UKCPR
University of Kentucky
Center for
Poverty Research

Discussion Paper Series
DP 2014-02

ISSN: 1936-9379

The Health and Nutrition Effects of SNAP: Selection Into the Program and a Review of the Literature on Its Effects

Marianne Bitler
University of California, Irvine
NBER

Preferred citation
Bitler, M. The Health and Nutrition Effects of SNAP: Selection Into the Program and a Review of the Literature on Its Effects. *University of Kentucky Center for Poverty Research Discussion Paper Series, DP2014-02*.

Author correspondence
Marianne Bitler, University of California, Irvine, Deparment of Economics, 3151 Socail Science Plaza, Irvine, CA, 92697; Email: mbitler@uci.edu ; Phone: 949-824-2182

University of Kentucky Center for Poverty Research, 302D Mathews Building, Lexington, KY, 40506-0047
Phone: 859-257-7641; Fax: 859-257-6959; E-mail: ukcpr@uky.edu
www.ukcpr.org
EO/AA

The Health and Nutrition Effects of SNAP: Selection into the Program and A Review of the Literature on its Effects

Marianne P. Bitler

University of California, Irvine and NBER*

This version: January 2014

*Correspondence to Bitler at UC Irvine Department of Economics, 3151 Social Science Plaza, Irvine, CA 92697, phone (949) 824-5606, fax (949) 824-2182, or mbitler@uci.edu. I thank Kosali Simon, Colleen Heflin, Hilary Hoynes, Diane Schanzenbach, Jim Ziliak, Craig Gundersen, Judi Bartfeld, and Tim Smeeting and audience participants at APPAM for helpful feedback. This paper made use of Integrated Health Interview Survey extracts, and I thank the MPC and SHADAC for making these available.

1 Introduction

The goal of this paper is to assess the existing state of knowledge about whether SNAP improves health and nutrition outcomes, and if so, which ones and by how much.

In an era of fiscal crisis, knowing whether SNAP has any significant causal effect on health and nutrition is crucial for informing policy decisions and policy makers. In this review, I pay particular attention to the challenges researchers face in overcoming selection bias and identifying causal effects of the program, and I will assess the literature through that lens. The fundamental challenge in program evaluation in general and in assessing the impact of SNAP in particular is that participants are not selected at random from the population. Thus, comparisons of those who use SNAP and those who do not—even conditional on observable characteristics—may not be apples to apples comparisons. To the extent that those who choose to participate in SNAP are negatively selected—as one might expect—SNAP recipients are likely to be less healthy, and thus possible positive estimates of the effects of SNAP could be biased downward.

I begin with descriptive evidence from pooled waves National Health Interview Studies about whether SNAP participants are less healthy than are non-participants. The next step is to see if SNAP recipients eat differently and have different levels of nutrition than non-recipients, using data from the National Health and Nutrition Examination Survey.

Then I go on to address the following questions using the best evidence from the existing SNAP literature. Do SNAP recipients have different diets than do non-recipients? Does SNAP improve health and nutrition outcomes? If so, which ones and by how much? Can SNAP improve birth outcomes? Is there useful evidence beyond work showing that the

introduction of SNAP leads to improvements in infant outcomes?

To answer these questions, I discuss and critically assess existing efforts in the literature to adjust for possible selection into the program. Methods used in the existing literature range from relatively simple comparisons of SNAP participants and non-participants, to methods which adjust for selection on observables (either via matching or similar methods or by regression), to those relying on policy changes and differences in differences estimation or event studies, to instrumental variables and other approaches which deal with selection on unobservables. I will also discuss experimental approaches or use of bounding methods in this setting. Finally, I pose challenges for research and suggestions for experimentation to answer some of the remaining puzzles about health and nutrition effects of SNAP.

2 Background

In the United States, the largest food assistance program is the Supplemental Nutrition Assistance Program (SNAP), formerly known as the Food Stamp Program. For fifty years, food stamps have been providing broadly targeted food vouchers to families who satisfy means-tested eligibility rules. SNAP provides targeted benefits for food and nonalcoholic beverages from authorized grocery retailers through Electronic Benefit Transfer (EBT) cards similar to debit cards. SNAP benefits were distributed 46.6 million people per month on average during fiscal year 2012 at a total cost of $74.6 billion. Historically, program eligibility depended largely on having gross income below 130% of the federal poverty guideline and net income below 100% of the federal poverty guideline, with some asset and other requirements.[1] Thus,

[1]Net income is what is left after a standard deduction, a 20% deduction for earned income, and child care and shelter deductions.

SNAP is explicitly counter-cyclical, and caseloads have recently risen to record levels during and after the Great Recession. All of the benefits are paid for by the federal government, but administration is done by the states and they pay 50% of administrative costs which amounted to nearly $7 billion in FY 2011 (FNS (2012)). A number of categorical rules make some AFDC/TANF recipients, SSI recipients, and General Assistance recipients in many states automatically eligible for the program; while requiring adults who can work to seek work if not employed. Rules were revised in the late 1990s during welfare reform to exclude many authorized immigrants and require able bodied adults without dependents to work to obtain benefits, but these constraints have been removed in part or fully over time. The goals of SNAP are to minimize food insecurity—uncertain access to enough healthy, nutritious food for an active life—for low-income individuals while improving the quality of their diets (as highlighted by recent concerns about obesity).

SNAP benefits are distributed to recipiency units made up of persons who purchase food and share resources, via EBT cards (in the past, families received vouchers). Benefits are a function of the number of persons in the recipiency unit, net income, and a maximum benefit level. Benefits are reduced by a benefit disregard rate of 30%, for counted income (such as earned income), so SNAP incorporates less of a work disincentive in its eligibility formula than many other safety net programs. Households are certified for a length of time that can vary by state choice, and Eslami, Filion & Strayer (2011) report the average certification period is 12 months.

The primary purpose of the program is to prevent hunger and promote food security, and in 2009, 84% of SNAP benefits were redeemed in supermarkets or superstores (Castner & Henke (2011)). The maximum benefit is based on the cost of purchasing an adequate low-

cost diet as manifested in the USDA's Thrifty Food Plan. This diet is calculated to both minimize costs and be similar to typical consumption patterns for low-income individuals while also satisfying nutritional requirements and limits on servings from certain food groups. With an increase tied to ARRA, the 2009 maximum monthly benefit for a family of 4 was $668.

SNAP is used by a wide swath of the population. Around half of participants are children under 18, while about 8 percent are age 60 or older. At the same time, a large share of participants also obtain some other government benefits, such as SSI, TANF, and/or General Assistance. SNAP take-up, like that of many safety net programs, is well under 100%. Cunnyngham, Sukasih & Castner (2013) report take-up estimates for the eligible population of 66% in 2008, 67% in 2009, and 75% in 2010.[2] In 2009, on average, SNAP households have used more than 3/4 of their benefits by the middle of the month. SNAP households on average also make many shopping trips during which they redeem benefits, with the average for April 2009 being nearly 10 visits, with an average SNAP purchase amount of $30.23.

SNAP has undergone a number of changes over its 50-year history. Initially distributed as coupons, the benefits are now issued via EBT cards. The earliest version of the program had a purchase constraint, and only distributed benefits to those who had themselves spent enough on food. Now, there is no such constraint. Purchases must be made at stores authorized to redeem SNAP benefits, where such authorization requires stores to carry basic

[2]Moffitt (1983) introduces one explanation for incomplete take-up, welfare stigma, or a psychological cost associated with using a program because the perception is that those using it are lazy or undesirable. Other possible explanations include the other costs associated with take-up, such as the time costs of application. Daponte, Sanders & Taylor (1999) show that information plays a large role in take-up decisions for SNAP. Flaherty & Mumford (2012) calculate that stigma is costly in both the WIC program and in the Food Stamp Program.

staples in several categories.

Until recently, there were few state options in the SNAP program. However, as discussed in Ganong & Liebman (2013), since about 2001, states have been encouraged by USDA to make modifications to their eligibility rules, loosening some of the asset constraints and instituting broad-based categorical eligibility which allows families to qualify if they satisfy the net income threshold without imposing any asset constraints or the gross threshold.[3]

2.1 Predicted effects on nutrition

Studying the effects of SNAP on food choices depends on the role of program benefits in the household budget. Unlike a cash subsidy, SNAP is an in-kind benefit that constrains families' choice of food.[4]

If the food households could buy with a SNAP EBT card were identical to that they would choose to buy with cash, then economic theory predicts that if food is a normal good, the only families influenced by the in-kind nature of the program are those who would have spent less than their SNAP allotment on qualifying foods (so-called extra-marginal or constrained participants). Families who would have spent at least as much on qualifying foods as the SNAP allotment should have their choices of foods remain relatively unaffected by SNAP (so-called infra-marginal participants). Economic theory predicts that a marginal increase in

[3]According to Eslami et al. (2011), prior to November 2010, categorical eligibility for SNAP applied to households where all the members got SSI, cash or in-Kind TANF, or General Assistance payments. These families were not subject to income or resource limits. Starting November 21, 2001, states were required to confer categorical eligibility on households that got or were certified as eligible to get benefits or services fully paid by TANF or Maintenance of Effort funds, and had the option to do so if the activity was less than 50% funded by TANF/MOE. They could also apply this eligibility if at least one member obtained the TANF/MOE benefit. 39 states adopted such categorical eligibility for entire households where a non-cash TANF/MOE benefit was authorized. These households meeting the state-set eligibility rules for the TANF/MOE non-cash benefit are eligible for SNAP and do not face income or resource limits. States often apply only a gross-income eligibility limit. However, benefits are still calculated based on net income.

[4]For an in-depth discussion of in-kind benefits, see Currie & Gahvari (2008).

targeted food assistance benefit will strongly affect food spending for extra-marginal participants, and the increase will only weakly affect food spending for infra-marginal participants. Empirical research commonly finds bigger program effects than expected for infra-marginal participants in targeted food assistance benefits programs (e.g., Wilde, Troy & Rogers (2009), Meyerhoefer & Yang (2011)). Breunig & Dasupta (2005) look at explanations that are tied to bargaining within households with more than 1 adult compared to those with 1 adult for the higher propensity to spend food stamps than to spend cash found in the experiments By contrast, Hoynes & Schanzenbach (2009) find the propensity to buy food out of benefits and cash income was the same using variation from the introduction of SNAP while Moffitt (1989) finds that converting the in-kind food stamp vouchers to cash benefits in Puerto Rico led to no change in food expenditures.

Of course, SNAP also requires individuals to buy food to prepare rather than food that is ready to eat immediately after purchase.[5] Wilde et al. (2009) find evidence that SNAP participants have higher needs or preferences for food at home than non-participants, suggesting a form of selection into the program.

This requirement to purchase raw ingredients or at least not ready to eat food at the store could also affect SNAP recipients' behavior, although less so now than perhaps in the past, as preparation time for food has declined. The bulk of research has suggested that while SNAP reduces food insecurity, it has no large and meaningful effect on diet quality. Attention has also focused on how SNAP affects the mix of food at home and away, and whether summary measures of diet quality—like the USDA's Healthy Eating Index—are

[5]Rose (2007) report that making food using weekly food plans based on recipes and meal plans created to show how the 1999 TFP could work took 16.1 hours per week (excluding clean-up and shopping).

affected by use of SNAP.

Recent discussion in some states has focused on excluding or taxing some foods such as sugar sweetened beverages from the qualifying list of foods, although USDA has refused to allow states to do this. At the same time, pilot studies have focused on the use of carrots—such as financial incentives to consume more fruits, vegetables, and other healthful foods (e.g., the Healthy Incentives Pilot, authorized by the 2008 Farm Bill).

SNAP also includes a nutritional education component, like many federal food assistance programs. In 2010's Healthy and Hunger Free Kids act of 2010, Congress added obesity prevention to the program's nutritional education goals. State agencies have the option of providing this education to SNAP recipients. In Fiscal Year 2014, about $400 million in grants for education are available. USDA also provides states with guidance about strategies for obesity prevention and control. It is possible that this nutritional education component could affect participants, although evidence is somewhat lacking. There is also variation across states in when they began participating in the nutritional education component. Cole & Fox (2008) report that in 1992 only seven states participated in the program.

2.2 Predicted effects of SNAP on health

Since the seminal work of Grossman (1972), economists have viewed health as a capital good that is produced by individuals. Demand for health derives from a desire to increase their utility. Health must be invested in as it depreciates and individuals must spend time and money to produce health, and trade this off with the other things they would like to consume. Thus use of health care and healthy behaviors are investments people make to

improve their own health. Demand for health derives both from the consumption effects and from the investment nature (healthier persons can participate in more market activities and consume more leisure). This model also assumes that education increases the efficiency of non-market prouduction, and thus posits that the more educated may end up with higher optimal health stocks. Finally, there are other key assumptions built into this model, (i.e., individuals want to maximize lifetime utility and are expoential discounters with perfect information, there are no insurance markets). In this model, higher wages mean a higher value on healthy leisure time, which suggests that those with higher wages will demand more medical care. In this model, subsidies to goods that improve health and health education can improve health.

It is possible and even likely that not all of the assumptions of the Grossman model hold, yet some of the insights of the model are helpful for considering the health impacts of a program like SNAP. First, if health is a stock variable which requires investment to maintain, then it is unlikely that brief exposure to SNAP is going to improve health. In fact, it might take sustained exposure to a program before health responds. Health care use, by contrast, can change quickly in response to changing circumstances. Thus, a comparison of long-ago determined health outcomes of SNAP recipients and non-recipients is unlikely to reveal differences that are due to SNAP.

At the same time, there is clearly a possibility that SNAP can improve nutrition and thus health. At base, if individuals were constrained in their access to healthy food, which is itself an investment good in producing health, SNAP could have positive effects on health. It is certain that at the time the program was first implemented as part of the War on Poverty, many individuals who would likely be eligible for what was then known as the Food Stamp

Program did not have adequate access to food, and have suffered from anemia, and other health issues. In fact, the Ten-State Nutrition Survey conducted during 1968–1970 found and wasting among low income children, as well as widespread prevalence of iron-definiency anemia as well as deficiences in vitamin A (Lowe (1997)).

2.3 Descriptive evidence on SNAP, Nutrition and health

Next, we turn to the NHIS and NHANES to get a sense of the descriptive associations between SNAP use, demographics and income, and health and nutrition. In particular, we first show that patterns of SNAP use in the NHIS mirror those shown in the chapter by Ziliak. Then we examine in greater depth the degree of health selection in SNAP and also the extent to which this may have changed during the recent Great Recession. Finally, we look at differences in nutrition between SNAP recipients and non-recipients.

2.3.1 NHIS

The National Health Interview Study is a large cross-sectional survey done since 1957 to monitor the health of the nation. The current incarnation of the NHIS is a household interview survey, which samples households and non-institutional group quarters. Blacks and Hispanics, and more recently Asians, are over-sampled, and thus weights must be applied to obtain population representative results. Sample is drawn from each state and DC. Since 1997, the survey has consisted of a core set of questions asked every year. The core includes household and family components, which collect information on demographics, health status and limitations, injuries, health access and use, health insurance, and income and assets; and are collected from everyone. The core also includes a sample adult and sample child

component, which include data on health status, health care services, and health behaviors, asked only for a random adult or child, if a child is present. In some years, supplements are used to collect specific health data. Our very limited data on nutritional outcomes come from such a supplement. The public use version of NHIS does not report state or a finer geographic area than 4 regions due to a combination of concerns about privacy and the fact that the individual data are not statistically representative of states.

2.3.2 NHANES

The National Health and Nutrition Examination Survey (NHANES) is a set of surveys designed designed to measure the health and nutritional status of children and adults. While it was started in the 1960s as a periodic survey, the current incarnation is a continuous program, which measures outcomes for a nationally representative sample of 5000 persons a year, from about 15 counties. In addition to collecting demographics and socioeconomic outcomes, NHANES collects information on dietary and health related measures. Additionally, a key aspect of NHANES is the examination component, where individuals are given medical, dental and physiological examinations, and administered laboratory tests. Unlike most other data sets which rely on self reports of conditions and medical experiences, the NHANES provides objective measures of these outcomes. Further, most other data sets only include data on conditions that individuals have been told by a medical professional that they have. For example, even for an event like a heart attack, some 15% of persons may not know they have had such an event. Thus, these individuals would not report that they have been told by a doctor they had this condition, and it is likely that low SES individuals and those with limited interaction with medical professionals might be more likely to not know

about such conditions. Like NHIS, NHANES over-samples blacks, Hispanics, and some older individuals. Also like NHIS, the public use version of the data does not include geographic information.

3 Descriptive evidence about SNAP and health and nutrition

In this section, I present some descriptive evidence about SNAP and health and nutrition using NHIS from 1997-2010 and NHANES from 2010). Some of this evidence confirms what we know from other data sets about SNAP recipients. Data on SNAP use is collected from 1997 through 2010 in the NHIS family questionnaire. Thus, any family where some member is reported to be an authorized SNAP user in the last year is coded as having gotten SNAP.

As in many other large survey sample data sets, SNAP use is under-reported in the NHIS. Figure 1 shows the administrative average participation by fiscal year and the NHIS total reported SNAP participation. As you can see, the NHIS under-reports, but the two lines track one another closely.[6]

I begin with the full sample for looking at characteristics of SNAP recipients, but will often separate NHIS adults (18 and over by NHIS convention) from children ($\leq$ 17) when

[6]Meyer, Mok & Sullivan (2009) document this under-reporting in the CPS, SIPP, and PSID. For FY 2008-2010, I compared total reported use of SNAP in the last year to the average number of participants. Between 62% and 65% of the administrative total number of participants from USDA administrative totals report SNAP in the NHIS. Of course, this comparison is imperfect. First, NHIS doesn't track the full population, and to the extent the persons not in scope are SNAP participants, the NHIS total should be smaller. Second, NHIS asks about use in the last year. To the extent that short spells are common, NHIS totals should be relatively bigger. This level of misreporting is a bit better than what Meyer et al. (2009) report for CPS-ASEC in their Table 12. Finally, NHIS assigns receipt to members of the family, but SNAP benefits are intended for household members who share resources, which could be a larger unit. A comparison of household level SNAP receipt with the number of households as reported in Table 12 of Meyer et al. (2009) shows NHIS captures 76% of the administrative recipiency unit receipt for 2007.

looking at outcomes collected from the sample adult or child.

3.1 Mean differences between SNAP recipients and non-recipients

Table 1 presents summary statistics for 1997–2010 for demographics, health insurance coverage, cash income and in-kind benefits, and home ownership for the full sample (column 1). Columns 2 and 3 show means for those reporting SNAP use or no SNAP use in the last year. (A small share of persons who do not respond to the SNAP question are excluded from Columns 2 and 3).

It is obvious from this table that SNAP recipients are more disadvantaged on many dimensions than those not getting SNAP. They live in larger households, and are less likely to be white or Asian and more likely to be black or Hispanic. They are more likely to live in households with children, and much more likely to be under the poverty threshold (57% are in poverty compared to 8% of the non-SNAP population). SNAP recipients are much less likely to have private insurance coverage than non-recipients (9% versus 70%) and much more likely to have Medicaid coverage (62% versus 7%). They are also much more likely to be getting other in-kind public assistance like public housing or TANF. 27% of SNAP recipients were in families with wage and salary income in the previous year, compared to 49% of non-SNAP recipients. They are also more likely to participate in safety net programs like AFDC/TANF[7] (22% versus 0.3% of non-SNAP recipients) and SSI (14% versus 1%). Due in part no doubt to the fact that many SNAP recipients are single parents, SNAP recipients are also more likely than non-participants to get private transfers (8% got child

[7]Note that in the NHIS this variable measures participation in a state or county cash assistance program and respondents are prompted not to report SSI/SNAP/LIHEAP or Medicaid or state medical assistance).

support compared to 2% of non-SNAP recipients). Finally, they are much more likely to be renters than non-recipients, and more likely to be citizens (not surprising given eligibility requirements). These differences are all statistically significant at the 1% level (test statistics use weights and are adjusted for the complex sample design).

Tables 2 reports further statistics for demographics, self-rated health and presence of family members with limitations, and health care use for adults. (Recall that the NHIS definition of adult is aged 18 or older). Again, column 1 reports result for the full sample, column 2 for SNAP recipients, and column 3 for non-SNAP recipients. Again, the negative selection into SNAP is clear; SNAP recipients are less likely to be married, more likely to have a low level of education, and much less likely to be in excellent or very good health. They are also much more likely to have a family member with a functional limitation, and to have a child who is in special education or whose parent has been told they have a developmental delay. The SNAP recipients are more likely to live in families with children, and have more contact with the medical system. They are also much more likely to report a family member needed medical care they did not get because they couldn't afford it. Again, all of these differences are statistically significant at the 1% level.

Table 3 reports similar measures for children (age ≤ 17). SNAP recipient children live in larger families and are younger than non-recipients. They are also more likely to have parents with less education or no reported information on education, and have worse parent-rated health. They are much more likely than non-recipient children to themselves be in special education (9% versus 6%), and to live in a family with some child in special education (20% versus 11%).

Tables 4 and 5 present similar breakdowns for many of the health conditions and disability

measures in the NHIS for adults and children respectively, along with some health behaviors and a small number of food-related outcomes for adults. Adults on SNAP are shorter and heavier than non-SNAP adults. They are more likely to have had any bed disability days. They are also much more likely than non-SNAP recipients to have ever been diagnosed with the following conditions: ADD, asthma, a vision problem even with glasses or blindness, diabetes, heart attack, stroke, or ulcer). They are also more likely to have recent back problems or frequent migraines. All of these differences are highly significant.

Regarding health behaviors, SNAP recipients are less likely to report current or ever drinking but more likely to report smoking than non-recipients. They have spend more time in the hospital in the last year but are less likely to have had a flu shot. Finally, as measured by the 3 questions on food consumptopn—having had a pizza, a non-diet soda, or a salad in the last month–the SNAP recipients had less healthy diets than than non-recipients.

Table 5 reports health conditions for children on and off SNAP. Children on SNAP were much more likely to have missed school and to have been diagnosed with a learning disability, ADD, mental retardation, or an other developmental delay. They were also more likely to have ever been diagnosed with asthma, to still suffer from asthma, or to have a severe vision problem or be blind. Using more current measures of health, the SNAP recipients also look worse off, with higher rates of anemia, recent illness, allergies, and stomach problems. They are, however, more likely than non-recipients to have had a flu shot in the last year.

3.2 Who participates in SNAP?

It is important to show that the determinants of SNAP use mirror those in data sets more aimed at collecting program participation. Thus, Table 6 looks at the determinants of SNAP use in the NHIS data, controlling for the pre-determined Xs above, as well as region and month of interview fixed effects, and the business cycle. One measure of the business cycle is annual, and based on Bitler & Hoynes (2010), using peak unemployment to the year before trough unemployment to date the contraction period. A second measure of the business cycle uses regional unemployment at the annual level (this is the finest geographic detail on the public use NHIS data). The other controls include gender; family size; number of children; age (leaving out 25–44); education of adult/mother of child (leaving out more than high school); race (leaving out white); and dummies for Hispanic ethnicity; being born in the US; and for immigrants, dummies for having been in the country less than 5 years, 5–14 years, and more than 14 years. This specification is weighted with the person weight, and uses the publicly available information on PSU and strata to adjust the variance-covariance measures for the complex sample design. For the key business cycle variables, we also report the P-values from using the wild bootstrap of Cameron, Gelbach & Miller (2008).

The first thing to note is that controlling for all of these factors, the SNAP recipients are still disadvantaged on many dimensions. Blacks, Hispanics, Asians, and American Indians/Alaska Natives are more likely to participate than are whites, and low education adults/children with mothers with low education are also more likely to participate. The elderly are less likely to participate as are males, and families with more children are more likely to participate. The coefficients on all of these individual controls are nearly unchanged

as we go across the two columns.

The next thing to note is that bad times lead to more participation. Being in a contraction year leads to a significantly higher level of participation of 1.2 percentage points, smaller than the heightened probabilities with low education or black/Hispanic status, but still important, especially compared to the sample average reported rate of SNAP participation of 5%. Column 2 reports coefficients from the same specialization as column 1 but measures the business cycle using the regional unemployment rate, with controls for region year and month. These results confirm the finding in Column 1, SNAP is counter-cyclical, with the preferred specification (column 2) suggesting a 1 percentage point increase in the annual regional unemployment rate leads to a 0.005 percentage point increase in SNAP participation that is highly statistically significant using a variance covariance matrix that adjust for the complex sample.[8]

3.3 Are SNAP recipient more healthy in downturns because selection into the program is changing?

The final descriptive exercise with the NHIS is to see if the health of the SNAP recipient population varies with the business cycle. Figure 2 shows how SNAP participation tracks the unemployment rate over the sample period. SNAP use has risen throughout the expansion of the mid 2000s and the following Great Recession.

I do this comparison separately for children and adults. These specifications regress various health indicators on the same exogenous controls as in Table 6, as well as a dummy

[8]Note that our coefficient of interest is also still statisically significant at the 1% level, adjusting the p-value for the fact that variation in the unemployment rate is only across the four regions, and it remains to implement an approach like the wild bootstrap that adjusts for this issue (e.g., Cameron et al. (2008)).

for SNAP receipt, a control for the business cycle, and their interaction.

Panel A uses the dummy for the year being a contraction year as a measure of the business cycle (and controls for month and region fixed effects), and panel B uses the regional unemployment rate as a measure of the business cycle (and controls for month, region, and year fixed effects). If the coefficient on the indicator for SNAP receipt last year has a different sign from the interaction of SNAP last year and contraction year, it suggests that the SNAP population is different in health status in contractions than in expansions. The goal for adults was to choose some health characteristics that should not be affected by use of SNAP in the last year, so as to get a sense of how selection into SNAP is changing across economic downturns. Here, the outcomes I expect to be unaffected by the last year's SNAP use are height and having ever been diagnosed with asthma.

Table 7 presents the results of this exercise for 3 adult outcomes; height, weight, and ever diagnosed with asthma. Being taller is generally thought to be a positive attribute, being heavier is typically not good, and having asthma is also a marker of bad health. Panel A reports the results interacting "contraction year" with SNAP receipt. While 2 of the interactions are negative, none are significant, suggesting that as measured by these relatively fixed measures of health (at least for height and asthma), the health of SNAP recipients is not all that different in contractions. (The same holds for measures not presented here such as ever having been told you have had a heart attack or a stroke.) Panel B reports the results with the measure of the cycle being the regional unemployment rate. Here again, the interactions are never significant, and the signs do not tell a consistent story.

Table 8 presents results for the same sorts of models for a sample of children. Here again, the evidence is mixed. In panel A, two of the four interactions presented are significant, and

these two go in opposite directions. Child SNAP recipients in contractions are less likely than those in expansions to have had anemia in the last year, while they are more likely to report ADD diagnoses. In panel B, with the year dummies included, the interactions are all small and insignificant.

Finally, I explored whether selection into SNAP was different during the Great Recession by interacting a dummy for the Great Recession period with the dummy for SNAP receipt and the regional unemployment rate, controlling for the 2 way interactions and main effects, and found no such evidence.

Tables 9–13 present results from analysis of NHANES from 2007–2008. In addition to knowing food stamp authorization in the last year, in the NHANES one knows whether someone is currently authorized for food stamps. This is an advantage as many of the micro-nutrients measured in the MEC exam are best attributed to recent exposure rather than exposure in the last year. One downside of the NHANES is that the public use NHANES does not report any geographic data, so analysis will simply look at different time periods, pooling the 2 years within each wave.

I compare objective measures of height and weight, for SNAP recipients, controlling for the pre-determined characteristics controlled for above when possible. I also compare levels of certain micro-nutrients from the food diary. A measure of anemia can also be constructed from having low hemoglobin and hematocrit based on blood examination data. The NHANES also contains information on dietary intake, andanalyze total calories, total carbohydrates, and total fat consumed as well as look at indicators for low calcium intake, low fiber intake, low iron intake, low magnesium intake, low protein intake, low zinc intake and high sodium intake based mostly on the RDA recommendations. These are indicators

that have been used in the past when analyzing at the effects of food assistance programs (e.g., Bhattacharya, Currie & Haider (2006)). I also look at calories from fat and alchohol.

Existing work by Cole & Fox (2008) examines many of these outcomes comparing SNAP participants to two groups of nonparticipants, income-eligible non participants and those whose income is high enough to make them ineligible for SNAP. Cole & Fox (2008) found that food stamp recipients have worse diets than either comparison group. Food stamp recipients were less likely to get the appropriate amount of vitamins and minerals than the higher income group of ineligibles. Adults on SNAP were found to get a larger share of energy from solid fats, alcohol, and added sugars than other adults. Female adults on food stamps were heavier than members of both comparison groups. Finally, they looked at the Healthy Eating Index (HEI) 2005, which measures food choices relative to the guidelines in the 2005 Dietary Guidelines for Americans and 2005 My Pyramid, which was a food guidance system that "translates the dietary guidelines into a total diet meeting nutrients" while limiting intake of certain foods typically over-consumed. Food Stamp recipients had lower scores on the HEI than did the comparison group.[9]

Table 9 presents the individual characteristics of our NHANES adult sample. Table 10 shows our outcomes for adults and Table 11 for children by SNAP last year/no SNAP last year, but adjusting for food stamp status not being reported and for there being no answer to the question about use of SNAP last year. Tables 11 and 12 show the dietary and nutritional outcomes by SNAP/no SNAP last year. First, based on the RDA and other recommendations, we look at whether children and adults are meeting nutritional

[9]IOM & NRC (2013) discusses the challenges with associating indicators like the HEI 2005 with diet quality as well as with associating diet quality in a causal fashion with chronic disease.

recommendations from the USDA and the IOM (and others). We also look at levels of these measures. The first column of each tables shows differences with the only control being no food stamp use reported and for the dietary outcomes, what day it was collected on. Column 2 controls for the Xs from Table 1. Strikingly,the SNAP recipients have a number of worse nutritional outcomes than non-recipients. This holds even controlling for the unemployment rate and other outcomes (reported in column 2 of each table). SNAP recipients consume less protein, less fiber, less calcium, less Zing, less iron, and less Magnesium than do other adults. SNAP recipients are more likely to be under and overweight when compare dto the WHO standards. The differences are more striking for adults than children also.

Overall, this descriptive analysis using the NHIS and NHANES has confirmed what we already knew from other settings. SNAP recipients are less healthy than the general population, and this is true whether we focus on measure of health that are stock variables and likely to have been unchanged for quite some time and may pre-date use of the program or whether we focus on health measures which can adjust more quickly. SNAP recipients also have worse diets based on micronutrients consumed and some macronutrients. Of course, ideally, we would be able to control for selection in some way to see whether SNAP recipients are less healthy to start or made less so by SNAP, but this is not feasible in the public use NHIS and NHANES where state identifiers are unavailable. Research opportunities await those who gain access to the restricted use data and combine that with policy variation. But the takeaway message is clear, SNAP recipients are less healthy than others and likely for reasons that have little or nothing to do with SNAP use.

Next we turn to a review of existing knowledge of the health and nutrition effects of SNAP.

4 Challenges to evaluation of SNAP

Obtaining causal estimates of the effects of national food assistance programs like SNAP is challenging. Comparisons of SNAP recipients to the full population of non-recipients is sure to be somewhat misleading due to selection in who takes up these programs. Given that SNAP eligibility is tied to having low income and asset holdings, comparisons of health outcomes for program recipients to those of the general population are unlikely to yield the true causal effects of the program on health. Even among those eligible for the programs, recipients may be positively or negatively selected compared to eligible non-participants due to the fact that participation is a individual choice, and existing evidence suggests that this might be the case for SNAP (e.g., Wilde et al. (2009). When recipients are healthier, more motivated, or more knowledgeable about the programs than non-participants, comparisons may suggest the program has a more positive effect than it actually does. Alternatively, if participants are more disadvantaged than eligible non-participants, comparisons of these two groups could lead to underestimates of the effects of the program. With SNAP, most research suggests participants are more disadvantaged than eligible non-participants (e.g., Gundersen, Jolliffe & Tiehen (2009)). And in fact, we saw above that compared to the general population, SNAP recipients are less healthy when measured using adult height or the presence of other conditions such as having been diagnosed with a learning disability that SNAP likely could not have affected. Finally, an additional challenge to such evaluation is tied to under-reporting of program benefits in most large survey data sets (e.g., Marguis and Moore (1990), Meyer et al. (2009), Bitler, Currie & Scholz (2003)). This means that SNAP receipt is underreported, and the reported SNAP recipients may be those with more attachment to

SNAP or otherwise different from non-reporters (e.g., Bollinger & David (1997)). Abreveya, Hausman & Scott-Morton (1998) discuss issues with this type of misreporting.

There are several approaches that researchers have taken to avoid selection bias (see the review articles Gundersen, Kreider & Pepper (2011) and Meyerhoefer & Yang (2011)). One approach compares outcomes among individuals in geographic areas with different program rules, using panel data on individuals or pooled cross sections of individuals, typically with controls for geographic entity and time. This approach relies on individuals with similar incomes and other characteristics being comparable across states or counties with different income thresholds for eligibility for programs or different rules about how individuals stay eligible for programs or different access to the program. This approach is particularly problematic for SNAP, due to the fact that until recently this programs was national with common rules across states. For example, until recently, SNAP or food stamps allowed little leeway for states to set program rules. Examples of this approach for SNAP using more recently introduced state rule variation include Kabbani & Wilde (2003), Currie & Grogger (2002), Ratcliffe, McKernan & Zhang (2011), Yen, Andrews, Chen, & Eastwood (2008). Ganong & Liebman (2013) document that recently, wider state experimentation has led to increases in use of the program.

When there is no geographic variation in rules, another common approach is to limit the analysis to more comparable treatment and control groups. Another approach when program rules do not vary across areas is to look at the effects of the introduction of programs in an event study, comparing otherwise similar individuals in places before and after programs are introduced. Another approach to studying the effects of programs is to use random assignment. If program administrators are able to randomly assign an offer of program

participation to otherwise identical eligible individuals, then comparisons of those assigned to be eligible for the program with those denied the option to participate can yield unbiased estimates of the effects of the program. In the case of food stamps, there have been several demonstration projects funded by USDA, which have yielded evidence about the effects of cashing out food stamp benefits on food spending (e.g., Fraker, Martini & Ohls (1995)). More recently, a pilot program has evaluated the use of financial incentives to consume more fruits and vegetables (the Healthy Incentives Pilot, Bartlett, Klerman, Wilde, Olsho, Blocklin, Logan & Enver (2013)).

5 What do we know now?

In this section, we review in more detail the existing causal evidence about SNAP and nutrition and health.

5.1 Does SNAP improve health and nutrition outcomes? If so, which ones and by how much?

Much of the evidence about the effects of SNAP on nutrition is based on cross-sectional studies comparing SNAP recipients and eligible non-recipients, and thus potentially biased for the reasons discussed above, even when observables are controlled for. This cross sectional evidence is summarized in various places, including IOM & NRC (2013) and Currie (1995) and Currie (2008). There is evidence suggesting SNAP recipients spend more on food than other similar families and that they have higher nutrient availability than others. An example of this literature which does deal in part with selection is Devaney & Moffitt (1991), who

find food stamp benefits have larger dietary effects than cash income does, using data from 1979–1980.

The lack of good causal evidence is in part due to the many challenges with evaluating what was for most of its life a national program with consistent rules across places, making it impossible to use the most common quasi-experimental estimators. Fox, Hamilton & Lin (2004) review the older literature for USDA in a technical report, summarizing it as finding no important impacts of SNAP or food stamps on dietary intake despite the higher spending and availability of nutrients.[10] Finally, there is the challenge that any of these comparisons of recipients and non-recipients in standard data sets suffer from misclassification, as SNAP use is underreported, and some of the reported non-recipients are actually getting SNAP (e.g., Bollinger & David (1997)).

Evidence discussed above about the introduction of the program as part of the War on Poverty however does find that introduction of SNAP in one's county increases spending on food and decreases spending on food away from home, but does not look at specific nutrients (Hoynes & Schanzenbach (2009)). An additional advantage to this work (like other work using policy variation in lieu of self-selected participation) is that underreporting of participation does not affect it.

Another natural experiment was part of the American Recovery and Reinvestment Act of 2009, which increased SNAP benefits by 15% on average. A recent paper (Beatty & Tuttle (2012)) finds evidence that this substantial increase in SNAP benefits ARRA did increase

[10]Gleason, Rangarajan & Olson (2000) and Currie (1995) point out additional challenges with measuring nutrition. One is related to different dietary needs for different types of people. Another challenge is the difficulty of measuring diet quality with even a two day record of dietary intake, due to day to day variation in intake. Finally, there are challenges with creating overall summary measures of diet that actually measure dietary quality.

food expenditures at home, using the Consumer Expenditure Survey.

Finally, USDA has been using randomized control trials to evaluate new changes to SNAP, which introduce incentives to purchase fruits, vegetables, or other healthful foods. Bartlett et al. (2013) report the impact of an experiment in Hampden County in Massachusetts, in 2011 and 2012. SNAP recipients were randomly assigned to a treatment group, who got the incentive, or to a control group who faced the usual SNAP rules. In the treatment group, SNAP recipients receive an additional $0.30 for each dollar of SNAP benefits spent on fruits and vegetables. Surveys of the participants show that the treatment group consumed more targeted fruits and vegetables per day than the control group, an increase of 25% over control group consumption. Take-up of at least some incentive payments was about 2/3 in the treatment group, with about $12 a month spent on the targeted fruits and vegetables. This additional spending was fairly evenly split between fruits and vegetables. This type of experiment is very useful for learning about ways to increase purchase and consumption of healthful foods. A final report not yet complete will analyze shopping patterns, incentive earnings, and presumably provide a cost benefit analysis of the experiment.

Turning now to health, all of the same challenges arise in finding causal estimates of the effect of SNAP along with some new ones.[11] Descriptively, above I showed that SNAP recipients look less healthy even on dimensions where at least current SNAP receipt is happening long after the health event in question (e.g., height, ever diagnosed with asthma). An additional challenge with evaluating effects on health is that health itself is primarily a stock variable, which evolves slowly. That said, there is some evidence that obesity and

[11]Note that other papers in this conference address food insecurity, thus I do not discuss the findings for food insecurity.

weight gain are associated with SNAP receipt for women but not men (Ver Ploeg & Ralson (2008) review of the literature).

Again, important work here relies on variation in the introduction of the Food Stamp Program. Hoynes & Schanzenbach (2009) find that introduction of the food stamp program led to increases in food consumption. Almond, Hoynes & Schanzenbach (2011) find that the introduction of food stamps led to increases in birth-weight as do Currie & Moretti (2008). Hoynes, Schanzenbach & Almond (2012) look at the long run impacts of being exposed to the Food Stamp Program while aged 0–5 on adult obesity, high blood pressure, and diabetes, finding positive effects on health. There is, however, an important challenge with using evidence about program introduction to inform current debate is that program rules may change in important ways over time, potentially raising questions about the ongoing validity of historical estimates for evaluating programs today.

In a series of papers, Brent Kreider and Craig Gundersen and coauthors have tried to seriously address the issues discussed above with misreporting of SNAP and how it affects estimates of the effects of SNAP. Their most recent work also deals with selection. Kreider, Pepper, Gundersen & Jolliffe (2012) bring techniques on bounding to deal with these two issues simultaneously. They find that with strong assumptions about the endogenous and reporting, SNAP is favorable for children's health, while weaker assumptions leave even the sign of the causal effect unidentified.[12]

[12]One possible issue with their analysis is that they use NHANES, which has very little information on income and nothing about assets. Arguably this is less an issue for a sample of children than it might be for adults, but they may well be missing eligibles with gross income above 130% of poverty in states with generous broad-based categorical eligibility.

6 Conclusion

A richer understanding of the effects of SNAP on health and nutrition awaits one of two innovations. First, there is room for work using policy variation at the state level. Ganong & Liebman (2013) have documented that this policy variation has had a modest effect on use of SNAP. Work looking at impacts on nutrition and health is the next step.

Second, it would be useful to have further experimentation into either more carrots (following on the HIP pilots) with subsidies for more purchases of fruits and vegetables, or more testing of what nutrition education is effective.

Finally, it seems as though there is room for the insights of behavioral economics to be brought to bear.

References

Abreveya, J., Hausman, J. & Scott-Morton, F. (1998), 'Misclassification of the dependent variable in a discrete-response setting', *Journal of Econometrics* **87**, 239–269.

Almond, D., Hoynes, H. & Schanzenbach, D. (2011), 'Inside the War on Poverty: The impact of food stamps on birth outcomes', *Review of Economics and Statistics* **93**(2), 387–403.

Bartlett, S., Klerman, J., Wilde, P., Olsho, L., Blocklin, M., Logan, C. & Enver, A. (2013), 'Healthy Incentives Pilot interim report', USDA FNS Office of Research and Analysis.

Beatty, T. & Tuttle, C. (2012), Expenditure response to increases in in-kind transfers: Evidence from the Supplemental Nutrition Assistance Program, Working paper, University of Minnesota.

Bhattacharya, J., Currie, J. & Haider, S. (2006), 'Breakfast of champions? The effects of the School Breakfast Program on the nutrition of children and their families', *Journal of Human Resources* **41**(3), 445–466.

Bitler, M., Currie, J. & Scholz, J. K. (2003), 'WIC eligibility and participation', *Journal of Human Resources* **38(s)**, 1139–1179.

Bitler, M. & Hoynes, H. (2010), 'The state of the safety net in the post-welfare reform era', *Brookings Papers on Economic Activity* **2**, 71–127.

Bollinger, C. & David, M. (1997), 'Modeling discrete choice with response error: Food stamp participation', *Journal of the American Statistical Association* **92**(439), 827–835.

Breunig, B. & Dasupta, I. (2005), 'Do intra-household effects generate the food stamp cashout puzzle', *American Journal of Agricultural Economics* **87**(3), 552–568.

Cameron, C., Gelbach, J. & Miller, D. (2008), 'Bootstrap based improvements for inference with clustered errors', *Review of Economics and Statistics* **90**, 414–27.

Castner, L. & Henke, J. (2011), 'Benefit redemption patterns in the Supplemental Nutrition Assistance Program', USDA Food and Nutrition Service.

Cole, N. & Fox, M. K. (2008), 'Diet quality of Americans by food stamp participation status: Data from the National Health and Nutrition Examination Survey, 1999-2004', USDA FNS ORNA.

Cunnyngham, K., Sukasih, A. & Castner, L. (2013), 'Empirical Bayes shrinkage estimates of state Supplemental Nutrition Assistance Program participation rates in 2008-2010 for all eligible people and the working poor', Mathematica Policy Research.

Currie, J. (1995), *Welfare and the Well-Being of Children*, Harwood Academic Publishers.

Currie, J. (2008), *The Invisible Safety Net: Protecting the Nation's Poor Children and Families*, Princeton University Press.

Currie, J. & Gahvari, F. (2008), 'Transfers in cash and in-kind: Theory meets the data', *Journal of Economic Literature* **46**(2), 333–383.

Currie, J. & Grogger, J. (2002), 'Medicaid expansions and welfare contractions: Offsetting effects on maternal behavior and infant health', *Journal of Health Economics* **21**(2), 313–335.

Currie, J. & Moretti, E. (2008), Did the introduction of food stamps affect birth outcomes in California?, *in* R. Schoeni, J. House, G. Kaplan & H. Pollack, eds, 'Making Americans Healthier: Social and Economic Policy as Health Policy', Russell Sage Foundation, pp. 122–142.

Daponte, B. O., Sanders, S. & Taylor, L. (1999), 'Why do low-income households not use food stamps? Evidence from an experiment', *The Journal of Human Resources* **34**(3), pp. 612–628.

Devaney, B. & Moffitt, R. (1991), 'Dietary effects of the Food Stamp Program', *American Journal of Agricultural Economics* **73**(1), pp. 202–211.

Eslami, E., Filion, K. & Strayer, M. (2011), 'Characteristics of Supplemental Nutrition Assistance Program households: Fiscal Year 2010', USDA Food and Nutrition Service.

Flaherty, C. & Mumford, K. (2012), How costly is welfare stigma? Separating psychological from time costs in food assistance programs, Working paper.

FNS (2012), 'Supplemental Nutrition Assistance Program State Activity Report Fiscal Year 2011', SNAP Program Accountability Administration Division, USDA.

Fox, M. K., Hamilton, W. & Lin, B.-H. (2004), 'Effects of food assistance and nutrition programs on nutrition and health: Volume 3 literature review', USDA ERS FANRP 19-3.

Fraker, T., Martini, A. & Ohls, J. (1995), 'The effect of food stamp cashout on food expenditures: An assessment of the findings from four demonstrations', *Journal of Human Resources* **30**(4), 633–649.

Ganong, P. & Liebman, J. (2013), The decline, rebound, and further rise in SNAP enrollment: Disentangling business cycle fluctuations and policy changes, Working Paper W19363, NBER.

Gleason, P., Rangarajan, A. & Olson, C. (2000), 'Dietary intake and dietary attitudes among food stamp participants and other low-income individuals', MPR report for USDA.

Grossman, M. (1972), 'On the concept of health capital and the demand for health', *Journal of Political Economy* **80**(2), 223–255.

Gundersen, C., Jolliffe, D. & Tiehen, L. (2009), 'The challenge of program evaluation: When increasing program participation decreases the relative well-being of participants', *Food Policy* **34**(4), 367–376.

Gundersen, C., Kreider, B. & Pepper, J. (2011), 'The economics of food insecurity in the United States', *Applied Economic Perspectives and Policy* **33**(3).

Hoynes, H., Schanzenbach, D. & Almond, D. (2012), Long run impacts of childhood access to the safety net, Working Paper W18535, NBER.

Hoynes, H. W. & Schanzenbach, D. (2009), 'Consumption responses to in-kind transfers: Evidence from the introduction of the Food Stamp Program', *American Economic Journal: Applied Economics* **1**, 109–139.

IOM & NRC (2013), *Supplemental Nutrition Assistance Program: Examining the Evidence to Define Benefit Adequacy*, The National Academies Press.

Kabbani, N. & Wilde, P. (2003), 'Short recertification periods in the US Food Stamp Program', *Journal of Human Resources* **38(S)**, 1112–1138.

Kreider, B., Pepper, J., Gundersen, C. & Jolliffe, D. (2012), 'Identifying the effects of SNAP on child health outcomes when participation is endogenous and misreported', *Journal of the American Statistical Association* **107**(499), 958–974.

Lowe, G. S. (1997), 'Computers in the workplace', *Perspectives on Labour and Income* **9**(2), 29–36.

Meyer, B., Mok, W. & Sullivan, J. (2009), The under-reporting of transfers in household surveys: Its nature and consequences, Working Paper W15181, NBER.

Meyerhoefer, C. & Yang, M. (2011), 'The relationship between food assistance and health: A review of the literature and empirical strategies for identifying program effects', *Applied Economic Perspectives and Policy* .

Moffitt, R. (1983), 'An economic model of welfare stigma', *American Economics Review* **73**(5), 1023–1035.

Moffitt, R. (1989), 'Estimating the value of an in-kind transfer: The case of food stamps', *Econometrica* **57**(2), 385–409.

Ratcliffe, C., McKernan, S. & Zhang, S. (2011), 'How much does the Supplemental Nutrition Assistance Program reduce food insecurity?', *American Journal of Agricultural Economics* **93**, 1082–1098.

Rose, D. (2007), 'Food Stamps, the Thrifty Food Plan, and meal preparation: The importance of the time dimension for US nutrition policy', *Journal of Nutrition Education and Behavior* **39**(4), 226–232.

Ver Ploeg, M. & Ralson, K. (2008), 'Food Stamps and obesity: What do we know?', USDA EIB-34.

Wilde, P., Troy, L. & Rogers, B. (2009), 'Food stamps and food spending: An Engel function approach', *American Journal of Agricultural Economics* **91**(2), 416–430.

Yen, S., Andrews, M., Chen, Z., & Eastwood, D. (2008), 'Food Stamp Program participation and food insecurity: An instrumental variables approach', *American Journal of Agricultural Economics* **90**(1), 117–132.

Table 1: Summary statistics for NHIS, full sample

	Full Sample	SNAP	No SNAP
Male	0.49	0.36	0.50
Age	36	29	36
HH size	3.3	3.7	3.3
# children	1.2	1.9	1.1
Hispanic	0.14	0.21	0.13
White	0.71	0.52	0.72
Black	0.11	0.28	0.10
Asian	0.04	0.02	0.04
AI/AK	0.01	0.01	0.01
Race other/miss.	0.13	0.17	0.13
Citizen	0.93	0.95	0.93
In US < 5 years	0.02	0.02	0.02
Poor	0.10	0.57	0.08
Uninsured now	0.15	0.18	0.14
Own health insurance from following source:			
Private insurance	0.67	0.09	0.70
Medicaid	0.10	0.62	0.07
SCHIP	0.01	0.03	0.01
Other state plan	0.003	0.006	0.003
Medicare	0.13	0.12	0.13
Military coverage	0.03	0.01	0.03
Indian Health Service	0.003	0.005	0003
Family in kind benefit last year from:			
SNAP	0.05	1	0
SNAP DK/RF	0.02	0	0
Housing assistance	0.03	0.27	0.003
TANF/AFDC non-cash	0.01	0.06	0.02
Family income last year from:			
Wages	0.47	0.27	0.49
Self employment	0.07	0.02	0.07
SS OA/Retirement	0.11	0.08	0.12
SS disability	0.01	0.05	0.01
SSI disability	0.02	0.11	0.01
SSI non-disability	0.004	0.03	0.003
Child Support	0.02	0.08	0.02
TANF/AFDC cash	0.02	0.22	0.005
Housing:			
Own/buying	0.68	0.26	0.72
Renting	0.28	0.69	0.26
N	1279344	74369	1173583

Notes: Table reports means for full sample (column 1), and for those reporting SNAP last year (column 2) and those reporting no SNAP last year (column 3). Health insurance reported are IHIS recodes, and are not mutually exclusive. All differences between columns 2 and 3 are significant at the 1% level. Statistics weighted with person weight, and variances for tests of equality allow for stratification and clustering within PSU in the original sample with the public use NHIS stratum and PSU variables.

Table 2: Summary statistics for NHIS, adults (age $\geq$ 18)

	Full Sample	SNAP	No SNAP
Age	45	41	46
Marital status:			
Married now	0.57	0.28	0.59
Widowed/divorced/sep.	0.18	0.36	0.18
Never married	0.23	0.36	0.23
Completed education:			
HS dropout	0.16	0.40	0.15
HS graduate/GED	0.29	0.33	0.29
More than high school	0.52	0.26	0.54
Self-rated health:			
Excellent/very good	0.62	0.34	0.63
Good	0.26	0.31	0.26
Fair/poor	0.12	0.34	0.11
Family member limited:			
Any	0.26	0.54	0.25
Number	0.33	0.76	0.31
Child special ed. or other developmental delay:			
Any	0.09	0.17	0.09
No kid in family	0.61	0.41	0.62
Health care use in family last 2 weeks:			
$\geq$ 1 doctor visit	0.34	0.43	0.34
# in hosp. overnight	0.23	0.39	0.22
Health care use in family last year:			
$\geq$ 1 needed care, not afford.	0.10	0.25	0.10
N	922970	45293	855514

Notes: Table reports means for all adults (18 and older, column 1), and for adults reporting SNAP last year (column 2) and for adults reporting no SNAP last year (column 3). All differences between columns 2 and 3 are significant at the 1% level. Statistics weighted with person weight, and variances for tests of equality allow for stratification and clustering within PSU in the original sample with the public use NHIS stratum and PSU variables.

Table 3: Summary statistics for NHIS, children (age $\leq$ 17)

	Full Sample	SNAP	No SNAP
Age	8.5	7.6	8.6
Under 5	0.28	0.33	0.27
Family number of children	2.5	2.9	2.4
Mother's completed education			
HS dropout	0.15	0.36	0.13
HS graduate/GED	0.25	0.30	0.24
More than high school	0.52	0.26	0.55
Missing	0.08	0.08	0.07
Father's completed education:			
HS dropout	0.11	0.16	0.11
HS graduate/GED	0.20	0.13	0.21
More than high school	0.41	0.09	0.45
Missing	0.27	0.62	0.24
Self-rated health:			
Excellent/very good	0.82	0.70	0.84
Good	0.16	0.26	0.15
Fair/poor	0.02	0.05	0.02
Family member limited:			
Any	0.23	0.40	0.22
Number	0.33	0.63	0.30
Child special ed. or other developmental delay:			
Self	0.06	0.09	0.06
Any	0.12	0.20	0.11
Health care use in family last 2 weeks:			
$\geq$ 1 doctor visit	0.38	0.40	0.38
# in hosp. overnight	0.31	0.41	0.31
Health care use in family last year:			
$\geq$ 1 needed care, not afford.	0.11	0.23	0.11
N	356378	30176	318069

Notes: Table reports means for all children (17 and younger, column 1), and for children reporting SNAP last year (column 2) and for children reporting no SNAP last year (column 3). All differences between columns 2 and 3 are significant at the 1% level except mother's education missing, which is significant at the 5% level. Statistics weighted with person weight, and variances for tests of equality allow for stratification and clustering within PSU in the original sample with the public use NHIS stratum and PSU variables.

Table 4: Health conditions for adults on and off-SNAP (age ≥ 18)

	SNAP	No SNAP
Height	67	68
Weight	185	178
Bed disability days in the last year:		
None	0.51	0.63
1–7	0.28	0.29
8–30	0.10	0.05
31–180	0.10	0.023
≥ 181	0.02	0.004
Missing	0.03	0.01
Diagnosed with/has health condition:		
ADD ever	0.07	0.03
Asthma ever	0.19	0.10
Asthma still	0.12	0.05
Vision problem	0.18	0.09
Blind	0.01	0.004
Chronic brochitis	0.10	0.04
Diabetes	0.12	0.07
Heart attack	0.12	0.03
Stroke	0.05	0.02
Ulcer	0.13	0.07
Health conditions in last 3 months:		
Lower back pain	0.45	0.27
Lower back and leg pain	0.21	0.08
Neck pain	0.24	0.14
Migraines frequently	0.32	0.14
Health conditions in last year:		
Hay fever	0.08	0.09
Sinusitis	0.18	0.14
Health behaviors::		
Current drinker	0.47	0.62
Ever drinker	0.69	0.76
Never drinker	0.29	0.22
Current smoker	0.40	0.21
Former smoker	0.15	0.22
Never smoker	0.44	0.56
Medical care last year:		
Flu shot	0.23	0.28
Hospital overnight	0.19	0.07
Health conditions in last 2 weeks:		
Stomach problems	0.08	0.05
Any of food in last month:		
Pizza	0.74	0.78
Non-diet soda	0.66	0.54
Salad	0.79	0.86

Notes: Table reports means for adults reporting SNAP last year (column 1) and for adults reporting no SNAP last year (column 2). All differences between columns 1 and 2 are significant at the 1% level except the following: 1) significant at the 5% level for one to seven bed disability days, having had hay fever last year. Food stamp recipients are less likely to be drinkers but more likely to be smokers. Food stamp recipients are less likely to have had a pizza last month, more likely to have had non diet soda, and less likely to have had a salad last month. Statistics weighted with person or sample adult weight as relevant and variances for tests of equality allow for stratification and clustering within PSU in the original sample with the public use NHIS stratum and PSU variables.

Table 5: Health conditions for children on and off-SNAP (age ≤ 17)

	SNAP	No SNAP
Age	7.6	8.6
Under 5	0.33	46
Family number of children	2.5	2.9
Days of school lost last year if school age:		
None	0.18	0.20
1–5	0.32	0.40
6–30	0.15	0.11
31–240	0.01	0.003
Not in school	0.008	0.007
Diagnosed with/has health condition:		
ADD ever	0.10	0.06
Learning disability	0.13	0.07
Mental retardation	0.01	0.004
Other dev. delay	0.05	0.02
Asthma ever	0.19	0.12
Asthma still	0.11	0.06
Vision problem	0.04	0.02
Blind	0.002	0.001
Health conditions in last year:		
Anemia	0.03	0.01
Frequent diarrhea	0.03	0.01
> 3 ear infections	0.09	0.06
Food allergy	0.04	0.04
Respiratory allergy	0.12	0.11
Skin allergy	0.11	0.09
Hay fever	0.08	0.10
Sinusitis	0.07	0.07
Preventive care:		
Flu shot last year	0.27	0.23
Health conditions in last 2 weeks:		
Stomach problems	0.08	0.06

Notes: Table reports means for children reporting SNAP last year (column 2) and for children reporting no SNAP last year (column 3). All differences between columns 2 and 3 are significant at the 1% level except the following: 1) no significant differences for child didn't attend school (if age 5 and older), days of school missed not reported, child was blind; 2) significant at the 5% level for respiratory allergy. Hayfever is the only health condition or negative outcome that is more commmon for non-Food Stamp recipient children than Food Stamp recipient children and having a flu shot last year is the only other outcome where food stamp recipient children are more advantaged. Statistics weighted with person or sample child weight as relevant and variances for tests of equality allow for stratification and clustering within PSU in the original sample with the public use NHIS stratum and PSU variables.

Table 6: Determinants of SNAP participation, 1998–2010

	(1)	(2)
Economic contraction	0.012	−−
	(0.001)	
P-value, wild bootstrap	[0.000]	−−
Regional unemp. rate	−−	0.005
(0.002)		
P-value, wild bootstrap	−−	[0.09]
(annual)		(0.001)
	−−	[0.0012]
Male	-0.026	-0.026
	(0.0007)	(0.001)
Family size	-0.03	-0.03
	(0.001)	(0.001)
Number of children	0.05	0.05
	(0.001)	(0.001)
Age 5–17	-0.12	-0.13
	(0.002)	(0.002)
Age 18–24	0.02	0.02
	(0.002)	(0.002)
Age 45–64	0.0006	-0.0008
	(0.001)	(0.001)
Age $\geq$ 65	-0.016	-0.018
	(0.001)	(0.001)
Mom HS dropout if child	0.13	0.13
	(0.004)	(0.004)
Mom HS grad/GED if child	0.05	0.05
	(0.002)	(0.002)
Mom's ed. missing if child	0.05	0.04
	(0.003)	(0.003)
HS dropout if adult	0.09	0.10
	(0.002)	(0.002)
HS grad/GED if adult	0.03	0.03
	(0.001)	(0.001)
Education missing	0.04	0.05
	(0.005)	(0.004)
Hispanic	0.02	0.01
	(0.002)	(0.002)
Black	0.08	0.08
	(0.002)	(0.002)
Asian	0.02	0.02
	(0.002)	(0.002)
AI/AK	0.05	0.05
	(0.010)	(0.010)
Race other/miss.	0.016	0.02
	(0.001)	(0.002)
Born in the US	0.04	0.03
	(0.004)	(0.004)
In US 5–14 years	-0.002	-0.006
	(0.004)	(0.004)
In US $\geq$ 15 years	0.02	0.02
	(0.004)	(0.003))
Month of IW dummies	Y	Y
Region dummies	Y	Y
Year of IW dummies	N	Y

Notes: Table reports results of specifications modelling use of SNAP for all person in 1998–2010. For adults, own education is reported while for children, mother's education is reported. Statistics weighted with person weight and SEs within parentheses allow for stratification and clustering within PSU in the original sample with the public use NHIS stratum and PSU variables. P-value for annual contraction variable for column 1 in brackets uses the wild bootstrap of Cameron et al., and cluster2 on year. P-value for region's annual unemployment rate for column 2 in brackets use the wild bootstrap of Cameron et al., and cluster2 on region. Coefficients on month, year, and region dummies (where relevant) omitted.

Table 7: Is health selection into SNAP different in bad times? Evidence for adults

Outcome	Height	Weight	Asthma, ever
A: Cycle measured by contraction year			
Food Stamps, last year	0.24***	11.9***	0.09***
	(0.07)	(0.65)	(0.005)
Economic contraction	0.051*	2.23***	0.02***
	(0.23)	(0.19)	(0.001)
Contraction * FS LY	-0.05	-0.60	0.004
	(0.09)	(0.89)	(0.007)
Month of IW dummies	Y	Y	Y
Region dummies	Y	Y	Y
B: Cycle measured by regional unemployment rate			
Food Stamps, last year	0.26*	14.0***	0.09***
	(0.14)	(1.60)	(0.011)
Regional unemp. rate	0.031	-0.06	0.004**
(annual)	(0.35)	(0.40)	(0.002)
Unemp. rate * FS LY	-0.008	-0.28	-0.001
	(0.02)	(0.26)	(0.002)
Month of IW dummies	Y	Y	Y
Region dummies	Y	Y	Y
Year dummies	Y	Y	Y

Notes: Table reports results of specifications modelling health as function of demographics and other controls in previous table plus controls for region, contraction, received food stamps last year, and the interaction of contraction and got food stamps last year for adults (panel A) or controlling for region, regional unemployment rate, received food stamps last year and the interaction of regional unemployment rate and got food stamps last year for adults (panel B). Sample period is 1998–2010, specification uses sample adult weight, and variances allow for stratification and clustering within PSU in the original sample with the public use NHIS stratum and PSU variables. Coefficients omitted on month, year, and region dummies (where relevant).

Table 8: Is health selection into SNAP different in bad times? Evidence for children

Outcome	No school days missed	ADD diag. ever	Asthma, ever	Anemia, last year
A: Cycle measured by contraction year				
Food Stamps, last year	-0.03***	0.03***	0.07***	0.017***
	(0.007)	(0.005)	(0.005)	(0.003)
Economic contraction	0.00002	0.01***	0.01***	0.0005
	(0.003)	(0.002)	(0.002)	(0.0007)
Contraction * FS LY	0.0004	0.02**	-0.013	-0.007**
	(0.009)	(0.08)	(0.000)	(0.004)
Month of IW dummies	Y	Y	Y	Y
Region dummies	Y	Y	Y	Y
B: Cycle measured by regional unemployment rate				
Food Stamps, last year	-0.03**	0.037***	0.05***	0.018***
	(0.015)	(0.012)	(0.014)	(0.006)
Regional unemp. rate	-0.003	-0.004	0.002	0.0003
(annual)	(0.004)	(0.013)	(0.004)	(0.0009)
Unemp. rate * FS LY	0.0005	0.0006	0.0008	-0.001
	(0.0023)	(0.002)	(0.0023)	(0.001)
Month of IW dummies	Y	Y	Y	Y
Region dummies	Y	Y	Y	Y
Year dummies	Y	Y	Y	Y

Notes: Table reports results of specifications modelling health as function of demographics and other controls in previous table plus controls for region, contraction, received food stamps last year, and the interaction of contraction and got food stamps last year for children (panel A) or controlling for region, regional unemployment rate, received food stamps last year and the interaction of regional unemployment rate and got food stamps last year for children (panel B). Sample period is 1998–2010, specification uses sample child weight, and variances allow for stratification and clustering within PSU in the original sample with the public use NHIS stratum and PSU variables. Coefficients omitted on month, year, and region dummies (where relevant). No school days missed reported for previous year.

Table 9: Summary statistics for NHANES 2007–2008, full sample

	Full Sample	SNAP last year	No SNAP last year
Male	0.49	0.46	0.50
Age	36	27	38
Family head HSDO	0.20	0.44	0.16
Family of 7 or more	0.05	0.12	0.04
Child aged 0-5	0.08	0.16	0.07
HSDO/child in school	0.32	0.53	0.29
HS or GED	0.20	0.17	0.44
More than HS	0.40	0.14	0.44
Hispanic	0.15	0.25	0.14
White	0.66	0.44	0.70
Black	0.12	0.27	0.10
Other race (non-Hispanic)	0.06	0.05	0.06
Citizen	0.93	0.92	0.93
Income under 200% poverty	0.36	0.86	0.28
SNAP receipt			
Ever	0.21	1	0.08
Last year	0.14	1	0
SNAP DK/RF	0.01	0	0
N	10149	2188	7873

Notes: Table reports means for full sample (column 1), and for those reporting SNAP last year (column 2) and those reporting no SNAP last year (column 3), using data from the 2007–2008 NHANES. Statistics weighted with person weight.

Table 10: Means for SNAP and non SNAP recipients in 2007–2008 NHANES, adults (age ≥ 18)

	Mean SNAP last year	Mean no SNAP last year
Dietary outcomes, 24 hour recall,adults		
Total calories	2052	2132
Protein (gm)	76	82
Protein < RDA	0.29	0.19
Carbohydrates	257	257
Fiber (gm)	13	16
Fiber < RDA	0.94	0.88
Cholesterol (mg)	293	292
Cholesterol < DG	0.34	0.34
Fat (gm)	77	81
Outside AMDR fat limits	0.49	0.51
Calcium (mg)	809	951
Below RDA for calcium	0.74	0.68
Zinc (mg)	14	12
Below RDA for Zinc	0.50	0.41
Iron (mg)	14	15
Below RDA for iron	0.50	0.33
Magnesium	246	299
Below RDA for magn.	0.83	0.74
Examination weight, height, BMI:		
Weight (KG)	83	81
Height (cm)	167	169
BMI	30	28
Underweight ($bmi < 18.5$)	0.04	0.02
Obese ($bmi > 30$)	0.40	0.32

Notes: Table reports SNAP and no SNAP means in outcome for adults (age ≥ 18). Statistics weighted with person diary or exam weight as relevant.

Table 11: Means for SNAP and non SNAP recipients in 2007–2008 NHANES, children (age ≤ 17)

	Mean SNAP last year	Mean no SNAP last year
Dietary outcomes, 24 hour recall, children/proxy		
Total calories	1778	1820
Protein (gm)	60	65
Protein < RDA	0.11	0.09
Carbohydrates	242	242
Fiber (gm)	12	12
Fiber < RDA	0.88	0.90
Cholesterol (mg)	196	216
Cholesterol $\geq$ DG	0.19	0.22
Fat (gm)	65	68
Outside AMDR fat limits	0.55	0.53
Calcium (mg)	956	985
Below RDA for calcium	0.62	0.65
Zinc (mg)	10	10
Below RDA for Zinc	0.26	0.28
Iron (mg)	13	13
Below RDA for iron	0.33	0.37
Magnesium	201	218
Below RDA for magn.	0.42	0.46
Examination weight, height, BMI:		
Weight (KG)	35	39
Height (cm)	134	140
Weight relative to WHO standards, children 0–10		
Weight $\leq$ 5th %ile	0.02	0.02
Weight $\leq$ 10th %ile	0.06	0.05
Weight $\geq$ 90th %ile	0.25	0.20
Height below various WHO standards, children 2–10		
Height $\leq$ 5th %ile	0.06	0.04
Height $\leq$ 10th %ile	0.11	0.07

Notes: Table reports SNAP and no SNAP means in outcome for children (age ≤ 17). Statistics weighted with person diary or exam weight as relevant.

Table 12: SNAP/no SNAP difference 2007–2008 NHANES, adults (age $\geq$ 18), adjusted and unadjusted

	Unadjusted Coefficient on SNAP	Adjusted Coefficient on SNAP
Dietary outcomes, 24 hour recall, adults		
Total calories	-67	-55
Protein (gm)	-5**	-3
Protein < RDA	0.10***	0.06**
Carbohydrates	-0.04	-1.7
Fiber (gm)	-3.6***	-2.4***
Fiber < RDA	0.06***	0.04**
Cholesterol (mg)	4.3	7.7
Cholesterol $\geq$ DG	0.005	0.013
Fat (gm)	-3.9**	-1.8
Outside AMDR fat limits	-0.02	-0.01
Calcium (mg)	-137***	-112***
Below RDA for calcium	0.06***	0.07***
Zinc (mg)	-1.0***	-0.7**
Below RDA for Zinc	0.08***	0.07***
Iron (mg)	-1.5***	-0.7**
Below RDA for iron	0.16***	0.07***
Magnesium	-52***	-36***
Below RDA for magn.	0.09***	0.08***
Controls for day of week diary was taken in	Y	Y
Controls for other Xs	N	Y
Examination weight, height, BMI:		
Weight (KG)	1.6	2.9**
Height (cm)	-2.2***	-0.52
BMI	1.4***	1.3**
Underweight ($bmi < 18.5$)	0.02**	0.02**
Obese ($bmi > 30$)	0.08***	0.07**
Controls for other Xs	N	Y

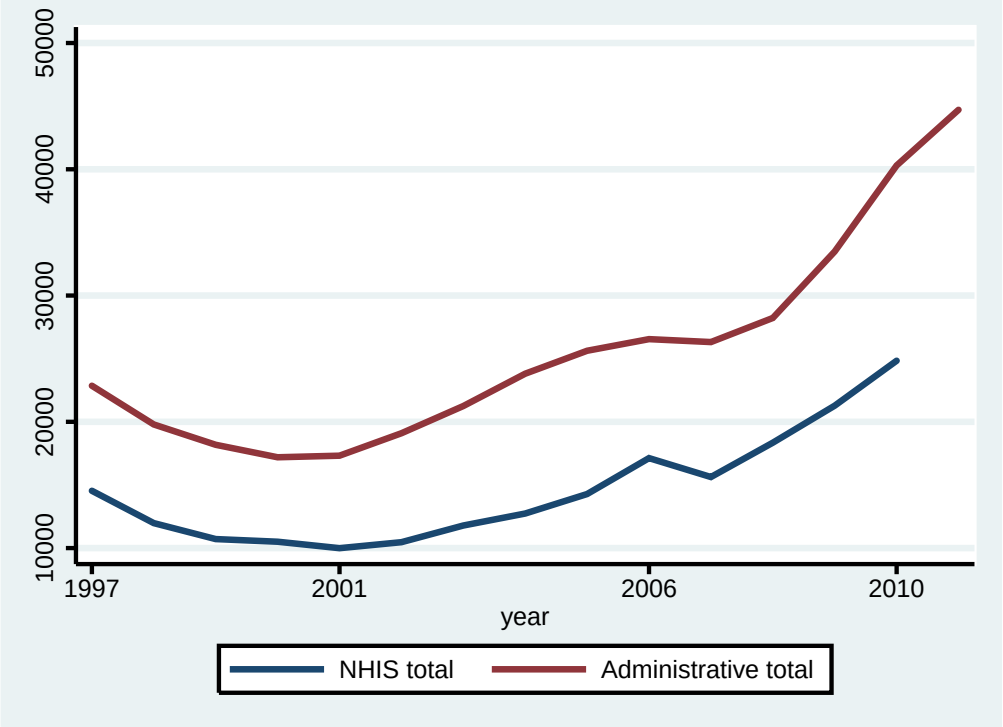
Notes: Table reports SNAP-no SNAP difference in outcome for adults (age $\geq$ 18). Column 1 reports unadjusted differences (only controls are no FS reported and day of week for food diary). Column 2 reports results adjusting for Xs (gender, family size, age, education of family head, own education, race/ethnicity). All differences between columns 2 and 3 are significant at the 1% level except mother's education missing, which is significant at the 5% level. Statistics weighted with person weight, and variances for tests of equality allow for stratification and clustering within PSU in the original sample with the public use NHANES stratum and PSU variables.

Table 13: SNAP/no SNAP difference 2007–2008 NHANES, children (age < 18)

	Unadjusted Coefficient on SNAP	Adjusted Coefficient on SNAP
Dietary outcomes, 24 hour recall, children/proxy		
Total calories	-35	30
Protein (gm)	-5**	-3
Protein < RDA	0.02	0.02
Carbohydrates	1.3	11.6
Fiber (gm)	-0.7	-0.3
Fiber < RDA	-0.02	0.02*
Cholesterol (mg)	-19*	-21**
Cholesterol $\geq$ DG	-0.03	-0.04*
Fat (gm)	-2.3	-0.5
Outside AMDR fat limits	0.02	0.04
Calcium (mg)	-32	-23
Below RDA for calcium	-0.03	0.01
Zinc (mg)	-0.12	0.17
Below RDA for Zinc	-0.02	-0.003
Iron (mg)	-0.17	0.07
Below RDA for iron	-0.05**	-0.05**
Magnesium	-17**	-12*
Below RDA for magn.	-0.04	-0.001
Controls for day of week diary was taken in	Y	Y
Controls for other Xs	N	Y
Examination weight, height, BMI:		
Weight (KG) age 0–10	-0.50	-0.26
Weight relative to WHO standards, children 0–10		
Weight $\leq$ 5th %ile	0.004	0.004
Weight $\leq$ 10th %ile	0.012	0.011
Weight $\geq$ 90th %ile	0.051**	0.04**
Height (cm) age 2–10	-0.74	-0.70
Height below various WHO standards, children 2–10		
Height $\leq$ 5th %ile	0.02	0.02
Height $\leq$ 10th %ile	0.04***	0.04***
Controls for other Xs	N	Y

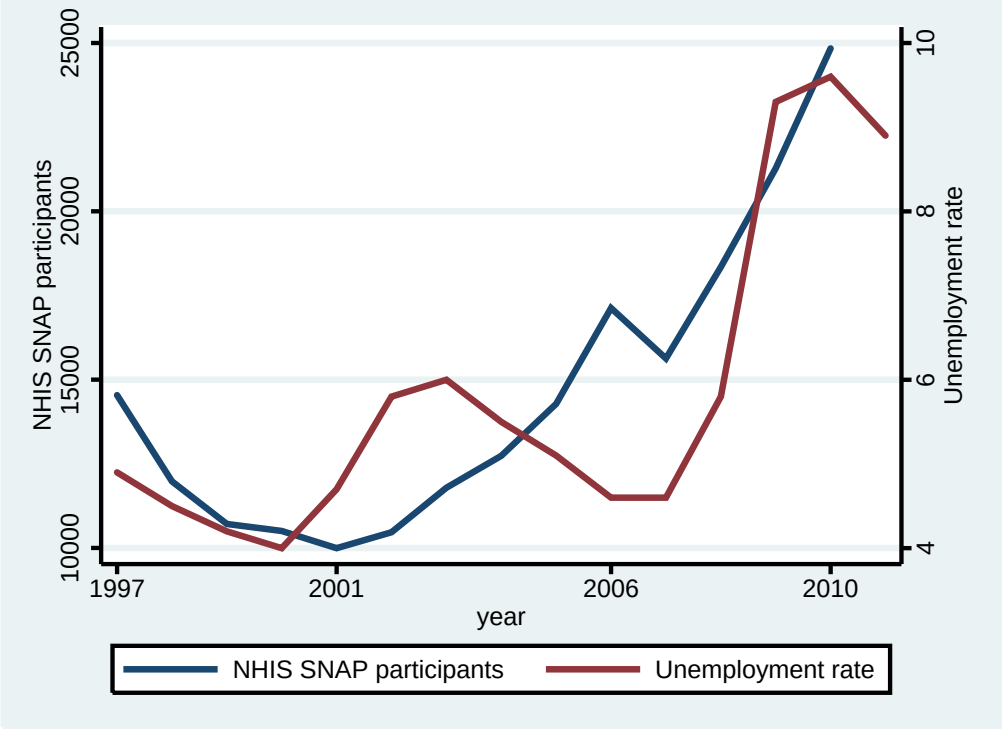
Notes: Table reports SNAP-no SNAP difference in outcome for adults (age $\geq$ 18). Column 1 reports unadjusted differences (only controls are no FS reported and day of week for food diary). Column 2 reports results adjusting for Xs (gender, family size, age, education of family head, own education, race/ethnicity). Statistics weighted with person weight, and variances allow for stratification and clustering within PSU in the original sample with the public use NHANES stratum and PSU variables.

Figure 1: Administrative and NHIS generated total SNAP participants by year



Notes: Figure shows total administrative persons on average on SNAP per month by Fiscal Year and the total weighted number of persons on SNAP in the previous year by NHIS survey year.

Figure 2: NHIS total SNAP participants and the business cycle, 1997–2010



Notes: Figure shows total administrative persons on average on SNAP per month by Fiscal Year and the total weighted number of persons on SNAP in the previous year by NHIS survey year.