The Impacts of SNAP on Food Insecurity, Obesity, and Food Purchases: Who Misreports and Does it Matter?

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I. Significance and Innovation

SNAP is the largest means-tested nutrition assistance program in the U.S., serving millions of low income individuals and households. It is administered by the U.S. Department of Agriculture (USDA) with the objective of increasing food security, reducing hunger, and improving health and well-being of low income individuals and households by expanding access to food, nutritious diets, and nutrition education (Mabli, Ohls, Dragoset, Castner, & Santos, 2013). Since 2000, the number of Americans receiving SNAP benefits has almost tripled from about 17 million to 46 million as of 2014 while total spending on SNAP has more than quadrupled from about $17 billion to almost $75 billion.[1]

Proponents assert that SNAP participation reduces food insecurity, lifts millions from poverty, and provides a fiscal boost to the economy during downturns (U.S. Department of Agriculture, 2012). However, the empirical literature on the causal impacts of SNAP has produced mixed results. Several studies have documented the expected negative relationship between SNAP and food insecurity, but others have found statistically insignificant or even positive associations (Hoynes & Schanzenbach, 2015). SNAP is also often found to be positively correlated with obesity, but some studies find insignificant effects (Gundersen, 2015).

These mixed results reflect two major methodological challenges in evaluating the causal effects of SNAP: endogenous selection and the misreporting of participation status. Although some previous studies have employed instrumental variable methods to address endogenous selection into SNAP, few attempts have been made to also correct for misreporting. A fundamental difficulty in dealing with misreporting is that true participation status is unobserved in almost all surveys and validation datasets that link survey responses to administrative records are scarce. We propose to improve on past research by leveraging the availability of both self-reported and administrative SNAP participation variables in the FoodAPS to credibly estimate the effects of SNAP on food insecurity, obesity, and household food purchases. We will also provide information about the relationship between self-reported and actual participation that will help guide future researchers who do not have access to administrative records.

This project aims to answer four specific questions:

1) What are the causal effects of SNAP on food insecurity, obesity, and household food purchases (size and healthfulness of food baskets) using validated participation variables and accounting for endogenous selection? Following prior literature, we will account for the endogeneity of SNAP participation by exploiting plausibly exogenous variation across states in

[1] Statistics are from http://www.fns.usda.gov/pd/supplemental-nutrition-assistance-program-snap.

eligibility rules. This aim's primary contribution will be to use actual rather than self-reported SNAP participation, thereby avoiding the measurement error issue. Another contribution will be to conduct a more detailed evaluation of SNAP's effects on expenditures than past research. In particular, rather than simply showing that SNAP increases food expenditures, we will be able to tell whether the increased expenditures are for healthy or unhealthy foods.

2) What individual and community characteristics influence misreporting of SNAP participation? Marquis and Moore (2010) and Bound, Brown, and Mathiowetz (2001) have suggested some reasons why people misreport but we are not aware of prior empirical research that specifically links individual and community factors to one's probability of misreporting.

3) How do the regression estimates of SNAP's impacts differ when self-reported participation variables are used instead of validated participation variables? Little is known about the magnitude and direction of the bias in regression estimates due to misreporting. Since the FoodAPS data contain both actual and self-reported participation, we will be able to directly quantify the amount of the bias and see how it varies across outcomes.

4) How effective is the estimator developed by Nguimkeu, Denteh, and Tchernis (2015) in mitigating the consequences of SNAP misreporting in the absence of validation data? We will contribute to the literature on the estimation of treatment effects of misclassified binary variables by examining the performance of Nguimkeu, Denteh, and Tchernis' (2015) new estimator, which aims to account for measurement error in program participation in situations where validation data are not available. The FoodAPS data will enable us to evaluate whether using this new estimator with self-reported participation can yield comparable results to those obtained using validated participation.

In sum, our project will shed light on three of the specific research topics listed on the NBER call for proposals: "Understanding Food Insecurity," "SNAP, Food Choice, and Purchase Quality for Households with Children," and "Reporting of Program Benefits and Participation."

II. Data

The FoodAPS survey is the first nationally representative survey of U.S. households to collect comprehensive data about household food purchases as well as health and nutrition outcomes. FoodAPS is sponsored by the Economic Research Service (ERS) and the Food and Nutrition Service (FNS) of the USDA to support critical research that informs policymaking on health and obesity, food insecurity, and nutrition assistance policy.

The FoodAPS survey collected data on 4,826 households, comprising SNAP households, non-participating low income households, and higher income households. We will conduct analyses both using the full sample and a subsample of only those households with SNAP-eligible incomes. The data include information about household characteristics such as income, program participation, food insecurity, health, weight, and height. In addition, FoodAPS contains detailed information about individual food purchases and acquisitions (merged with nutrition information), along with variables related to local food availability and prices. A unique feature of FoodAPS that makes it even more well-suited for our study is the linked administrative records on SNAP participation for consenting respondents. This presents an opportunity to study SNAP misreporting more thoroughly than past research.

We will utilize three sets of dependent variables. The first contains outcomes related to food insecurity, constructed using the ten-question household food security questionnaire included in FoodAPS. Following prior studies such as Courtemanche et al. (2015), the specific outcomes will be: number of affirmative responses, a dummy for whether the household is food insecure

(defined as having affirmative responses to at least three questions), and a dummy for whether the household has very low food security (eight or more affirmative responses in households with kids; six or more in households without kids).

The second set of dependent variables will relate to obesity. The FoodAPS contains self-reported height and weight for the household responder. We will use this information to create five outcomes: body mass index (BMI=weight in kilograms / height in squared meters) and indicators for overweight or obese (BMI≥25), obese (BMI≥30), severely obese (BMI≥35), and underweight (BMI<18.5). Dichotomous variables are often used in addition to continuous BMI in the obesity literature since health is not monotonically decreasing in weight. Weight gain generally improves health at low levels of BMI, and the large increase in mortality risk from excess weight does not begin until around the severe obesity threshold (Courtemanche et al., forthcoming). If, for instance, we ultimately find that SNAP only increases BMI at the lower and middle portions of the BMI distribution, then the health implications are minimal. Alternatively, if SNAP's effects are strongest on severe obesity, the health implications could be substantial.

The third category of dependent variables relates to food purchases. First, we will consider outcomes related to the overall size of the food basket, such as total grams of food/drinks purchased and overall dollar amount spent on food. Second, we will utilize grams/dollars spent in various categories, such as meats, fruits, vegetables, starches, snacks, prepared foods, and food additives. Third, we will consider the summary measures of food purchase healthfulness (such as the Healthy Eating Index) used by Volpe, Okrent, and Leibtag (2013).

The FoodAPS also contains a number of variables that can be used as controls. Available demographic information includes responder's age, gender, educational attainment, race, marital status, household size, and household income. The FoodAPS also contains local-area measures of household's access to SNAP-eligible stores and various types of food-away-from-home eating places as well as food prices/expenditures that will serve as additional controls. Finally, we can control for participation in other programs (e.g. WIC).

III. Research Strategy

Aim #1 – Causal Effects of SNAP on Food Insecurity, Obesity, and Food Purchases:

Identifying causal effects of SNAP requires solving two identification challenges. The first is non-random selection. SNAP participation is endogenous, so there is a strong likelihood that certain unobservable characteristics are correlated with both SNAP participation and nutrition-related outcomes. Such factors might include current and/or expected future health, human capital, financial stability, and attitudes toward work (Currie, 2003; Kreider et al., 2012). We will address the issue of endogenous participation through an instrumental variables (IV) strategy in which the instruments are state-level policies related to SNAP eligibility. These policies, which have been shown by prior studies to influence SNAP enrollment, include the length of the recertification period, the use of broad-based categorical eligibility, and the exemption of one vehicle from asset tests (Gregory et al., 2013). We will validate the instruments through overidentification tests, robustness checks (e.g. using different sets of control variables, adding census division fixed effects), and falsification tests (e.g. ensuring the instruments do not affect the outcomes for those with incomes too high to qualify for SNAP).

The second identification problem is that even if the individual's decision to participate in SNAP was random, her participation status is potentially misreported in surveys. This results in a non-classical measurement error problem. Misreporting occurs when SNAP participants report receiving no benefits when they actually did (false negatives) or vice versa (false positives).

Misreporting of SNAP participation in national surveys has been documented with false negatives being much more prevalent than false positives. For instance, the estimated false negative rates for SNAP in various surveys range from 20% to 50% (Mittag, 2013). There is a growing literature suggesting that the estimated effect of a misclassified binary explanatory variable (such as SNAP participation) may be substantially biased and may even yield "wrong signs" (Kreider, 2010; Kreider et al., 2012). This is even the case within an instrumental variables framework (Almada, McCarthy, and Tchernis, forthcoming). Most researchers using survey data do not account for the possibility of non-classical measurement error and the few that do so make assumptions akin to random misreporting. By using the FoodAPS' administratively-verified SNAP participation variable, we will avoid this issue.[2]

In short, we will estimate IV models in which the first stage estimates the effects of state SNAP policies and the control variables on the probability of actual SNAP participation, while the second stage estimates the effects of participation on the food security, obesity, and food expenditure outcomes. We will also conduct subsample analyses by education, age, race/ethnicity, and household structure (e.g. households with children vs. households without children). The exact number of subsamples will depend on the available statistical power.

Aim #2 – Determinants of Misreporting:

Next, we will investigate what factors cause people to misreport their SNAP participation by regressing a binary misreporting variable (equal to one if the administrative and self-reported participation measures differ) on the individual and community controls. We will also conduct stratifications based on actual SNAP participation status in order to differentiate between the determinants of false negatives and false positives. Of interest in these analyses is not only the extent to which each individual covariate explains misreporting, but also their collective explanatory power. If, for instance, observable characteristics explain only a small portion of misreporting, then including control variables is not likely to eliminate much of the bias from measurement error in analyses that rely exclusively on self-reports.

Aim #3 – Comparison of Results using Administrative and Self-Reported Participation:

We will accomplish this aim simply by re-estimating the models discussed under Aim #1 and quantifying the differences in the estimated effects of SNAP. Of interest are whether the differences in magnitudes are substantial and also whether there is notable sign-switching.

Aim #4 – Evaluation of New Estimator to Address Measurement Error

Finally, we will examine the performance of an identification strategy developed by Nguimkeu, Denteh, and Tchernis (2015) for use when the researcher does not have access to administratively-verified participation. While we refer the reader to the paper for technical details, the idea is to utilize a two-step estimation approach that models the SNAP participants' health outcomes in terms of their decisions to participate in the program and report (correctly or incorrectly) their participation status. This allows both decisions to be modeled jointly, minimizing biases that result from unobserved characteristics of the individual that are correlated with the decisions to participate in SNAP and misreport participation status and also influence outcomes. Nguimkeu, Denteh, and Tchernis (2015) use simulated data to demonstrate the performance of the estimator. FoodAPS will allow us to evaluate its performance using actual data. Specifically, we will implement the estimator using self-reported participation and compare the results to those obtained using a conventional IV approach with administrative participation.

[2] Administrative status is only available for those who consent to verification of their reported status. If non-consenters end up being unique, we will consider sample selection corrections.

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