Applied Economic Perspectives and Policy (2018) volume 40, number 1, pp. 119–135.
doi:10.1093/aepp/ppx058

Submitted Article

Food Insecurity Research in the United States: Where We Have Been and Where We Need to Go

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Submitted 22 April 2017; editorial decision 3 December 2017.

Abstract *Food insecurity is now recognized as a major health crisis in the United States. This is due to the size of the problem – more than 42 million persons were food insecure in 2015 – as well as the multiple negative health outcomes and higher health care costs attributable to food insecurity. An extensive body of literature from multiple fields has examined the causes and consequences of food insecurity and the efficacy of food assistance programs – especially the Supplemental Nutrition Assistance Program. We review this literature and provide suggestions for future research directions. We suggest examining the distribution of food insecurity within households, the impact of the food distribution system on food insecurity, the coping mechanisms of low-income food secure families, food insecurity among American Indians, the effects of charitable food assistance, the causal relationship between food insecurity and health outcomes, the declining age gradient in food insecurity among Seniors, the effects of labor force participation and the Great Recession on food insecurity, and the long-term consequences of food insecurity. In addition, the impact of two recent policy recommendations on food insecurity – the minimum wage and the Affordable Care – Act should be considered.*

Key words: Food insecurity, hunger, poverty, Supplemental Nutrition Assistance Program (SNAP), Food Stamp Program, National School Lunch Program, School Breakfast Program.

JEL codes: I13, I31, D12.

Food insecurity in the United States is defined as a household-level economic and social condition of limited access to food. In 2016, 12.9% of all persons (41 million) in the United States lived in food-insecure households

(Coleman-Jensen et al. 2017), which is roughly similar in scale to the number of persons living in poverty. However, the reasons for food insecurity extend well beyond poverty to also include low assets, low human capital, low physical and mental functioning, among others. Food insecurity is associated with numerous negative health outcomes across the age gradient, and as such has emerged as arguably the leading nutrition-related health care issue in the United States (Gundersen and Ziliak 2014).

In response to the challenge of food insecurity, an array of food assistance programs have been developed and, consequently, have become an important part of the social safety net. But the role of these programs, especially the Supplemental Nutrition Assistance Program (SNAP, formerly known as the Food Stamp Program), has increased over the past 20 years as non-food assistance programs have declined. The four largest programs, SNAP, the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), the free- and reduced-price National School Lunch Program (NSLP), and the free- and reduced-price School Breakfast Program (SBP), have a combined budget of almost $100 billion.

Alongside the widening recognition of the importance of alleviating food insecurity and the role of food assistance programs in meeting this goal, an extensive body of literature has emerged. (In this article we concentrate on food insecurity in the United States; food insecurity topics in low-income countries are covered in Martin [2018], found elsewhere in this issue.) We begin by reviewing how food insecurity in the United States is measured, and then we review the causes and consequences of food insecurity. We then turn to a discussion of food assistance programs, with a particular emphasis on SNAP. As we will demonstrate, this has become a mature body of literature and, consequently, many important questions have been addressed from multiple directions. However, there are still a wide array of fundamental questions that are in need of answers, and we conclude by covering several of these.

Measuring Food Insecurity

The measurement of food insecurity in the United States is based on a set of questions from the nationally representative Food Security Supplement, which since 2001 has been distributed each December as part of the Bureau of Labor Statistic's Current Population Survey. The measure consists of 18 questions for households with children and a subset of 10 of these for households without children, with each condition at least in part owing to financial constraints. Some of the conditions are as follows:

- "I worried whether our food would run out before we got money to buy more," (the least severe item).
- "Did you or the other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food?"
- "Were you ever hungry but did not eat because you couldn't afford enough food?"
- "Did a child in the household ever not eat for a full day because you couldn't afford enough food?" (The most severe item for households with children).

Using these 18 questions, households are delineated into the following categories: (*a*) food secure (defined as cases in which all household members had access at all times to enough food for an active, healthy life); (*b*) low

food secure (cases in which at least some household members were uncertain of having, or were unable to acquire, enough food because they had insufficient money and other resources for food); and (*c*) very low food secure (cases in which one or more household members were hungry at least some time during the year because they could not afford enough food). Households responding negatively to two or fewer questions are food secure, those responding affirmatively to three to seven questions are classified as low food secure (three to five questions for households without children), and those responding affirmatively to eight or more questions are classified as very low food secure (six or more for households without children). In most research and policy discussions, the latter two categories of low and very low food secure are combined and called food insecure. In some applications, however, a broader measure of food insecurity is implemented, which classifies households as marginally food insecure if they answer affirmatively to at least one question. For a broader discussion of food insecurity measurement issues, with an emphasis on those used in low-income countries, see Headey and Ecker (2013).

As seen in figure 1, from 2001 to 2007 the food insecurity rate for all individuals was relatively steady at about 12%, and for children at about 17% (Coleman-Jensen et al. 2017). For all groups both with and without children, these rates increased dramatically by 30% or more in 2008 with the onset of the Great Recession, and remained significantly elevated above pre-recession levels until the two most recent years (Coleman-Jensen et al. 2017).

Determinants of Food Insecurity

The distribution of food insecurity is not even across demographic characteristics, income, or geography in the United States. This can be seen in figure 2, which has information on estimated food insecurity rates for all counties from 2014. In some parts of the country, especially the upper Midwest and the Northeast, in the main, food insecurity rates are lower than the national average. In contrast, there are pockets where rates are especially high, including in the Mississippi Delta and Appalachia. Further, reflecting the challenges facing those living on American Indian Reservations, there are isolated counties throughout the country with very high rates. Figure 3 shows a similar picture for households with children. Some counties, especially along the Texas-Mexico border, have rates above 40%. Furthermore, substantially higher rates of food insecurity are found in households with children in comparison to households without children.

Alongside geographic variation, there is substantial variation across economic and demographic categories. In what follows, we do not provide citations to all of the central findings from this research area insofar as, in many cases, multiple papers have investigated the influence of a particular variable, even if it is not the central variable of interest. For example, multiple papers include a standard set of covariates.

Households with lower incomes are consistently found to be more likely to be food insecure. The importance of current income, however, is diminished once assets are considered. Factors that lead to food insecurity include human capital (e.g., lower financial management skills [Gundersen and Garasky 2012] and lower education levels), physical assets (e.g., renting rather than owning a home), and financial assets (e.g., limited savings, lack of access to credit [Fitzpatrick and Coleman-Jensen 2014], sharp changes in

Figure 1. Food insecurity rates by year, 2000–2016

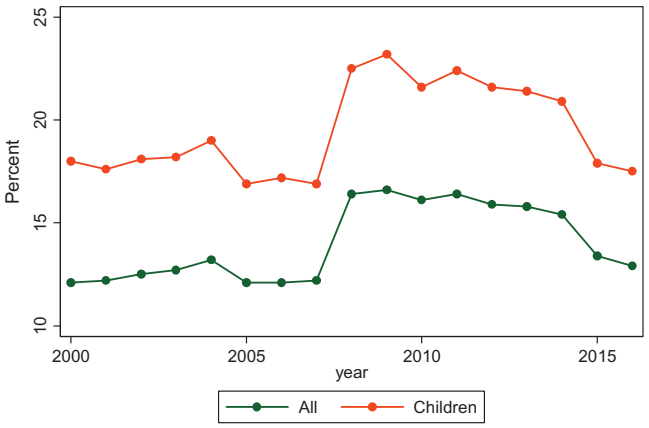
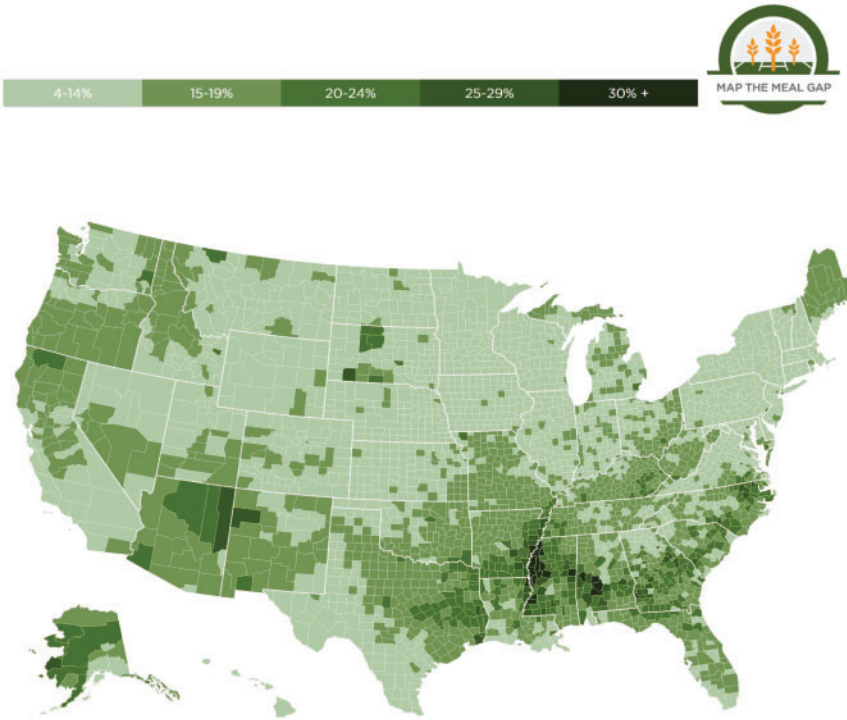
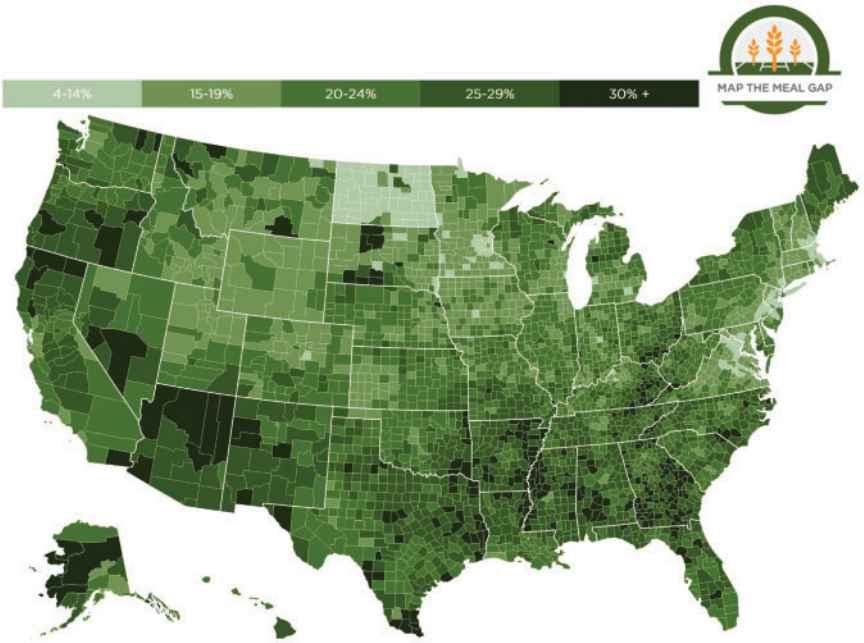


Figure 2. County food insecurity rates, full population, 2014



asset levels). These assets are protective over many dimensions, including in response to negative income shocks, income volatility, and job loss (Ribar and Hamrick 2003; Heflin, Corcoran, and Siefert 2007; Leete and Bania 2010; Gjertson 2016). Along with assets and access to credit, having working teenagers (Hamersma and Kim 2016) and receiving child support (Garasky and Stewart 2007) are protective against food insecurity. As might be expected given their higher real incomes, households that live in areas with lower

Figure 3. County food insecurity rates, children, 2014



food prices (Gregory and Coleman-Jensen 2013) and lower heating costs (Nord and Kantor 2006) are less likely to be food insecure.

Even after controlling for economic resources available to households, the composition of households influences food insecurity. For example, food insecurity rates are higher in the following situations: single-parent households; households with grandchildren present (Ziliak and Gundersen 2016); households with a disabled parent or child (Huang, Guo, and Kim 2010; Burke et al. 2016; Sonik et al. 2016); households with a non-custodial father who does not visit regularly (Nepomnyaschy et al. 2014); households with someone who is currently incarcerated or who has been incarcerated previously (Turney 2015; Cox and Wallace 2016); households at high risk of homelessness (Gundersen et al. 2003); households with an adult smoker (Cutler-Triggs et al. 2008); chaotic households (Fiese et al. 2016); and households with an American Indian (Gundersen 2008).

Health Consequences

Over the past decade, a flurry of studies has found that food insecurity is associated with a wide array of negative health outcomes. As reviewed in Gundersen and Ziliak (2014), this research has found, among children, that food insecurity is associated with increased risks of some birth defects, anemia, lower nutrient intakes, cognitive problems, and aggression and anxiety. Food insecurity is also associated with higher risks of being hospitalized and poorer general health and with having asthma, behavioral problems, depression, suicidal ideation, and worse oral health. For adults, studies have shown that food insecurity is associated with decreased nutrient intakes; increased rates of mental health problems and depression, diabetes,

hypertension, and hyperlipidemia; worse outcomes on health exams; being in poor or fair health; and poor sleep outcomes.

Given the broad spectrum of negative health outcomes associated with food insecurity, it has long been assumed that food insecurity would be positively associated with health care costs. A key challenge in evaluating the truth of this association has been that food insecure households in the United States are less likely to have access to medical insurance. Thus, a paradoxical negative association may exist whereby food insecure households show *lower* health care expenditures because they are not able to access care. In response, recent work has examined the association between food insecurity and health care costs in Canada. Canada is, of course, quite similar to the United States, except that universal health care coverage mitigates the selection issue that occurs in the United States, whereby some food insecure households may also be unable to afford health care and, paradoxically, one could find that being food insecure leads to lower health care costs. Tarasuk et al. (2015) analyzed the health care costs of non-senior adults in the Province of Ontario who were also in the Canadian Community Health Survey (CCHS). The CCHS includes information on food insecurity and other relevant covariates. After adjusting for other factors, total costs were 23% higher for adults in marginally food secure households, 49% higher for those in low food secure households, and 121% higher for those in very low food secure households compared with adults in fully food-secure households. Recent work done using U.S. data has also found substantially higher costs for food insecure households. Namely, Berkowitz et al. (2017) find that households with food insecurity had significantly greater estimated mean annualized healthcare expenditures in comparison to those food secure households—$6,072 versus $4,208. This amounts to $77.5 billion in additional annual healthcare expenditures.

Food Assistance Programs

In response to food insecurity and its attendant consequences, the USDA has established an array of food assistance programs. Alongside these programs specifically designed to reduce food insecurity are other programs that indirectly alleviate food insecurity through reduced food prices (Lusk 2017). In what follows, we cover three of the programs most directly tied to efforts to reduce food insecurity.

Supplemental Nutrition Assistance Program

SNAP began with the Food Stamp Act of 1964. At first, the act allowed counties to decide whether to introduce the program. In 1974, SNAP became a national program available in all counties. Since becoming a national program, SNAP has undergone numerous changes, but its basic structure has stayed the same. Due to the declining importance of other assistance programs as well as increased need, the role of SNAP in the social safety net has increased quite dramatically over the past 20 years (Ziliak 2015). In 2016, more than 44 million people received benefits totaling nearly $66.6 billion. This represents a very large increase from before the Great Recession—in 2007, 33 million participants received $30 billion in SNAP benefits.[1]

[1] *See http://www.fns.usda.gov/sites/default/files/pd/SNAPsummary.pdf.*

Benefits from SNAP can be used to buy food in authorized retail food outlets, of which there are currently over 250,000 in the United States. Benefit levels are directly proportional to family size and inversely proportional to income, with a maximum of $649 for a family of four in 2016.[2] Households are eligible for SNAP if they meet three criteria. First, the gross income test where a household's income (before any deductions) cannot exceed 130% of the poverty line. Some states, however, have set more lenient thresholds and households with at least one senior or a person with a disability do not have to meet this threshold. Second, net income, which is calculated as gross income less certain deductions, cannot exceed the household-size specific poverty line. The allowable deductions include a standard deduction for all households, a 20% earned income deduction, a dependent care deduction when care is necessary for work, training, or education, a child support payments deduction, a medical costs deduction for elderly and disabled people, and an excess shelter cost deduction. This is binding even in states that have set a higher gross income threshold and for households that do not have to meet the gross income test. Third, a household's total assets cannot exceed $2,000; this limit is $3,000 for a household with a senior or disabled member. Most states, however, now elect to waive this test (for more on SNAP, see Bartfeld et al. 2015).

Despite SNAP's potentially high monetary benefits—high enough to have a nontrivial influence on the extent and depth of poverty in the United States (Tiehen, Jolliffe, and Smeeding 2015)—many people who are eligible do not participate. Nonparticipation reflects three main factors.

First, transaction costs can diminish the attractiveness of participation. Such costs include time spent in or traveling to a SNAP office, the burden of transporting children to the office or paying for child care; and the cost of transportation. A household faces these costs repeatedly because it must recertify its eligibility (Ponza et al. 1999). The amount of time between recertification periods varies by state (and within states) based on the characteristics of the household. Though transactions costs might be a way to discourage those in less need from applying for a program, with SNAP the opposite appears to be true: those in most need, as defined by education and income, find it most difficult to navigate the SNAP application process (Currie and Gahvari, 2008). Second, the benefit level can be quite small—for example, for one or two person households, as low as $16 per month. Given the inverse relationship between income and SNAP benefit levels, this explains why, all else being equal, households with incomes closer to the SNAP eligibility threshold are less likely to participate. Third, receiving SNAP may carry a stigma due to a person's own distaste for receiving SNAP, the fear of disapproval from others when redeeming SNAP, and/or a possible negative reaction from caseworkers (see, e.g., Moffitt 1983; Ranney and Kushman 1987; Stuber and Kronebusch 2004; Stuber and Schlesinger 2006; Reutter et al. 2009; Wu and Eamon 2010).

Given that the central goal of SNAP is to alleviate food insecurity, one may wonder why food insecurity rates are substantially higher among SNAP participants. For example, in 2015, SNAP participants had food insecurity rates above 50%, while those with incomes below 130% of the poverty line had food insecurity rates of 24.3% (Coleman-Jensen et al. 2017; see table 8). This result, however, is not surprising insofar as SNAP is designed to

[2] *See https://www.fns.usda.gov/snap/eligibility.*

reach those who are most at-risk of food insecurity. After controlling for this selection into SNAP using a variety of methods ranging from instrumental variables to nonparametric bounds, participants have been calculated to be between 5 and 20 percentage points less likely to be food insecure than nonparticipants (Gundersen et al., 2017). Recent estimates suggest that SNAP results in health care expenditures that are $1,400 less than those of similarly situated non-SNAP households, likely because of reduced food insecurity (Berkowitz et al. 2017).

Given the proven success of SNAP, some have argued for SNAP expansion: an increase in benefit amount and/or eligibility of a wider group of households (Ziliak 2016; Gundersen, Kreider, and Pepper 2018). These arguments emerge because 54% of SNAP-recipient households still report being food insecure, and, out of households ineligible for SNAP but near the eligibility threshold (between 130% and 185% of the poverty line), just over 25% are food insecure.

The maximum SNAP benefit is anchored to the Thrifty Food Plan, or the TFP. The TFP is the lowest-cost plan that the USDA designed to outline the types and quantities of foods—and the attendant costs—that people can purchase and consume at home in order to obtain a nutritious diet. The TFP was first established in 1975, and most recently revised in 2006. Ziliak (2016) highlights the following central problems with the TFP: (*a*) it assumes that households effectively have unlimited time to prepare food at home because it ignores the price of time in home production; (*b*) updates to the TFP are required to maintain constant (in inflation-adjusted terms) cost relative to earlier plans, which means the real benefit today is the same as five decades ago when the program was introduced; (*c*) the TFP is based on the faulty assumption that there are no geographic differences in the cost of food; and (*d*) the survey sample used to construct the TFP is from a highly disadvantaged population, and misses important segments of the SNAP population.

In response to these shortcomings, Ziliak (2016) proposed reforming the TFP by introducing an immediate 20% adjustment for the value of time. Ignoring the cost of time artificially reduces the price of the TFP, and as a result the TFP is inadequate to purchase and prepare its market basket for all but a small fraction of recipients. For a four-person household in fiscal year (FY) 2016, the maximum monthly benefit would increase from $649 to $779. Notably, this still places it 10% lower than the next highest plan produced by the USDA. Ziliak also proposed relaxing the constant-cost requirement across plan updates, introducing geographic cost-of-living adjustments, and encouraged research into new data sources like the USDA's FoodAPS dataset to form the foundation of a revised TFP.

Gundersen, Kreider, and Pepper (2018) take up the problem of inadequate benefits by using a question on the CPS that asks about how much additional income households would need in order to be food secure, that is, the *resource gap* between what a household has and what it needs. Using data from the 2014 CPS, these authors consider the costs and benefits with three scenarios: (*a*) perfect distribution of SNAP benefits based on individuals' resource gaps; (*b*) an across-the-board increase in SNAP benefits; and (*c*) an increase in SNAP benefits based on household size.

The average weekly resource gap is $41.62 for food insecure SNAP households and $30.91 for food insecure households with incomes between 130% and 185% of the poverty line. Under Gundersen, Kreider, and Pepper's (2018) first scenario—the perfect distribution of benefits—there is a 100%

reduction in the food insecurity rate at a cost of $20.1 billion for current SNAP participants and $7.1 billion for currently SNAP-ineligible households. This scenario would be difficult to implement due to the need to fund and construct benefits based on directly reported resource gaps. Moreover, the potential for moral hazard would be present.

The second two scenarios (across-the-board SNAP increase and increase based on household size) are more easily implementable but less effective at reducing food insecurity (because some recipients do not get enough money to be food secure) and more expensive (since some recipients get more benefits than is needed to make them food secure). The reductions in food insecurity under the second and third scenarios for current SNAP recipients are approximately 60% at a cost of roughly $25 billion, rising to about $50 billion with similar coverage if currently SNAP-ineligible households between 130% and 185% of the poverty line are included.

School Meal Programs

The NSLP began in 1946 under the National School Lunch Act, and, since then, there have been relatively minor changes. Today, the NSLP operates in over 100,000 public and nonprofit private schools across the United States. In 2016, more than 30 million students received at least one meal through NSLP and, of these, nearly 22.1 million received free lunches and 2.0 million received reduced-price lunches.[3]

Any child at a participating school is potentially eligible for NSLP (children who are home-schooled or who no longer attend school are not). Among children in participating schools, families with incomes at or below 130% of the poverty level are eligible for free meals, and children with household incomes between 130% and 185% of the poverty level are eligible for reduced-price meals, which cannot cost more than 40 cents.

A few decades after the NSLP, the School Breakfast Program (SBP) began as a pilot program and was permanently authorized in 1975. The SBP is operationally similar to the NSLP, but while almost all schools in the United States serve lunches, only about two-thirds serve breakfasts. In 2016, 14.8 million children participated in the program every day, and 12.6 million received a free or reduced-price meal, suggesting that the SBP reaches a slightly more disadvantaged population than the NSLP.[4]

The benefits associated with receiving free or reduced-price meals through NSLP or SBP are not trivial. At least as defined by the reimbursement costs to schools, lunch for one child every day for a week is worth about $15 (Bartfeld 2015). Still, a high proportion of eligible children do not participate in NSLP or SBP. This can be ascribed to three main factors. First, as with SNAP, receiving free or reduced-price meals can carry a stigma, so some children or their parents may not want to participate. Second, many schools do not serve breakfast and, hence, even eligible children at those schools cannot participate. Third, despite being enrolled, some children, for a myriad of reasons, do not always eat the meals provided. For example, a child might not want the meal served, a parent might decide a meal is not healthy enough, or a child might have already eaten breakfast at home.

[3] *See https://www.fns.usda.gov/sites/default/files/pd/slsummar.pdf.*
[4] *See https://www.fns.usda.gov/sites/default/files/pd/slsummar.pdf.*

Like with SNAP, the true effect of school meal programs on food insecurity is difficult to assess due to the selection problem. Gundersen, Kreider, and Pepper (2012) found that NSLP decreases the prevalence of food insecurity among households with children in school by 2.3 to 9.0 percentage points. The effect is smaller than that for SNAP, but that is only to be expected because NSLP's benefit level, on average, is lower than SNAP's. Artega and Heflin (2014) reach similar qualitative conclusions using different identification strategies. Along with this direct evidence, there is indirect evidence that NSLP reduces food insecurity. Two studies have found that during the summer, when most children do not participate in school meal programs, the extent of food insecurity increases (Currie and Bhattacharya 2001; Nord and Romig 2006). Consistent with these findings, recent work has found that those receiving meals through the Summer Food Service Program are less likely to be food insecure (Miller 2016).

Future Research Directions

The previous sections have demonstrated that the food insecurity literature has become a mature one. This is due, in part, to the numerous contributions made by agricultural economists along with economists, nutritionists, pediatricians, and sociologists, among others. While this is a mature literature, there are, of course, numerous questions that remain and will inform the future direction of the food insecurity research agenda. We now turn to some of these.

How Is Food Insecurity Distributed within a Household? Food insecurity measures are generally defined at the household level rather than for each individual in the household. Some recent work has utilized measures that include questions about food insecurity specifically for children (Connell et al. 2005; Framm et al. 2011; Nalty, Sharkey, and Dean 2013). Child-specific responses can lead to new insights into the food security status of the individual members of the family.

How Does the Food Distribution System Influence Food Insecurity? The United States has an advanced food distribution system that has allowed for lower food prices than are found in other high-income countries. One consequence of this is that food insecurity rates are lower than they otherwise would be for reasons covered above. Given the importance of food prices, research on how to further improve the food distribution system to address food insecurity is worth pursuing over several dimensions. For example, one could examine how the regulatory process impedes the distribution of food from farm to food stores. Or, for example, analyses of how the food distribution system could do a better job at reaching underserved areas are worth pursuing.

What Types of Coping Mechanisms Do Low-income Food Secure Families Utilize, and What Are the Effects of these Mechanisms? The majority of poor households are able to avoid food insecurity. By definition, income-poor households have to forego at least some necessities. In other words, to be food secure, these households may be deprived in some other dimension of well-being. Two main issues could be explored in this context. The first is what goods are these families giving up to be food secure? For example, seniors may be foregoing prescription drugs to feed themselves and other members of the household. The second issue is the coping strategies being used by these families to lower the probability of being food insecure at any

given income level. Do these coping mechanisms have unintended effects on health and well-being?

Why Are the Food Insecurity Rates of American Indians so High? As shown in figures 2 and 3, counties with American Indian Reservations have substantially higher rates of food insecurity than neighboring counties. More research is needed to explain these higher rates, and, more importantly, how policies can be effectively constructed to address this challenge.

What Are the Effects of Charitable Food Assistance Programs on Food Insecurity? Alongside public food assistance programs, a substantial private food assistance network exists in the United States. This network is comprised of food banks and the tens of thousands of agencies they serve, as well as a vast network of home-delivered meals via programs such as Meals On Wheels. Food banks receive food directly from major food companies, grocery stores, restaurants, commodity exchanges, individual donors, and food purchased with donations. The food is distributed through food pantries, soup kitchens, and residential shelters. This system served an estimated 46.5 million people in 2013 (Weinfield et al. 2014), with most clients receiving food multiple times. Given the size of this program, research on the impact of these private food assistance programs is of interest, especially to program practitioners and donors to these programs. Such research could further consider how these programs interact with public food assistance programs.

What Is the Causal Relationship between Food Insecurity and Health Outcomes? In many of the cases discussed above, the causal relationship between food insecurity and health is clear. For example, it would be difficult to construct a scenario in which limited nutrient intake was a cause of food insecurity instead of the other way around. However, in other cases the causality is not as clear.

Consider depression. In several studies, food insecurity is seen as leading to depression—that is, in the multivariate regression model, depression is the dependent variable and food insecurity is one of the independent variables (Ziliak, Gundersen, and Haist 2008). This is plausible—the inability, say, of parents to feed their children could lead to depression. In contrast, others have used depression as a predictor of food insecurity, treating food insecurity as the dependent variable and depression as one of the independent variables (Garg et al. 2015; Noonan, Corman, and Reichman 2016). Future research using longitudinal data with the appropriate econometric techniques should address these causality issues along the lines of, for example, Noonan, Corman, and Reichman (2016).

In addition to often assuming the direction of food insecurity and negative outcomes, previous authors have also implicitly assumed that the effect of food insecurity was properly identified after other observed characteristics from the data set were controlled for. In other words, they assumed that there were no unobserved characteristics that led a household both to be more (or less) likely to be food insecure and to be more (or less) likely to suffer from a negative health outcome. This assumption is unlikely to hold since we expect that multiple factors are not included as covariates in any given model. As a consequence, the results found in these papers are subject to some level of bias. The extent of this bias and its direction are unclear.

To address this issue, we make a suggestion. A number of econometric techniques could be used to reduce or eliminate endogeneity bias. For example, Gundersen and Kreider (2009) used an econometric method

that establishes bounds regarding the potential impact of food insecurity on health in the presence of unobserved characteristics that would lead one to be food insecure and in poor health. This approach does not allow, in general, for point estimates of the impact. However, the bounds are more reasonable insofar as they do not explicitly ignore unobserved characteristics. In some cases, there may be variables that influence food insecurity but not health outcomes, and in those cases, standard instrumental variable techniques could be used to derive point estimates of the impact of food insecurity on health outcomes.

How Does Disability Status Influence Food Insecurity? As discussed above, households with someone with a disability are substantially more likely to be food insecure than households without someone with a disability. Little is known, however, about how disability status influences food insecurity. We would suggest, among other issues, that researchers consider the following. First, one may imagine that the type of disability influences the impact of food insecurity. For example, disabilities associated with mobility constraints would presumably have a different impact than, say, a disability associated with cognitive limitations. While some data sets do not distinguish between disabilities, others, such as NHANES, do allow one to distinguish and could be used. Second, as covered in Kreider and Pepper (2007), reports of disability status often are associated with whether or not one is in the labor force. In response, work analyzing this source of measurement error is worth pursuing. Third, the impact of disability status may differ by whom in the household has a disability. If the person was, at one point, the primary earner in the household, the impact of him or her becoming disabled presumably may have a different impact. Or, if the person with a disability is a child, this may have an impact on the labor supply decisions of one or both parents.

Why Is There a Declining Age Gradient in the Probability of Food Insecurity among Seniors? As first noted in Ziliak, Gundersen, and Haist (2008) and confirmed in later work (e.g., Ziliak and Gundersen 2016), older seniors are less likely to be food insecure than younger seniors. This is perhaps unexpected given the economic and physical challenges faced by many older seniors. Some have speculated that this could be due to older seniors becoming satiated more quickly and, therefore, even if the amount of food they consume would be considered insufficient by younger seniors, because they are satiated they may report being food secure. Another possibility is differential mortality. Namely, younger seniors who are food insecure do not reach older ages and, therefore, the composition of older seniors is composed of those less at risk of food insecurity.

How Does Labor Force Participation Effect Food Insecurity? As might be expected, consistent with the discussion above about income and food insecurity status, all else being equal, being employed and having higher earnings are consistently associated with lower probabilities of food insecurity. These studies, though, treat employment and earnings as exogenous. In doing so, this assumes that putting an unemployed person in a job and/or giving someone a higher paying job would lead to the same impact as what is seen among those currently employed and earning a particular wage. This is unlikely to hold, though, insofar as there are unobserved characteristics that lead to both higher employment probabilities and higher wages that, importantly, are also associated with food insecurity. As a result, the coefficients on employment and earnings are likely to be biased upward. Future research may wish to carefully consider how labor force participation influences food

insecurity status, especially since many proposals to reduce food insecurity often involve efforts to increase earnings and/or hours worked.

Why Did Food Insecurity Increase so Much during the Great Recession, and Remain Elevated? Food insecurity increased 30% with the onset of the Great Recession, and even several years after the recession officially ended, it remains above pre-recession levels. One would expect food insecurity to rise with an economic decline, but the increase exceeded expectations, and the sluggish rebound to lower levels even more so. Anderson et al. (2017) have begun an empirical decomposition of potential factors, concluding that households were substantially over-leveraged leading up to the recession, and thus over-consumed relative to their permanent incomes. Qualitative work that examines how households allocate resources in flush versus scarce economic times would greatly aid our understanding.

What Is the Impact of Changes in Minimum Wages on Food Insecurity? One effort to increase earnings that some have argued would lead to declines in food insecurity is increases in the minimum wage or, in some cities, the imposition of a "living wage". To date, there has not been any credible work looking at the impact of changes in the minimum wage on food insecurity. Based on both theory and empirical work, *a priori*, the impact is unclear.

Perhaps the central concern whenever there is an increase in the minimum wage is regarding the impact on employment. Recent work has found that a 10% increase in the minimum wage would result in a 1.5% decline in employment among teenagers, with a slightly smaller 0.5% decline among teenagers in the restaurant sector (Neumark, Salas, and Wacher 2014). Other work looking at teenagers has found slightly larger impacts of 2% to 3% on employment (Sabia 2009); this author also examined the impact of a 10% increase in the minimum wage on hours worked and found a 4% to 5% decline in hours worked. With respect to food insecurity, then, the increase in wages for teenagers and low-skill workers who are able to maintain employment will likely lead to declines in food insecurity in their households given the inverse relationship between income and food insecurity covered above. The benefits from this must be weighed against the increase in unemployment and the decline in hours worked—both of these would lead to increases in food insecurity with potentially larger effects during economic downturns. Whether the positive effect is larger than the negative effect is an empirical question that has not yet been answered.

As expected, empirical work has demonstrated that in industries with a high proportion of workers receiving the minimum wage, when the minimum wage increases, so do prices, especially in the restaurant business (Aaronson, French, and MacDonald 2008). The total magnitude of the implications arising from increases from the minimum wage were covered in MaCurdy (2015), who finds that while households in the top income quintile do pay three times more than those in the bottom quintile because of a minimum wage increase, and hence in an absolute sense bear most of the cost, the relative burden is substantially higher for those in the bottom quintile. Given the relationship between food prices and food insecurity noted above, these price increases will lead to increases in food insecurity. Again, whether these changes in the food insecurity rate are offset by increases in income will demonstrate its effectiveness in reducing food insecurity.

What Is the Impact of the Affordable Care Act (ACA) on Food Insecurity? Recent work has established that difficulties in paying medical bills has a profound influence on the probability of being food insecure among one of

the more vulnerable groups in the United States, those using charitable food assistance programs like food pantries (Gundersen, Engelhard, and Hake 2017). For these households, the expansion of Medicaid eligibility through the ACA will likely lead to fewer challenges in paying medical bills, and hence, a reduction in food insecurity. For households receiving subsidies to purchase health insurance, they are similarly less likely to be food insecure.

For other households, though, the impact is less clear. Households that were previously uninsured, were encouraged by the mandate to purchase health insurance, and had high medical care costs are perhaps less likely to be food insecure. Conversely, households that previously were uninsured due to the costs of insurance being higher than the benefits and have now purchased insurance may be more likely to be food insecure. Some recent estimates by Moellman (2017) suggests that the ACA's biggest effects were among those facing less severe forms of food insecurity (marginal and food insecure, but not very low food secure) and were mainly concentrated among those also receiving SNAP, suggesting important program interactions. More work, however, is need to unpack mechanisms underlying these program effects.

What Are the Long-term Consequences of Food Insecurity? With few exceptions (Wilde and Nord 2005; Ziliak and Gundersen 2016), most research on food insecurity has relied on cross-sectional data. This stems in part from a lack of longitudinal data that follows households and their food security status over time. There are some exceptions, for example, the Panel Study of Income Dynamics, Fragile Families and Child Well Being Study, and the Early Childhood Longitudinal Survey, each of which have multiple reports of food insecurity over time. However, to better inform policy, more research is needed on links between food security and income and consumption volatility, as well as how food insecurity in childhood is transmitted into long-term health and human capital outcomes as adults, and whether food insecurity is transmitted across generations, to name a few potential topics using longitudinal data.

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