://www.abtassociates.com/attachments/torakeornottorake.pdf>).
- Jyoti, Diana F., Edward A. Frongillo, and Sonya J. Jones. 2005. "Food Insecurity Affects School Children's Academic Performance, Weight Gain, and Social Skills." *The Journal of Nutrition* 135(12):2831–2839.
- Kennedy, Sheela, and Catherine A. Fitch. 2012. *Children's Economic Well-being During the Great Recession*. Minneapolis, MN: University of Minnesota. Retrieved (<http://www.pop.umn.edu/sites/www.pop.umn.edu/files/Working%20Paper%202012-01.pdf>).
- Korenman, Sanders, Jane E. Miller, and John E. Sjaastad. 1995. "Long-term Poverty and Child Development in the United States: Results from the NLSY." *Children and Youth Services Review* 17(1–2):127–55.
- Leete, Laura, and Neil Bania. 2009. "The Effect of Income Shocks on Food Insufficiency." *Review of Economics of the Household* 8(4):505–26.
- London, Andrew S., and Ellen K. Scott. 2005. *Food Security Stability and Change Among Low-Income Urban Women*. Chicago: University of Chicago. Retrieved (http://harrisschool.uchicago.edu/about/publications/working-papers/pdf/wp_05_03.pdf).
- Manning, Wendy D., and Susan L. Brown. 2006. "Children's Economic Well-Being in Married and Cohabiting Parent Families." *Journal of Marriage and the Family* 68(2):345–62.

- Mayer, Susan E., and Christopher Jencks. 1989. "Poverty and the Distribution of Material Hardship." *The Journal of Human Resources* 24(1):88–114.
- Nord, Mark. 2009. *Food Insecurity in Households with Children: Prevalence, Severity, and Household Characteristics*. Washington, DC: U.S. Dept. of Agriculture, Economic Research Service. Retrieved (http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CCMQFjAA&url=http%3A%2F%2Fwww.ers.usda.gov%2Fpublications%2Ffeib56%2Ffeib56.pdf&ei=bZAcT9PwHZDmgge9nsWpDA&usg=AFQjCNE86DY46_bInjiJxzA-wHIZy7rLnA&sig2=pQohl4Sta5OtlMxBE8GAtw).
- Ribar, David C., and Karen S. Hamrick. 2003. *Dynamics of Poverty and Food Sufficiency*. USDA.
- Ryu, Jeong-Hee, and Judith S. Bartfeld. 2012. "Household Food Insecurity During Childhood and Subsequent Health Status: The Early Childhood Longitudinal Study—Kindergarten Cohort." *American Journal of Public Health* 102(11):e50–e55.
- Skalicky, Anne et al. 2005. "Child Food Insecurity and Iron Deficiency Anemia in Low-Income Infants and Toddlers in the United States." *Maternal and Child Health Journal* 10(2):177–85.
- Weinreb, Linda et al. 2002. "Hunger: Its Impact on Children's Health and Mental Health." *Pediatrics* 110(4):e41.
- Winicki, Joshua, and Kyle Jemison. 2003. "Food Insecurity and Hunger in the Kindergarten Classroom: Its Effect on Learning and Growth." *Contemporary Economic Policy* 21(2):145–57.

Table 1. Number and Percent of Children Linked Across Consecutive Food Security Supplements (FSS) by Food Security Status, 2001-2010

	Linked households (Year 2)		
	% linked in Basic Monthly	% linked in FSS	N FSS links (households)
Overall	76%	67%	44,297
<i>Household FS status (Year 1)</i>			
Secure/marginal	78%	69%	37,716
Low food secure	67%	59%	4,971
Very low food secure	62%	53%	1,610
<i>Children's FS status (Year 1)</i>			
Secure/marginal	77%	68%	40,897
Low food secure	66%	57%	3,149
Very low food secure	63%	53%	251

Table 2. Transitions among Food Security Transitions, 2001-2010

Food Security Year 1	Food security Year 2						
	Panel A (column %)			Total	Panel B (row %)		
	Secure	Low	VLFS		Secure	Low	Very Low
<i>Household food security</i>							
Secure	91.2	7.2	1.7		89.8	51.0	33.1
Low	56.5	34.0	9.5		8.6	37.6	29.5
Very low	31.1	31.7	37.2		1.6	11.4	37.4
<i>Childhood food security</i>							
Secure	94.6	5.1	0.3		94.1	60.0	39.4
Low	62.0	34.2	3.7		5.6	36.6	42.3
Very low	42.2	38.5	19.3		0.3	3.5	18.3

Table 3. Transitions among Food Security Transitions, 2001-2007 and 2007-2010

Food Security Year 1	Food security Year 2						
	2001-2007			Total	2007-2010		
	Secure	Low	VLFS		Secure	Low	Very Low
<i>Household food security</i>							
Secure	92.0	6.7	1.4		94.0	5.4	0.6
Low	57.6	33.4	9.0		54.2	35.1	10.6
Very low	31.8	32.8	35.4		30.2	30.0	39.8
<i>Childhood food security</i>							
Secure	94.9	4.9	0.2		94.0	5.4	0.6
Low	62.4	34.5	3.1		61.4	33.7	4.9
Very low	49.1	35.2	15.7		34.3	42.3	23.3

Table 4. Percent of Children who Enter into or Persist in Food Insecurity among Children across Two Consecutive Years

	<i>Newly entering (%)</i>		<i>Persisting in (%)</i>
	Low/very low	VLFS only	Low/very low
Overall	6.3	0.7	40.3
<i>Socioeconomic status</i>			
Income to needs ratio (Y1)			
< 100%	18.1	2.1	45.3
100-133%	14.0	0.7	40.3
133-185%	10.3	0.9	35.6
> 185%	2.6	0.2	30.2
Unknown	4.9	0.9	34.7
Parent education			
< HS	15.2	2.4	39.7
HS degree	9.2	0.8	41.4
Some coll	6.9	0.7	42.0
Coll	1.9	0.1	33.7
<i>Family Structure</i>			
Married	4.1	0.4	35.5
Cohab	10.6	1.7	40.5
Single	12.2	1.5	45.5
Other	9.5	1.2	38.0
Lives with Grandparent			
Yes	8.7	1.3	37.3
No	6.2	0.7	40.6
Yes (single parent)	8.1	1.1	36.2
No (single parent)	12.8	1.5	46.6
<i>Race/Ethnicity</i>			
American Indian	10.5	0.3	39.1
Asian/Pacific Islander	4.1	0.4	35.9
Black	11.8	1.8	44.4
White	3.8	0.3	41.5
Hispanic	11.2	1.2	36.2
<i>Child age</i>			
0-4 year	6.3	0.5	36.4

5-9	6.7	0.7	40.0
10-14	6.2	0.8	42.3
15-17	5.8	1.0	42.5

Notes: Estimates are calculated for children linked between consecutive years of the December CPS and are based on the longitudinal weights. Food insecurity is defined as low or very low food security among children and is measured at the household level and may not reflect the characteristics of a particular child. Transitions into "low or very low" food insecurity calculated among those who were secure or marginally food secure in year 1; transitions out of "low or very low" food insecurity include those who were low or very low food secure in year 1. Transitions into very low food security are calculated among those who were secure or marginally or low food secure in year 1. Parental education is reported as the maximum education for children living with two parents; the household head's education is used when a child lives with no parents. To maximize sample sizes and ensure consistent race categories over time, we have applied race-bridging techniques to estimate single-race categories for multiple-race children (Liebler & Halpern-Manners 2007).

Table 5. Logistic regression models predicting entry into Very Low Food Security Among Children*

	Model 1			Model 2			Model 3		
	B	SE	P>t	B	SE	P>t	B	SE	P>t
Intercept	-6.05	0.52	***	-6.64	0.52	***	-6.97	0.55	***
Child age(Y1)									
5-9	0.25	0.19		0.29	0.19		0.30	0.19	
10-14	0.52	0.24	*	0.58	0.23	*	0.63	0.23	**
15-16	0.73	0.28	**	0.81	0.28	**	0.90	0.28	**
Parent education (Y1)									
HS grad	-0.95	0.28	**	-0.81	0.28	**	-0.75	0.28	**
Some coll	-0.98	0.31	**	-0.71	0.31	*	-0.60	0.31	+
Coll grad	-2.31	0.42	***	-1.80	0.44	***	-1.46	0.44	**
Race/ethnicity									
American Indian	-0.77	0.75		-0.91	0.74		-0.92	0.73	
Asian/Pacific Isl.	0.32	0.69		0.24	0.69		0.26	0.70	
Black	0.95	0.29	**	0.79	0.30	**	0.72	0.30	*
Hispanic	0.52	0.28	+	0.42	0.28		0.33	0.28	
Family type (Y1)									
Cohabiting	1.05	0.44	*	1.03	0.45	*	0.97	0.44	*
Single parent	0.58	0.24	*	0.38	0.28		0.32	0.27	
Other	0.18	0.48		0.06	0.49		0.00	0.48	
Total # children	0.40	0.17	*	0.25	0.18		0.20	0.17	
Household size	-0.25	0.15		-0.15	0.16		-0.13	0.15	
2007-2010	0.82	0.22	***	0.80	0.21	***	0.74	0.21	***
Total working FT (Y1)				-0.26	0.19		0.00	0.24	
Income to needs (Y1)									
< 100%				1.09	0.40	**	0.42	0.44	
100-133%				0.40	0.42		-0.27	0.47	
133-185%				0.91	0.38	*	0.38	0.45	
Unknown				0.86	0.38	*	0.50	0.42	
Total working FT, Y2							-0.31	0.20	
Income to needs (Y2)									
< 100%							1.31	0.42	**
100-133%							1.45	0.44	**
133-185%							1.08	0.47	*
Unknown							0.37	0.47	

*Models control for the clustering of children within household.

Table 6. Logistic regression models predicting exit from Very Low Food Security Among Children*

	Model 1			Model 2			Model 3		
	B	SE	P>t	B	SE	P>t	B	SE	P>t
Intercept	1.45	0.82	+	1.76	0.89	*	3.36	1.20	**
Child age(Y1)									
5-9	-0.13	0.44		-0.14	0.43		-0.21	0.48	
10-14	-0.35	0.43		-0.38	0.43		-0.46	0.46	
15-16	-1.00	0.47	*	-1.00	0.50	*	-1.08	0.55	*
Parent education (Y1)									
HS grad	-0.46	0.66		-0.54	0.60		-0.60	0.60	
Some coll	-0.01	0.65		-0.03	0.64		-0.19	0.61	
Coll grad	0.74	0.93		0.65	0.95		-0.24	0.98	
Race/ethnicity									
American Indian	-0.34	1.11		-0.35	1.04		0.40	1.12	
Asian/Pacific Isl.	-1.94	0.87	*	-2.02	0.90	*	-2.03	0.85	*
Black	-0.09	0.49		-0.08	0.50		-0.06	0.52	
Hispanic	0.41	0.46		0.39	0.47		0.57	0.52	
Family type (Y1)									
Cohabiting	0.65	0.97		0.61	1.00		0.46	1.15	
Single parent	0.85	0.42	*	0.85	0.44	+	0.96	0.46	*
Other	-0.54	0.66		-0.58	0.65		-0.46	0.71	
Total # children	0.35	0.24		0.31	0.25		0.45	0.26	+
Household size	0.02	0.19		0.08	0.20		0.06	0.21	
2007-2010	-0.64	0.39		-0.66	0.37	+	-0.73	0.38	+
Total working FT, Y1				-0.26	0.37		-0.45	0.35	
Income to needs (Y1)									
< 100%				-0.34	0.52		0.33	0.66	
100-133%				-0.43	0.65		0.17	0.81	
133-185%				-0.30	0.74		0.17	0.79	
> 185%				0.03	0.73		0.63	0.85	
Unknown									
Total working FT, Y2							-0.14	0.35	
Income to needs (Y2)									
< 100%							-2.53	0.84	**
100-133%							-1.43	0.88	
133-185%							-1.91	0.68	**
> 185%							-1.81	1.07	+
Unknown									

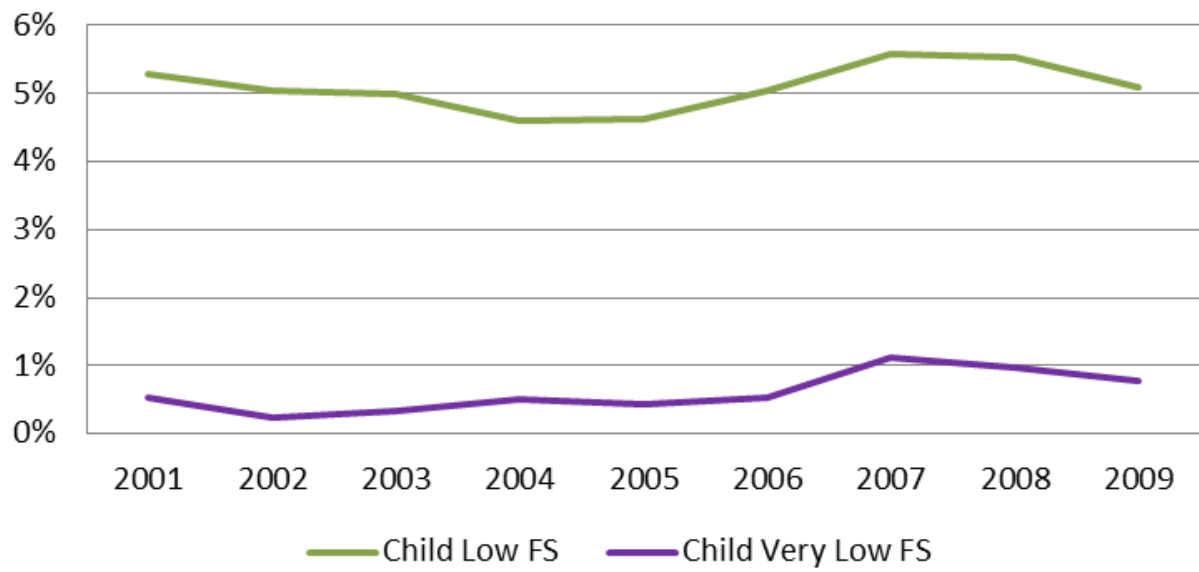
*Models control for the clustering of children within household.

Table 7. Fixed Effect Model of Changes in Very Low Food Security Status Children Status (Linear Probability Model) *

	B	SE	P>t
Intercept	0.008	0.010	
Child age(Y1)	0.000	0.000	
Married/Cohabiting	-0.004	0.004	
Total # children	0.003	0.001	*
Household size	0.000	0.001	
Total working FT	-0.001	0.000	+
Income to needs			
< 100%	0.004	0.002	*
100-133%	0.003	0.001	+
133-185%	0.001	0.001	
Unknown	-0.001	0.001	

*Model controls for the clustering of children within household.

Figure 1. Annual probability of entering into food insecurity among children: 2001-2010



Appendix. Current Population Survey Food Security Questions

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?

(Questions 11-18 were asked only if the household included children age 0-17)

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)