

# **Getting it Right, or at Least Better: Improving Identification of Food Stamp Participants in the National Health and Nutrition Examination Survey**

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Tables and figures for this draft appear at the end but are hyperlinked to points of reference in the text. Click on label or browser back button (Alt ←) to return.

## **Abstract**

The utility of the National Health and Nutrition Examination Survey (NHANES) for studying the use and consequences of the Supplemental Nutrition Assistance Program (SNAP) is diminished by substantial net under-reporting of both SNAP participation and benefits among survey respondents. This paper compares NHANES-based national SNAP estimates with administrative totals and investigates the pattern of under- and over-reporting of SNAP receipt by NHANES respondents in Texas. Shifting from focus on individual “authorization” to identification of participation using a more broad-based “household” measure reduces net under-reporting in aggregate. The Texas data confirm this gain, but the reduction in actual under-reporting is in part offset by increased over-reporting. Comparison of NHANES results to other national surveys is complicated by differences in the surveys’ definitions of SNAP participation and, especially, by differences between the populations within which SNAP receipt occurs and the populations actually sampled. Strategies for further research and survey development are suggested.

Key words: National Health and Nutrition Examination Survey, Supplemental Nutrition Assistance Program, NHANES, SNAP, Under-Reporting

## Executive Summary

### **Getting it Right, or at Least Better: Improving Identification of SNAP Participants in the National Health and Nutrition Examination Survey**

John A. Kirlin and Michael Wiseman

The National Health and Nutrition Examination Survey (NHANES) is a premier information source for study of the health of Americans. The Supplemental Nutrition Assistance Program (SNAP, formerly FSP, the Food Stamp Program) is the nation's largest nutrition-oriented social assistance program. Ideally, the combination of other nutrition and health information about NHANES respondents with information on receipt of nutrition assistance would support study of the targeting and effectiveness of SNAP. However, the utility of NHANES as a source of information on use and consequences of SNAP is diminished if survey respondents fail to report receipt accurately. In this paper we compare estimates of national SNAP participation and benefits derived from the NHANES with administrative totals and investigate the pattern of under- and over-reporting of SNAP receipt by NHANES respondents in a pilot study that matched NHANES data for Texas to that state's program administrative files.

#### *Background*

The NHANES is designed and managed by the National Center for Health Statistics (NCHS) and fielded by contractor. The survey focus is on individuals, termed "Sample Persons" (SPs). Since 1999 the NHANES has been collected continuously, with changes in content and frame occurring at two-calendar-year intervals. Sample size per wave is roughly 10,000 persons, selected and weighted to represent the contemporary non-institutional population. The survey combines questions on individual health and nutrition and questions about household and family circumstance with a lengthy physical examination, conducted in mobile examination centers, for most SPs. The family questionnaire includes a "food security" module with questions about FSP/SNAP participation by all members of the household.

#### *The Problem of Under-Reporting*

Up until the 2005-2006 interview wave, the NHANES family questionnaire asked if any members of the SP's household, including the SP, were at the time of the survey "authorized" to receive food stamps. In the 2005-2006 wave, the food security module prefaced the individual authorization question with a general query about receipt by anyone in the household. Citing possible respondent misunderstanding of the meaning of individual "authorization," NCHS recommended use of response to the general question, rather than reported individual SP authorization, to identify SPs receiving FSP benefit.

Figure ES 1 shows results of NHANES-based estimation of FSP/SNAP individual participation over six survey waves, covering the 12-year interval 1999-2010. For the first four waves the estimate is based on the reported authorization of the SP for food stamp receipt. For the 2005-2006 and two following waves the chart shows participation estimates based on response to the

general question about household receipt, adjusted for the probability that the SP is eligible for inclusion in the FSP receipt/SNAP administrative unit (for various reasons some household members may not be included). The shift from individual to adjusted household reference raises the estimated reporting rate. For the three waves from 2005-2010 the NHANES-based individual participation estimate is not significantly different from the administrative participant count.

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Figure ES 1: Using Household Reference Increases Consistency of Survey Results for Individual FSP Participation with Administrative Data

On average over the three waves 2005-2010, the household-based participation rate is 99.3 percent of the administrative total. It is possible to manipulate the NHANES data on persons to produce estimates of total benefits and total cases. These estimates are less successful in replicating administrative totals: Benefits fall short by 18.9 percent, cases by 23.6 percent.

In sum, identifying individual FSP/SNAP receipt on the basis of household status substantially improves the degree of conformity between NHANES-based participation estimates and administrative data. The implication is that collection of data on household receipt has improved the utility of the NHANES as an instrument for studying the association between health and nutrition outcomes and nutrition assistance. Estimates of both benefits and total cases are less successful. The estimated reporting rate for all three measures is net, presumably combining both over- and under-reporting. The Texas Pilot subsample supports a more detailed investigation.

#### *The Texas NHANES Pilot*

To investigate further possible sources of discrepancy between food stamp receipt as reported in the NHANES and administrative data, NHANES data were matched with food stamp records in Texas, a state contributing a significant share of the NHANES samples for the 2005-2006 and 2007-2008 waves.

The 2005-2006 data on individual authorization in the Texas subsample confirmed the presence of significant problems. As suspected, both under and over-reporting occur. Figure ES 2 shows sample reporting rates calculated from the weighted response to reported individual authorization (left pair of columns) and on the basis of household receipt (right pair).

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Figure ES 2: Under- and Over-Reporting of Food Stamp Receipt, NHANES 2005-2006 Wave, Texas Subsample

For both definitions, the lower portions of the bars show the percent of the sample of all known SNAP/FSP participants (based on administrative data) for whom receipt is correctly reported—54 percent using individual authorization, 69 when the household definition is employed. The left bar of each pair adds the remainder—all under-reporters. The right bar shows what is reported, including the correct responses and false reports of program participation. The total

height of the right bar is equivalent to what is termed the “reporting rate” in the aggregate analysis. The difference between 100 percent and the second bar in each cluster is what would be identified as “under-reporting” in simple comparison of reported recipients to the administrative total. As the diagram indicates, this is an understatement of actual under-reporting, because of the offset created by those who claim to be recipients but are not matched to administrative data. Note that in both groups the over-reporters are drawn from the population beyond the true recipients categorized in the left bar.

Comparison of the individual authorization and adjusted household-based results reveals the consequence of the shift in the basis for identifying recipients. First, the proportion of true recipients that are correctly identified goes up, as does the reporting rate. But the cost of the adjustment is that the share of false positives (over-reporters) among those identified goes up as well. The nearly 30-percentage-point improvement in the nominal reporting rate (i.e., from about 63 to 92 percent) substantially exaggerates the 11-percentage-point gain in accurate coverage (i.e., from about 57 to 68 percent).

We have also examined under- and over-reporting when reference is made to any receipt over the 12 months prior to the interview. The results, for combined data for two waves, appear in Figure ES 3. The household-based counts for recipients at the time of interview in the left-hand cluster in this figure are the same in concept as the counts on the right-hand side of Figure ES 2, but in this case the data for 2005-2006 are combined with data for 2007-2008.<sup>1</sup>

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Figure ES 3: Effects of Reference Time Interval on Reporting Accuracy, Texas Subsample Combined Waves

The prevalence of both under-reporting and over-reporting is reduced by the change in reference interval. Once again, simple comparison of self-reporting data to a known caseload overstates significantly the success of the survey in capturing the population of recipients because survey-based estimates involve a combination of under- and over-reporting.

### *Other Studies*

There is a substantial literature on under-reporting of social assistance in surveys. Only one other study reports on results for the NHANES, and that study includes only the 2007-2008 wave. Comparison of the results reported here to that of others is complicated by differences in target, time period, and sampling strategy. Nevertheless, the NHANES-based estimates of total participant households and individuals, as well as benefits, come much closer to administrative totals than do CPS-based estimates.

### *Conclusions*

We conclude the following:

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<sup>1</sup> Data from multiple waves could not be combined in Figure ES 2 because the 2005-2006 wave is the only wave that included questions needed to create both the individual- and household-based measures of SNAP participation. We combine waves in Figure ES 3 to take advantage of increased sample size.

- Food stamp receipt in the NHANES is substantially misreported.

On balance the prevalence of receipt is under-reported, but both under- and over-reporting occur. Inaccuracy seems sufficiently pronounced to raise questions about the utility of the NHANES as a source of information on the connection between food stamp/SNAP receipt and nutrition without correcting for the likelihood of misreporting.

- The consistency of survey reports and administrative data on receipt is enhanced when reference is made in survey questions to household receipt rather than individual authorization.

However, the gain in accuracy of responses for actual recipients may be offset by an increase in false reports of receipt.

- Attempts to correct NHANES data must accommodate both under- and over-reporting.

Any modeling is complicated by variation within households of the person responsible for answering questions about FSP receipt and error correlation created by the presence of multiple SPs in the same household.

#### *Next steps*

Possible next steps in this research effort include;

- Analyzing the determinants of the probability of under- and over-reporting of receipt.

Recent changes in the NHANES will help.

- Replicating the Texas effort in other states and over time.

Incorporation of the NHANES in current Census Bureau efforts to link administrative and survey data is an alternative to duplication of the approach reported here.

- More detailed comparison of NHANES misreporting to results from other surveys.

Are there alternative tactics for improving the accuracy of response?

## **Getting it Right, or at Least Better: Improving Identification of Food Stamp Participants in the National Health and Nutrition Examination Survey**

John A. Kirlin and Michael Wiseman \*

Data on transfers are notoriously under-reported in household surveys (Meyer, Mok, and Sullivan 2009). In recent years various agencies, including the Bureau of the Census, have begun to study opportunities for enhancing the coverage and quality of income data available for program management, evaluation, and policy analysis by linking survey and administrative data. This paper presents results from a pilot experiment with linking data from the National Health and Nutrition Examination Survey (NHANES) to Food Stamp Program (FSP) administrative records. Most study of reporting accuracy has focused on the Current Population Survey (CPS) and its adjuncts. This is the first detailed study of FSP participation data in the NHANES.

While the results of this project are specific to NHANES, the issues addressed are general and the NHANES is important. The NHANES is the premier information source for study of the health of Americans. Nutrition is a fundamental contributor to people's health and well-being. The Supplemental Nutrition Assistance Program (SNAP, called the Food Stamp Program—FSP—prior to October 2008) is the nation's largest nutrition-oriented social assistance program. These connections suggest that the NHANES should be a major resource for policy analysts interested in the connections between SNAP/FSP participation and nutrition outcomes. However, the utility of the NHANES for policy studies is diminished by the apparent failure of many respondents to report their SNAP receipt and some cases of respondents who report receipt when it does not occur. For 2005-2006—the NHANES two-year “wave” with the lowest food stamp reporting rate in recent history—the survey-based estimate of monthly national FSP participation amounts to just half of the number of participants reported in administrative data.

Given the substantial public investment involved in designing and fielding the NHANES, accuracy of reported SNAP participation is an important issue, and over the past five years improvement has occurred. The present paper investigates the NHANES misreporting issues. It is a product of a collaborative pilot effort by the Economic Research Service of the U.S. Department of Agriculture (ERS), the National Center for Health Statistics (NCHS) of the U.S. Department of Health and Human Services, and the Ray Marshall Center at the University of Texas (RMC) to link administrative data on FSP/SNAP participation to person observations taken from the NHANES. The object of the pilot is to seek ways of improving the accuracy of information on nutrition assistance receipt in the NHANES and, in so doing, increasing the usefulness of the NHANES for the design and evaluation of national nutrition assistance policy.

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This effort is of general interest because of the importance of improving information on transfer receipt collected in many surveys and the rapid and controversial growth in SNAP receipt since 2008 (DeSilver 2013).

Both national data and a special sample of NHANES records matched to FSP/SNAP administrative records in Texas are employed in this effort. These sources indicate that misreporting has been reduced but not eliminated by a change in the character of the NHANES food stamp questions that occurred beginning in 2005. The results provide opportunity for studying the correlating between household and respondent characteristics and misreporting; such information may suggest possible strategies for further improvement in question wording or survey administration, adjustment in statistical analyses to account for the misreporting and, possibly, correction of some survey data errors.

In what follows, when reference is made to data covering time before October 1, 2008 FSP/ Food Stamp Program will be employed. For reference to data collected thereafter, SNAP is used, and this term is also employed in reference to general program properties.

### **The Problem**

The NHANES is unique among surveys in simultaneous collection of data on health and nutrition and the inclusion of a lengthy physical examination, conducted in mobile examination centers (MECs), for most respondents.<sup>2</sup> The first interviews for what was to become the NHANES were fielded (as the National Health Examination Survey) in 1960. The survey was expanded to include nutrition information and food stamp receipt in 1971-1975 (NHANES I), and the name was changed to reflect this development. The survey has been conducted continuously since 1999, with aggregated data released in two-year waves. Currently about 5,000 persons are interviewed each year.

The NHANES focus is on individuals. Once an address is selected by a “complex multistage probability sampling” process<sup>3</sup> and the location is confirmed to be a residential household, a roster of all persons residing at the address—i.e. living in the household—is developed. One or more individual household members may then be selected as Sample Persons (SPs). There may be multiple families and unrelated individuals within a single household. SPs are invited to participate, and a personal interview and clinical examination follow. The 2007-2008 wave of the continuous NHANES includes 10,149 persons, representing a national non-institutional population (including children) of 297 million people. Persons age 60 or above, African-Americans, and Hispanics were oversampled for this wave.<sup>4</sup> The data are reweighted to infer national characteristics given probability of selection and adjustment for nonresponse. The unweighted response rate for candidate SPs in 2007-2008 was 78.4 percent.<sup>5</sup>

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<sup>2</sup> The description that follows is taken from the NHANES website or based on calculations by the authors using the NHANES public-use samples. See <http://www.cdc.gov/nchs/nhanes.htm> (accessed on August 28, 2014).

<sup>3</sup> See NCHS (No Date) for detail on the NHANES sample.

<sup>4</sup> Groups being oversampled have changed over time; see wave-specific documentation on the NHANES website for details.

<sup>5</sup> See [http://www.cdc.gov/nchs/data/nhanes/response\\_rates\\_cps/RRT0708MF.pdf](http://www.cdc.gov/nchs/data/nhanes/response_rates_cps/RRT0708MF.pdf) (accessed on August 28, 2014).

This is the response rate for the sample persons selected after administration of the household screen. NCHS does not report the number of “at the door” refusals encountered in the initial phase of sample development.



At roughly the same time the SP person interview is conducted, the head (or spouse of the head) of the SP's *family* is asked to complete an interview covering family circumstances. The family questionnaire includes questions about FSP participation by all members of the *household*, which can include persons other than the SP's family. In the four two-year waves conducted between 1999 and 2006, the food stamp query procedure was to first ask the family questionnaire respondent if any member of the household had been "authorized" to receive food stamps during the "last 12 months." If the answer was affirmative, the entire roster was reviewed and the respondent was asked in each case if that person was currently *authorized* to receive food stamps. In households with more than one SP, the household questions are asked only for the family respondent for the first SP selected; the first respondent's answers are then added to the records for all remaining SPs. Multiple SPs are common; on average households with more than one member have 1.7 SPs.<sup>6</sup>

It appears that in practice the interpretation of "authorization" proved problematic and possibly led to under-reporting of benefit receipt (NCHS 2008, 4). Given sampling weights, the reported prevalence of food stamp authorization within NHANES can be used to infer the average number of FSP/SNAP recipients in the country as a whole over the months of the wave interval. This estimate can then be compared to the population of FSP/SNAP participants recorded in administrative data. As Figure 1 indicates, NHANES-based estimates fall short of the administrative total for recipients in all four waves 1999-2006; in every wave the difference exceeds what would be likely given normal sampling variation.<sup>7</sup>

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Figure 1: Under-Reporting of Food Stamp Participation in the NHANES, 1999-2006

The idea of comparing weighted, survey-based estimates to administrative totals is more complex than might first appear. Because the NHANES is continuous, the population being sampled is equivalent to the collection of individuals potentially eligible for Food Stamps/SNAP in each month of the 24-month wave. The administrative data cover the subset of this population that receives SNAP/FSP benefits in each month. The sample universe for the survey is thus equivalent to all persons ever "at risk" of FSP participation over the interval. Comparing the NHANES participation reports to the administrative data assumes the sample is distributed over the wave interval in proportion to growth of the population at risk and that the sample frame is dynamic. Of course in practice the distribution of the sample over the 24 month period is a matter of contractor convenience and scheduling, and the NHANES frame does not change. We have no ready way of assessing the consequence of this difference between ideal and actuality, but given the slow rate of change in the character and distribution of the population, it seems unlikely to be a significant source of bias. Nevertheless, later in our discussion the NHANES sampling strategy will turn out to be an important consideration in comparing our discoveries to results from other survey-based studies of misreporting.

<sup>6</sup> We infer this from the fact that NCHS reports an average of 1.6 SPs per household (NCHS, No Date), and roughly 8 percent (unweighted) of SPs in the seven waves 1999-2010 are in single-person households. There is no household (or family) identifier in the NHANES public use data.

<sup>7</sup> The administrative data include a small number of beneficiaries in congregate facilities (group homes, battered women shelters, and drug and alcohol treatment centers) that would not fall within the NHANES sample frame. Beneficiaries and benefits in this category amount to about one-quarter of one percent of the aggregate, far too few to account for the disparities evident in the figure (Benefit Redemption Division 2012, 5).

## Shifting to Household Reference: A Solution?

The 2005-2006 NHANES introduced an additional question beyond the authorization count, asking for the total amount received in food stamp benefits by the *household* in the previous month. In 2007-2008 and 2009-2010, investigation of *individual* authorization was skipped altogether. It is possible to use the response to the household receipt question to infer SP status and, from that, national recipient counts. Before building this estimate (and for later use in discussion of the literature), we establish definitions more formally and say more about FSP/SNAP administrative conventions.

Like the Bureau of the Census, the NHANES defines a household as all persons living in a dwelling unit. Families are groups of two people or more related by birth, marriage, or adoption and residing together. The NHANES treats unmarried partners as a family if they have a biological or adoptive child in common. Households may include more than one family, as well as unrelated individuals.

Confusion about the meaning of household arises, however, in discussions of SNAP. SNAP benefits are awarded to eligible single people or groups of people. Groups must live together in a residential unit and purchase and prepare food together. The administering agency for SNAP, the USDA Food and Nutrition Service (FNS), uses the household designation in two ways. One is synonymous with what we will call the SNAP “administrative unit” (AU), the collection of people on whose behalf a benefit is received. This is how FNS data on “households participating” in SNAP should be interpreted.<sup>8</sup>

FNS also uses a household definition that extends beyond the AU to include persons not counted as part of the AU (and therefore not included in the agency’s tabulation of benefits) but whose income or assets potentially affect AU eligibility and benefit amount. Examples include non-citizens and persons denied benefit for failure to comply with program rules. As a result, the agency’s national quality control data include for each sampled AU a variable for “Certified Unit Size” and a variable for “Number of People in the Household” (Wolkwitz and Ewell 2007, 73). However, this latter variable includes in principle only those administratively linked to the AU, although what happens in practice when states collect the data is uncertain.

The upshot is that the SNAP/FSP household need not conform to the Bureau of the Census household definition, and what is called a household in surveys that conform to census definitions may contain multiple AUs as well as persons who are not authorized as part of an AU. The “households” to which official publications such as the annual *Characteristics of Supplemental Nutrition Assistance Program Households* reports (cf. Strayer, Eslami, and Leftin 2012) are AUs.

To use response to the household question to infer recipient status for individual SPs requires adjusting for the possibility that the SP is *not* part of an AU. We do this using the QC sample to calculate the probability of inclusion. Details are presented in Appendix A. For adults our estimates probably exaggerate probabilities of inclusion, because the QC data at best capture

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<sup>8</sup> See <http://www.fns.usda.gov/pd/snapmain.htm> (accessed on August 28, 2014).

only non-recipients who are administratively associated with AUs. Some household residents may be unrelated to AU members in any way.

Figure 2 shows the results of shifting to identification of SP recipient status by using the household questions and adjusting for the probability of AU inclusion. The analysis is extended to the 2009-2010 NHANES wave. National FSP recipient estimates based on reported household receipt are indeed higher than estimates based on the NHANES respondents' assessments of individual authorization. For waves 2005-2006, 2007-2008 and 2009-2010, the actual caseload lies within the 95-percent confidence interval for the estimate. For 2009-2010 the ratio of the NHANES-based point estimate to the administrative average is 0.98. Note that what we have calculated here is again an estimate of individual recipient counts, not an estimate of the number of participating households. We have simply switched from counts based on reported individual SP status to inference about individual recipient status based on what is reported for the SP's household and estimates of the likelihood that a sampled individual is a recipient given that the household contains at least one SNAP administrative unit.

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Figure 2: Using Household Reference Increases Consistency of Survey Results for Individual FSP Participation with Administrative Data

Addition of the household benefits questions allows moving beyond participation estimates to comparison of survey-based estimates of total FSP benefits received to administrative totals. We construct this estimate as the weighted sum of per-member household benefits reported by SPs; details are reported in Appendix A. The outcome is graphed in Figure 3 and benefits are summarized in Table 1. These results indicate lower rates of reporting of benefits than of participation. Review of the data for the 2005-2006 wave suggests that part of the shortfall in the estimate of benefits received in that wave may be attributable to possible coding errors affecting nearly 10 percent of the SPs identified as currently authorized.<sup>9</sup> Although it is not possible to verify this suspicion using information in the NHANES public-use sample, we have elected not to show estimates of total food stamp benefits for the 2005-2006 wave. This decision is supported by Texas data considered later in the paper.

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Figure 3: Estimated Average Total Monthly FSP/SNAP Benefits Compared to Administrative Data, by NHANES Release

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Table 1: Comparison of Estimated Participation and Benefit Reporting Rates

Table 1 also compares an estimate of total FS administrative units to administrative data. This estimate is derived by converting a household count to an estimate of cases (AUs) using data derived from the Survey of Income and Program Participation. For 2007-2008 and 2009-2010

<sup>9</sup> For example, the most recent monthly FSP benefit is recorded as \$12 for 79 of the 1443 SPs with reported positive current benefit. The weighted frequency of 3.6 percent for the \$12 report compares to an average weighted frequency of just 0.14 percent for a \$14 benefit in the Food Stamp Program's quality control sample for FY 2006.

the estimated reporting rates for benefits and cases are similar. In part this reflects the fact that recipient households (and, after adjustment, cases) are identified by reports of benefits. The fact that our estimates of reporting rates for cases are so much lower than reporting rates for individuals may indicate that our adjustment for the prevalence of multiple SNAP cases per household is inadequate; we return to this issue at the end of the paper.

We conclude that in recent years the NHANES may be a better source for study of association between SNAP receipt and other individual health and nutrition circumstances, including food security, if one uses a household-based measure of participation instead of focusing on the SP's own reported status. But the data used thus far are aggregates, and the participation estimates are in a sense "net," involving both under-reporting and possibly over-reporting by some survey respondents. This aggregation may mask significantly less accuracy at the individual level, where misreporting of any sort complicates associating food stamp receipt to personal health and nutrition outcomes. There is much room for study of misreporting not by targeting replication of administrative totals, as done so far, but by investigating the matter directly using linked survey and administrative data at the individual level. This is the subject of the second part of our report.

### **The Texas NHANES Pilot**

The NHANES asks respondents for Social Security numbers for linking responses in the survey to other data. To further investigate possible sources of discrepancy between food stamp receipt as reported in the NHANES and administrative data, NHANES data were matched with food stamp records in Texas, a state contributing a significant share (over 13 percent) of the NHANES samples for the 2005-2006 and 2007-2008 waves. (Work with 2009-2010 is underway.)

As part of the protocol for NHANES administration, Sample Persons (or their proxies) must give informed, written consent for participation in the survey and for the physical examination.<sup>10</sup> Before the interview, interviewees are asked for permission to combine the survey data with "vital, health, nutrition and other related records." Social Security numbers (SSNs) are requested during the interview. Based on consent and the availability of certain identifying information for persons with inaccurate or incomplete SSN information, SPs are classed by NCHS as eligible or ineligible for combining with other datasets. "Eligible" observations are employed in this pilot study.

Information on receipt of FSP benefits in Texas was obtained from the Texas Department of Human Services under protocols established by the Ray Marshall Center. An iterative, three-stage procedure was employed to match NHANES Sample Person records to program data from up to 48 months prior to the NHANES interview date and up to 48 months thereafter. Persons were matched on the basis of SSN, birthdate, name, and other information, including address Zip code. The third stage involved some clerical review. Match procedures are summarized in more detail in Appendix B.

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<sup>10</sup> Consent documents for the 2007-2008 wave are at [http://wwwn.cdc.gov/nchs/nhanes/search/nhanes07\\_08.aspx](http://wwwn.cdc.gov/nchs/nhanes/search/nhanes07_08.aspx) (accessed on August 28, 2014). The question sequence for obtaining Social Security number is part of the Demographics Information section of the Sample Person Questionnaire: [http://www.cdc.gov/nchs/data/nhanes/nhanes\\_07\\_08/dmq207\\_08\\_eng.pdf](http://www.cdc.gov/nchs/data/nhanes/nhanes_07_08/dmq207_08_eng.pdf) (accessed on August 28, 2014).

The final matched data file of NHANES respondents in Texas for the four years 2005-2008 contained 2,755 records. Table 2 shows the breakout of these records by wave and disposition (i.e., match not permitted, match achieved, and match not achieved). Overall for the two waves, 83.5 percent of NHANES respondents were eligible for data combination.

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Table 2: Disposition of Match Attempts, Texas NHANES Subsamples

As the table indicates and as previously discussed, some NHANES interviews did not include the questions about food stamp receipt. In our investigation of aggregate data, we treated this as a random event and adjusted weights for observations with data to account for this exclusion. Since we are not using these pilot data to estimate some known aggregate case count, our analysis uses only the 2,261 match-eligible Sample Persons from the Texas NHANES subset for whom food stamp data are available. NHANES questions cover authorization at the time of the survey and for the preceding 12 months, a 13-month interval. Table 2 indicates that a total of 568 NHANES records were matched to a Texas administrative record of food stamp participation at some point within this window. It is the overlap between administrative data for this collection and reporting of FSP benefits in the NHANES that is studied here.

The idiosyncratic nature of these data must be kept in mind. Counties are selected for the NHANES sample frame to support inference about the national, rather than state population, so the sample cannot be used for generalization about families receiving or not receiving food stamp benefits in Texas at the time of NHANES administration. Further, whatever the characteristics of individuals represented by this sample may be, the sample is potentially biased by self-selection through the consent process. An example of the perils of inference is provided by change between years in the prevalence of SP consent and eligibility for combination with other data: Table 2 seems to indicate a decline in the eligibility proportion between the 2005-2006 and 2007-2008 waves, and this could be taken as a manifestation of changing attitudes toward confidentiality of personally identifiable information (PII). However, such inference is unjustified without refinement beyond the scope of this report, because the populations underlying the two waves may differ in ways that may have affected permission rates quite independently of secular trends.

We generally present weighted data. While the Texas NHANES subsample does not represent Texas, when weighted by the inverse of the sampling probability, the data are intended to represent a share of the national population. Because of variation in sampling probability generated by the survey design, these weights vary significantly across SPs. They are smaller for persons selected from the deliberately oversampled populations, and they are smaller as well for observations drawn from larger households than smaller ones because the likelihood of entering the sample given a sampled address turns in part on how many alternative candidates there are at the same location. If the propensity to misreport food stamp receipt is related to the factors leading to variation in sampling probability, tabulation of reporting errors without adjustment for weights may lead to errors of inference even for the share of population the subsample represents. Accordingly, we use the NHANES weights.

We adjust the weights for match eligibility to reduce the impact of any bias created by varying SP willingness to permit matching. Our procedure is to estimate coefficients of a logit model of the probability of an individual observation being identified as eligible for the match. We multiply individual sample weights by the inverse of the eligibility probability. More detail is provided in Appendix C.

### **The Outcomes**

As illustrated in the analysis of the aggregate data, the 2005-2006 NHANES questionnaire includes questions both about the FSP status of the Sample Person and amounts received by the SP's household as a whole. Assessing individual SP food stamp receipt on the basis of the household question produced estimates of aggregate FSP receipt by individuals that were much closer to totals derived from administrative data than was true for estimates based on reported SP FSP authorization. It would be of interest to see if this outcome is replicated in the Texas NHANES observations matched with FSP administrative data and if the Texas data offer clues to the reasons behind the difference between SP and household-based participation estimates.

Unfortunately, full replication is not possible because of the nature of the administrative data. Our match is at the individual level, not for families or households. The Texas administrative data available to us include only persons authorized to receive food stamps, not others in the household. Thus we cannot identify SPs who reside in households in which others are receiving benefit but the SPs themselves are unauthorized.

What we can do is look for evidence that switching from the individual authorization question to reference to household receipt raises the likelihood that individual receipt is correctly assessed, and this will be our focus. We cannot with these data gauge the accuracy of identification of household receipt.

The standard we apply for consistency of survey-based estimates of monthly benefit with administrative data in aggregate (i.e. comparison of total benefits reported with total benefits paid) is quite rigorous, and when used with data collected at the individual level it may exaggerate the prevalence of misreporting because there is no opportunity for errors to average out. For a variety of reasons, respondents may consider themselves recipients when, technically speaking, they would not be included in published aggregate case data, since such data typically refer to status at a point in time and reflect payments only in the current month. Given that the effects of food stamp receipt may be the product of receipt over a longer period, it is common in analyses of the association between food stamp receipt and various household and individual circumstances (poverty, food security, obesity, etc.) to make reference to a longer window than a month—usually a year.

Asking about receipt over the past year poses a problem for comparison to administrative data, because no national administrative data are published on the prevalence of receipt defined in that way. It is, however, possible to look at receipt over a longer period of time using state administrative data. This opportunity is exploited here by comparing administrative data not only to responses regarding food stamp receipt at the time of the NHANES interview but also to survey-reported receipt during the preceding 12 months.

In sum, it is reasonable to ask what the data for this state reveal of the mix of under- and over-reporting of food stamp receipt, changes in this mix from one wave to the next, the reliability of individual versus household-focused responses, and the consequences of shifting from a narrow (one month) reporting window to the more inclusive preceding 12 month reference.

Comparisons between waves can only be done for individual receipt assessed on the basis of reported household receipt, since the household measure is all that is available for 2007-2008.

Table 3 summarizes results. We take the administrative data to be “truth,” and evaluate survey responses from this perspective. In brief:

[Table 05060708ACCUIND about here]

Table 3: Consistency Indicators, NHANES Food Stamp Program Status Reports, Texas Subsample, 2005-2006 and 2007-2008 Waves

Rows (2) and (3) indicate, respectively, that both over-reporting (false positives) and under-reporting (false negatives) are present in the authorization reports for individuals, for both waves. About one in five SPs (21.1 percent) identified as FSP-authorized in NHANES data were not confirmed by administrative data. On the other hand, row (3) indicates that 4.5 percent of SPs known from administrative data to be authorized for FSP receipt were not so reported in the NHANES.

For the 2005-2006 wave, the change from individual (rows 1-4) to household reference (rows 5-8) increases the consistency of survey reports of SP receipt status and administrative data, from 54.4 percent of actual participants being so reported (row 1) to 68.8 percent using the broader household-reference measure (row 5). At the same time, however, the broader measure increases the prevalence of apparent over-reporting from 21.1 percent (row 2) to 33.8 percent (row 6) of SP records with current participation indicated.

We use the term “apparent” deliberately. As discussed in connection with the aggregate data, some share of SPs reported as residing in a recipient household may in fact not be part of the FSP AU, the collection of people qualified for assistance and for whom the FSP benefit is calculated. The administrative data available for our match include only actual beneficiaries. As a result there is no way of identifying SPs in the Texas subsample who live in a household in which someone else receives FSP benefits but the SPs themselves are not authorized to do so. The linking procedure used for the Texas subsample does not link SPs to FSP cases at the same address—the link is to individual recipients. The consequence is that the false positive rate reported for FSP receipt estimated on the basis of the household questions is likely exaggerated.<sup>11</sup>

<sup>11</sup> One test of the possibility that the false positives identified in line 6 reflect instances in which ineligible individuals reside in a household with others who are recipients is to compare the average probability of AU inclusion for the SPs identified as over-reporters to the probability of AU inclusion for those correctly identified (line 5). For this we use the same probability estimate based on age and citizenship status that we employed in adjusting the aggregate household-based participation estimates (see Appendix A, Table A2). The outcome does not support the hypothesis. In the 2005-2006 data the average estimated probability of inclusion for SPs for whom household FSP status is consistent with individual authorization is .90. The measure is *higher*, .96 for SPs identified as over-reporters when individual authorization is inferred from survey response concerning receipt by anyone in the

Expanding the window from current month (columns A and B) to “any time in the past 12 months” (columns C and D) also increases the consistency of survey reports of receipt status with administrative data. However, while this alteration lowers the prevalence of over-reporting, the rate of under-reporting actually increases.

Regarding evidence of overall improvement in consistency between NHANES records and administrative data, the bottom line (row 8) of Table 3 indicates that the proportion of SPs with reported FSP status consistent with administrative data is slightly lower in the 2007-2008 wave of Texas interviews than in 2005-2006. This finding appears to be at odds with the previous analysis of food stamp receipt at the national level. Again, this could simply be the product of a different sampling frame, or it may be that respondents in non-Texas sites of NHANES 2007-2008 did a better job in reporting food stamp receipt.

It also could be a matter of perspective. The survey-based estimates of participation to administrative counts that are compared to administrative counts in Figure 1 and Figure 2 are the product of a combination of correct and incorrect reports at the SP level. Those graphs show only the extent to which, when totaled up, the reports of food stamp receipt approach the administrative totals. A similar exercise can be done with the Texas data. The results appear in Table 4.

[Table ESTXCOMP about here]
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Table 4: Ratio of Total Reported to Total Actual FSP Participation, Texas NHANES Subsamples

As in Figure 2, results based on reported SP individual authorization status are reported for 2005-2006 and results based on reported SP household receipt are presented for 2005-2006 and 2007-2008. “Recipient NHANES count” is the number of SPs counted as FSP beneficiaries based on either the individual or household definition. To be consistent with procedures followed for aggregate assessment, we again adjust counts based on reported household recipient status downward to reflect the likelihood that SPs are individually eligible using the same probabilities employed in aggregate (see Appendix A, Table A1: Adjustment Factors for Cases with Missing Food Security Data). “Recipient administrative count” is the number of sample members identified as FSP recipients in the state administrative data. The ratio is just that: the ratio of the two numbers. It is NOT a measure of the accuracy of individual reports—consistency as assessed in Table 3. Results are reported both for unweighted counts and counts weighted by the inverse of the estimated sampling probability adjusted for the probability of program and match ineligibility; the weighted data mimic what is reported in Figure 2. “Mimic” is the right term, since unlike the comparison of estimated and actual receipt at the national level, both the numerator and the denominator in the Table 4 ratios are based on the sample, and the accuracy of the ratio estimate is dependent upon the success of the administrative match.

Caveats notwithstanding, the outcome suggests that caution is in order when using the ratio of survey-based participation to administrative data as a measure of consistency at the individual level—the level at which most analytical work is carried out. As for the national data, the ratio

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household. The proportions are virtually identical for 2007-2008; this is again inconsistent with the notion that high over-reporting rates are the product of inclusion of SPs that are not members of household FSP administrative units.



improves with the shift from individual to household focus. However, Table 3 indicates that, at least in Texas, this improvement is accomplished only with a substantial increase in over-reporting.

Assessment of “false positive” and “false negative” and consistency in general is contingent upon the reliability of the administrative data and the accuracy of the match protocol. Thus the description of results from the Texas pilot may be considered interesting but not conclusive. A more reliable conclusion involves the possible data errors identified for the 2005-2006 public-use file. The administrative data for Texas confirm error for every case exhibiting the problem identified in the public-use data. No such errors appear in the subsample for 2007-2008. This error affects survey-based estimates of total benefits but not the recipient counts. This supports our decision to exclude benefits data for 2005-2006 in Table 1.

### Comparison to Other Studies

There is a substantial literature on misreporting of transfer receipt in household surveys.<sup>12</sup> We concentrate here on recent work by Cynthia Taeuber and others (Taeuber et al. 2004), Bruce Meyer and various colleagues (Meyer, Mok, and Sullivan, 2009; Meyer and Goerge 2011) and John Czajka and others (Czajka et al. 2012). (The Czajka report includes a more exhaustive general literature survey.) Our intent is to compare the approaches taken for assessing SNAP/FSP misreporting to that we have used for the NHANES. As done earlier in the present paper, we look first at under-reporting in aggregate and then consider research using data matched at the case level.

#### *Under-Reporting in Aggregate*

*Taeuber et al.* In a joint project involving the Census Bureau and various federal and Maryland state agencies, Taeuber and her colleagues (Taeuber et al. 2004, henceforth TEA) matched household benefit reports from the national 2001 Supplementary Survey (SS01) to administrative data on receipt of FSP benefits in Maryland. The object of the effort was to improve understanding of the nature and extent of what appeared to be under-reporting of Food Stamp receipt in national surveys. The SS01 was methodologically similar to the American Community Survey (ACS), the largest survey currently conducted by the Census Bureau. This similarity increases the utility of the TEA results.

As in the ACS, the Current Population Survey, and other similar data sources, respondents in SS01 were not asked specifically about current recipient status when they were interviewed. Rather, they were asked “At any time DURING THE PAST 12 MONTHS, did anyone in this household receive Food Stamps?” (emphasis in the original questionnaire; reproduced in TEA 2004, 29). TEA used the positive responses and sampling probability to estimate the total number of *households* receiving Food Stamps over the month of interview or the preceding 12 months. The survey-based estimate amounts to just 55 percent of receipt counted from administrative data (Taeuber et al 2004, Table 1).

Note three things. First, TEA is not a comparison of person counts as done for the NHANES; it is a comparison of households as defined by the Census Bureau (in the SS01) to FSP assistance

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<sup>12</sup> See, for examples, Atrostic et al. (2001), Bollinger and David (2001), and Czajka and Denmead (2008).

units. This will pose problems without adjustment for the multiple AU issue. Second, the question used by TEA is retrospective, and no detail is collected on the number of months of receipt, or when they occurred. As a result, it is not possible to identify households that were receiving food stamps at the time of the SS01 interview. Thus TEA must compare the survey totals to administrative data on *all* food stamp AUs over the 13-month reference interval. Since SS01 is, like the NHANES, continuous, it is necessary to construct a weighted average of AUs ever open during the 13-month window for each SS01 observation. This is the denominator for the 55 percent reporting rate; the numerator is the sum of weights for surveyed households reporting food stamp receipt. Thus—and this is the third note—the number TEA pursue is the percentage of all households *ever* receiving food stamps over a 13-month interval that correctly report when interviewed on the 13<sup>th</sup> month.

Setting aside for the moment the individual-versus-household and AU-versus-household issues, the TEA target differs in an important way from what we have measured with the NHANES. Our participation estimate is an average point-in-time estimate of the reporting rate. As is well known from the literature on welfare turnover, point-in-time counts of recipients include more “stayers” than are characteristic of the experience of the population of units ever on during a longer period.<sup>13</sup> Those who move in and out of receipt tend to differ from stayers in many ways, and propensity to correctly answer questions may be one of them. This is not necessarily a shortcoming of the TEA study, but the differences in sampled population is an important consideration in comparing such work to estimates such as our own.

Beginning from the base figure for net under-reporting, TEA add many refinements. As with the Texas data, when the matched SS01/ administrative data are investigated, both apparent under- and over-reporters were discovered. An estimated 13 percent of Maryland SS01 households that reported FSP receipt did not, in fact, include recipients. These households were removed from the SS01-based estimate of recipients, increasing the estimated undercount. However, this adjustment was in part offset by correction for moves outside the state. Since the Maryland data were matched to the entire national SS01, movers could be identified. An estimated 3.1 percent of SS01 households that reported food stamp receipt and were matched to Maryland FSP administrative data in the 13-month SS01 reference window were, at the time of the interview, not resident in the state. TEA removed these households from the count of under-reporters.<sup>14</sup>

As discussed earlier in the present paper, the Census Bureau definition of household differs from the FSP administrative unit. It is possible for a single CB household to include multiple FSP assistance units. Perhaps the most important conceptual adjustment made by TEA involves the difference between the Census Bureau household definition and the FSP administrative unit. The TAE estimates imply that about 4.2 percent of Maryland households receiving Food Stamps during the time span referenced in the SS01 included more than one FSP AU.

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<sup>13</sup> For a famous early discussion of the movers-versus-stayers issue, see Bane and Ellwood (1986).

<sup>14</sup> If we have interpreted the paper correctly, a better approach might have been to add the weights for out-of-state movers that did report FSP receipt to the survey-based estimate of Maryland FSP recipients instead of subtracting from the count of underreporters. The net discrepancy would remain the same, but the misreporting rates become slightly smaller. Neither the TEA adjustment nor our suggested approach corrects for movers who fail to report their food stamp participation, so this group remains part of the unexplained difference.

After an adjustment for estimated failures in the matching process, TAE conclude that 68 percent of the discrepancy between survey-based estimates of household FSP receipt is actually due to under-reporting, 6 percent to exclusion of persons living in group quarters from SS01, 8 percent to the difference between household and assistance unit definition, and the remaining 18 percent is unexplained (Table 1, p. 20).

The distinction TEA draw between actual under-reporting and the unexplained residual is interesting. One implication is that caution is in order in treating the residual between survey-based estimates of receipt and administrative totals as net under-reporting by surveyed households. The problem may lie, as TAE note, in “a combination of factors related to survey coverage and a highly mobile target population” (p. 13). In other words, the SS01 samples the universe of households present at the survey interview date, not the universe of households that potentially could have been FSP recipients at some month over a year. A second implication is that the prevalence of under-reporting within the universe of households that the SS01 actually sampled, while substantial, is not as great as implied by simple comparison of administrative totals to survey extrapolation. For the Maryland SS01, it is 38 percent, not the 45 percent figure derived from raw comparison of survey-based estimates of receipt to administrative totals cited initially above.<sup>15</sup>

TEA do not investigate case characteristics associated with under-reporting with the exception of time since last receipt, as identified by the administrative data. Under-reporting rates rise dramatically with time since last receipt: The under-reporting rate was 21.2 percent for households known from administrative data to be receiving FSP benefits at the time of the survey interview; for those that had last received benefit a year earlier, the under-reporting rate was 94.8 percent (Table 3, p. 18).

The TEA analysis has important implications for thought about SNAP reporting in the NHANES. One is to underscore the importance of the difference between the FSP administrative unit and household as typically defined by surveys. Without adjustment, the number of recipient households will always be less than the number of SNAP/FSP administrative units, so the difference between the two is not a measure of under-reporting. A second is that in study of the impact of SNAP/FSP on individuals, thought must be given to within-household distribution of resources. How should SNAP benefits received for an AU within a household be assumed to affect the well-being of others? The importance of this issue grows as the federal government, some states, and some localities attempt to devise poverty measures that improve upon the official poverty measure by incorporating FSP benefits.<sup>16</sup> A third implication is that reports of recipient status at the time of survey interview receipt are more likely to be accurate than retrospective reports of prior receipt. Finally, the processes of household formation, transformation, and dissolution weaken the connection between households as constituted at the time survey interviews occur and all households at risk in prior months.

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<sup>15</sup> See TEA 2004, Table 1. This is the sum of weights for SS01 households reporting no receipt of Food Stamps but matched to administrative data divided by the sum of weights for all households in the sample identified from administrative data as recipients, including the TEA estimate for “SS01 households that should have been matched but were not.” We also incorporate the adjustment noted in footnote 14.

<sup>16</sup> For a good example of the importance of the AU/household distinction for poverty assessment with the ACS, see New York City Center for Economic Opportunity 2013, Appendix E.

TEA did not attempt to estimate the rate of under-reporting of benefits, stating that “the information from the SS01 is not useable because the survey amounts differ so greatly from the known benefit amounts” (p. 25).

*Meyer, Mok, and Sullivan.* In their influential 2009 NBER Working Paper, Bruce Meyer, Wallace Mok, and James Sullivan (MMS) compare reported FSP benefits and participation in five national surveys to administrative reports over an extended time period (Meyer et al. 2009). (The NHANES is not included.) For the Current Population Survey–Annual Social and Economic Supplement (CPS-ASEC, formerly the Annual Demographic File), MMS’s estimates are based on survey response to a question similar to that used by TAE but with a different reference period: “Did (you/ anyone in this household) get Food Stamps at any time during [the preceding calendar year]?”<sup>17</sup> After querying for number of household residents “covered by Food Stamps,” the interview asks for the number of months in which benefits were received by the household and the average benefit per month. The calculated annual total is then confirmed (and corrected, if necessary) by the respondent. Total reported months are then multiplied by the household weight and summed over all households in the sample. This total is then compared to total assistance unit months of receipt from administrative data to estimate an average monthly under-reporting rate.

In like manner, reported household benefits are multiplied by the household weight and summed over all households in the sample for an estimate of aggregate benefits. MMS compare this estimate to administrative totals to produce a benefit reporting rate. No matching of individual survey response to administrative data is done.

There are three problems with the MMS estimates. The first is that, as shown by TEA, the difference between survey-based estimates and administrative data may not be entirely the result of misreporting by interviewees. Labeling it as “under-reporting” is thus misleading. The second, alluded to in constructing our own and in our summary of the TEA work, concerns the difference between the census definition of household and the assistance unit definition employed for administrative reports. Without adjusting for this definitional difference, the estimated degree of under-reporting will be exaggerated because households can include multiple assistance units. This problem will not bias sample-based estimates of total benefits if interviewee response to questions about total benefits received in the household includes all benefit units in the household. If this condition is not met, then we anticipate lower estimated rates of under-reporting of benefits than for household participation. This effect will be offset if households with multiple FSP/SNAP units are more likely to acknowledge SNAP/FSP benefit receipt than are households containing only a single unit.

The third problem arises because the set of households captured in the frame for the March CPS is not a sample of all households or all persons potentially eligible for Food Stamp benefits over the months of the previous (reference) year. The MMS procedure implicitly assumes that all households extant in the calendar year are present the following March and that all person-months of potential Food Stamp participation in the preceding year are represented by the experience of persons residing in those sample households. Quite apart from accuracy of

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<sup>17</sup> See <http://www.census.gov/prod/techdoc/cps/cpsmar07.pdf>, appendix D for the Food Stamp questions posed in the 2007 ASEC (accessed on August 28, 2014).

reporting, the existence of births, deaths, and other forms of household fragmentation and reconstitution weaken the link between what is captured in the CPS and the universe of the preceding year's Food Stamp recipient units. The consequences for estimated reporting rates are uncertain.

By being distributed over the entire two-year wave interval, the NHANES is in a sense genuinely framed to sample the average monthly collection of persons potentially eligible for Food Stamps and to measure take-up contemporaneously. The TEA results suggest that contemporaneous receipt is least underreported, so the NHANES design appears well-suited for gauging reporting. In practice, of course, the NHANES sample is somewhat flawed use in this way: The frame is not dynamic, and interviews are not distributed over each 24-month period in proportion to population. Nevertheless, the NHANES sample design is potentially more appropriate for estimating rates of Food Stamp misreporting than is reliance on the retrospective questions available to MMS and TEA.

*Czajka, Peterson, McGill, Thorn, and Warner-Griffin.* The original MMS study covers the period 1979-2006. In their 2012 report, John Czajka and collaborators (henceforth CEA) extend the MMS calculations to 2010 (Czajka et al. 2012) and perform comparable calculations for the 2007-2008 NHANES. Table 5 shows MMS estimates for 2004-2006 and the CEA estimates for 2007-2010. These data differ slightly from numbers reported in the two sources because we have employed revised administrative data that correct for certain errors in state reporting. The effect of this adjustment is not large, but it ensures comparability with our own work.

Table REPRATE about here
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Table 5: CPS Reporting Rates, 2004-2010

The outcome is that the number of CPS households reporting some Food Stamp receipt consistently falls short of the number of Food Stamp assistance units. The difference is substantially greater than what would be expected as a result of the difference in household definition alone. The sample-based estimates of aggregate benefits also fall short of administrative totals, with the ratio of reported amounts to administrative total virtually the same as the household ratio. While over the interval summarized in the table there is no obvious trend in these ratios, over the full span of the MMS/CEA data the trend is downward. The benefit reporting rate calculated by MMS for 1979-1981 is 0.715, 27 percent higher than the 2004-2010 CEA average; for household participation the rate (for 1980-81) is 0.651, 15 percent higher than calculated for recent years. Of course none of these estimates incorporates adjustment for what TEA call the "unexplained" element in the difference between administrative totals for SNAP receipt and survey-based estimates. It is all treated as net under-reporting.

Table 6 takes the information in Table 5 and recasts it in two-year averages appropriate for comparison of our NHANES-based estimates and the 2007-2008 NHANES-based estimates done by CEA. To improve comparability between the survey-based households estimate and the AU counts, we also introduce an adjustment for the prevalence of multiple AUs across households based on the Survey of Income and Program Participation. As a result, the CPS reporting rates in this table are higher than those in Table 5, which are unadjusted.

## Table RECOMP about here

Table 6: Comparison of Administrative Data to Sample-Based Estimates, Food Stamp Program, 2005-2010

There are three estimate types and three two-year NHANES intervals. The first (top) set of estimates is for households. CPS-based estimates of the number of recipient households consistently fall short of the administrative total. CEA estimates for 2007-2008 are consistent with our own (labeled NHANES, this paper), despite differences in calculation procedures and data.

MMS do not estimate the number of FSP recipients. CEA do. The second set of data in Table 6 report the CEA-CPS estimates along with administrative totals and our own participant estimates from the NHANES. Three features are important. The first is that the CPS-based estimates come closer to the recipient count than was true for households; the CEA estimate (average) for 2009-2010 is 82 percent of the administrative total, compared to 58 percent for the household/benefit unit comparison. Second, the NHANES estimates developed earlier in the paper (recall Figure 2) are consistently closer to participant counts than those based on the CPS. Third, our NHANES-based participants estimate come closer to administrative totals for 2007-2008 than does the CEA estimate. Both estimates are larger than the actual total. In contrast, the CEA estimate for total benefits is somewhat closer to the mark than our own; the reasons for the difference are a matter for future research.

MMS do not limit their work to the CPS, and they include methodologically comparable calculations for reporting rates in other major surveys. Their results imply higher benefits and participation reporting rates for longitudinal surveys (i.e. the Survey of Income and Program Participation and Panel Study of Income Dynamics) and similar or lower reporting rates (for benefits, participation is not calculated) in other cross-sectional surveys (i.e. the American Community Survey and the Consumer Expenditure Survey).

### *The Correlates of Reporting Error*

*Meyer and Goerge.* In their 2011 paper, “Errors in Survey Reporting and Imputation and their Effects on Estimates of Food Stamp Program Participation,” Meyer and Goerge (MG) move beyond the TEA work to study misreporting at the household level (Meyer and Goerge 2011). Like TEA, MG employ the 2001 Supplementary Survey (SS01), but they also use data from the 2002-2005 CPS ASEC. Administrative data are from Illinois and, again, Maryland. The Maryland SS01 analysis apparently involves the same survey and administrative data as used by TEA, although this connection is not acknowledged.

Like TEA, MG use administrative and survey files linked by Protected Identification Keys (PIKs).<sup>18</sup> Households were matched to assistance units if survey response for any household member could be linked to an assistance case over the interval defined by the “During the past 12 months” question. MG acknowledge the problems posed by differences in household and administrative unit definitions but are apparently unable to address the issue in the way used by

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<sup>18</sup> See NORC (2011) for a description of the Census Bureau’s Person Identification Validation System and the PIK component.

TEA. Because of differences in strategy for obtaining household consent for matching, a substantially lower proportion of CPS/ASEC households include persons with PIKs than is true for the SS01. MG's analysis is limited to households for which some member has been assigned a PIK. Because missing PIKs is nonrandom, household weights in the sample with PIKs are adjusted by the inverse of a prediction of PIK probability obtained from a multivariate probit model of PIK success, done by household separately for the SS01 and CPS samples.

MG raise a number of issues not addressed by TEA. One concerns the problem of imputation of recipient status for households in the sample that are missing FSP data. Like TEA, MG find that imputation is generally successful when judged by looking at what was imputed for matched households—i.e. households known from administrative data to be recipients. However, imputation also plays a significant role in creating over-reporters—“false positives.” Imputations account for 41 percent and 26 percent of false positives in the Illinois and Maryland respectively (p. 10). Similar results were found using the CPS. However, MG note that false positives in both cases constitute a very small proportion of the total sample. This has, they claim, an important implication:

The low false positive rate does mean that the aggregate under-reporting rate (one minus the reporting rate) is a good approximation to the rate of false negative reports. This is a useful result since aggregate rates are available for most years and the entire U.S., while our matched results are geographically and temporally limited. (p. 11)

Here MG appeared to be confused by their definition of false positives. The base used is, alternatively, all households or all households not matched to recipient lists. Food stamp receipt is a characteristic of only a minority of households, so defining the false positive rate this way instead of relative to the set of all households reporting receipt ensures a small number. But, as we have argued in discussing the Texas data, a more meaningful number is false positives as a share of all households claiming receipt. Viewed this way, correction for false positives has significant impact on the under-reporting rate, as TAE demonstrate. This is illustrated by MG's own Maryland data. The estimated false positive rate is indeed just 2.4 percent. The aggregate under-reporting rate (computed relative to estimated total recipient households) is 29 percent. The false negative reporting rate is 37 percent—27 percent greater. The corresponding numbers for Illinois are 2.8 percent false positive rate, 23 percent aggregate under-reporting rate, and 32 percent false negative reporting rate—42 percent greater. Similar results hold for the CPS-ASEC data.

In interpreting the MG data, it is important to keep in mind that the “universe” of households receiving FSP benefits that is the focus of their estimates of under-reporting is the population sampled by the SS01. The TEA results indicate that this population overlaps, but is not identical with the collection of households receiving benefits at some time during the interval covered by the retrospective receipt question in the survey. Nevertheless, the SS01 and CPS-ASEC do sample the households present at the time of the interview, and it is interesting to investigate household characteristics associated with under- and over-reporting participation as well as benefit receipt, however defined. MG report results of analysis of the correlates of under- and over- (by their definition) reporting. The results vary substantially between surveys (SS01 and CPS) and between the Illinois and Maryland samples, but some interesting results emerge. For

example, under-reporting is associated with race (black households are more likely to fail to report), receipt of other assistance (beneficiaries are less likely to under-report), gender of the householder (male increases likelihood of under-reporting) and income (higher income recipients are less likely to report). Comparable work is possible with the Texas NHANES pilot data, but comparison is complicated again by difference in focus (SPs versus households), in measures (current versus over-time), and in sample design (the SS01 and CPS samples support inference about state totals; the NHANES Texas subsample does not). Work along these lines is beyond the scope of the present paper.

### **Conclusions and Implications**

We conclude the following while acknowledging the special nature and uniqueness of the merged NHANES-Texas records:

- Food stamp receipt in the NHANES is substantially misreported.

On balance the prevalence of receipt is under-reported, but both under- and over-reporting occur. Inaccuracy seems sufficiently pronounced to raise questions about the utility of the NHANES as a source of information on the connection between food stamp/SNAP receipt and nutrition without statistically correcting for the likelihood of misreporting.

- The consistency of survey reports and administrative data on receipt is enhanced when reference is made in survey questions to household receipt rather than individual authorization.

However, the gain in accuracy of responses for actual recipients may be offset by an increase in false reports of receipt. Whether a household- or individual-based estimator is “better” for a specific piece of research may depend on the respective loss functions attributed to false positives and false negatives.

- Attempts to correct NHANES data must accommodate both under- and over-reporting.

It is not clear that the same factors underlie both. Any modeling is complicated by variation within households of the person responsible for answering questions about FSP receipt. It is complicated as well by NHANES sampling strategy. On average, in households with more than one person, the NHANES selects two or more people for SP status. As a result, errors in food stamp reporting across individual observations are not independent.

The following offer potential next steps:

- Analyzing the determinants of the probability of under- and over-reporting of receipt viewed from both administrative and survey perspectives. Any such analysis is complicated by the multiple SP/family problem. Fortunately, in future research of the merged Texas-NHANES data, we will be able to account for multiple SPs from a single household.
- We can encourage replication of the Texas effort in other states and over time. As also detailed in Kirlin et al. (2012), we learned in doing this work a great deal about the



implications of administrative procedures for the challenge of linking administrative and survey data. Some of the problems we encountered may be idiosyncratic to Texas; others may be more general.

- Beginning with the 2013-2014 wave, NCHS has re-introduced review of the household roster as part of the Food Security module. However, there is no reference to authorization. Rather, what is asked is, “In the last 12 months, did {you/you or anyone who lives here} receive SNAP or Food Stamp benefits?” then parenthetically, “Here is the list of people who live here, let me read it to you.”<sup>19</sup> This alteration, unexplained in survey documentation, seems intended to improve identification of individual, and especially SP, reciprocity, and in principle it should in future exercises such as our own allow better correction of participant counts for ineligible. But it will not identify cases with multiple AUs. One possibility, possibly worthy of testing, would be to ask respondents if the household has more than one SNAP EBT card.
- As indicated in our introduction, our interest in linking survey and administrative data is part of a more general cross-agency effort both in the U.S. and internationally to improve the database for social policy development and evaluation. Careful attention now needs be given to comparing what we are learning from the NHANES work to developments in the larger survey research field.

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<sup>19</sup> See [http://www.cdc.gov/nchs/data/nhanes/nhanes\\_13\\_14/FSQ\\_Family\\_H.pdf](http://www.cdc.gov/nchs/data/nhanes/nhanes_13_14/FSQ_Family_H.pdf) (accessed on August 28, 2014).

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## Appendix A: Calculation Details

This appendix provides detail on calculation procedures used for estimates reported in the text. The SAS code and supporting spreadsheets are available on request from the authors.

### *Individual-based FSP participation estimates*

The estimates plotted in Figure 1 (“Under-Reporting of Food Stamp Participation in the NHANES, 1999-2006”) are simply the sum of weights for persons identified as authorized for FSP receipt in question FSQ 200 (“{Are you/Is PERSON NAME} now authorized to receive Food Stamps?”) adjusted for missing data. Over the four-year period 2005-2008, less than one percent of NHANES observations lack Food Security, and hence Food Stamp, data. Preliminary analysis suggests that failure to collect Food Security information was not a random event, but the small number of affected records in each wave precludes reliable estimation of a model of this administrative shortcoming. For this paper we therefore assume that absence of Food Security data *is* random and, as a result, the prevalence of FSP authorization among SPs missing such data is identical to that observed among SPs with Food Security data. Accordingly, each wave’s sum of weights for SPs reporting authorization is inflated by the inverse of the weighted proportion of all SPs for whom Food Security data are missing.<sup>20</sup> The calculated adjustment factors for missing data are listed by wave in Table A1.

[Table MISSDAT about here]
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Table A1: Adjustment Factors for Cases with Missing Food Security Data

Our standard errors are calculated by constructing a participation variable for each SP based on either personal authorization (in 2005-2006) or response to the household-related questions, as discussed in the following subsection. The mean of this variable equals the ratio of the sum of weights for SPs identified as recipients to the sum of weights for all SPs. Calculations were made using the Proc SurveyMeans procedure in SAS 9.2 to incorporate the parameters of the complex NHANES survey design. The reported upper and lower bounds of the 95-percent confidence interval of the sample mean participation rate were multiplied by the sum of weights to produce the upper- and lower-bound estimates of participants that appear in Figures 1 and 2.

### *Household-based individual FSP participation estimates*

For 2005-2006 the estimates of participation based on household response begin with FSQ 210, “How much did {you/your household} receive in food stamps benefits last month”.<sup>21</sup> Any answer other than “refused,” or “don’t know” is counted. Basing participation on this question is justified because it is asked of respondents who cite ANY member of the household as “now authorized to receive Food Stamps”. (See “Box 10” in the Food Security questionnaire section.) Here too, adjustment is made for absence of Food Security data.

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<sup>20</sup> Discussions with NCHS personnel suggest that missing Food Security data are largely the result of problems with scheduling the family interview near the end of a fixed-duration survey visit to the selected data collection site. The scheduling difficulty appears to be correlated with certain household characteristics.

<sup>21</sup> The food security questionnaire is at [http://www.cdc.gov/nchs/data/nhanes/nhanes\\_05\\_06/fi\\_fsq\\_d.pdf](http://www.cdc.gov/nchs/data/nhanes/nhanes_05_06/fi_fsq_d.pdf).

To use the response to FSQ 210 for an assessment of participation of the SP him- or herself, it is necessary to adjust also for the possibility that the SP, while a member of a household that includes Food Stamp recipients, is not actually in a Food Stamp unit, i.e. is not authorized for benefit receipt. This adjustment is made using the Food Stamp Quality Control (QC) case samples for the Fiscal Years overlapping the relevant NHANES waves. In principle the QC data include information on all household members whose presence affects eligibility determination or calculation of the benefit allotment regardless of their individual participation status, with those members of the sampled case identified as program-eligible or not. We tabulated the proportion of non-participants among all persons listed as members of FSP recipient households of two or more persons within each of the QC samples by age (adults and children) and citizen (citizen and noncitizen) categories, then used the resulting proportions to adjust downward the derived estimate of the population of recipients. Not all noncitizens in Food Stamp households are nonparticipants, but requirements for “qualified aliens” are complicated, and we do not attempt to summarize them here (see FNS 2011). The conditional size restriction is applied because regardless of citizenship status a single person in a recipient single-person household must be eligible.

The adjustment factors for probability of ineligibility are displayed in Table A2.

[Table ADJFACTORS about here]
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Table A2: Non-participant adjustment factors

Because of a change in question wording, the household-based participation estimates for 2007-2008 and 2009-2010 are calculated in a slightly different manner from the procedure followed for 2005-2006. For these waves the estimates are based on the response to FSQ 230, “Do you/Does any member of your household} currently receive Food Stamp benefits?” In the 2009-2010 wave, the query cited “SNAP or Food Stamp benefits”.

### *Benefits estimates*

Central to estimation of total benefits from the NHANES is recognition that every member of FSP recipient households nationally is represented by an NHANES SP. Thus if we sum the household benefit reported by each SP divided by household size and multiplied by the SP sample weight, the total should come to aggregate benefits. Division by household size is necessary because each member of the household is represented in the sample, so without adjustment total benefits recorded by the household would be actual benefits multiplied by household size. Some SPs identified as residing in recipient households were missing benefits data; these were imputed based on household size. Also, household size in the NHANES is top-coded at 7. For SPs recorded with household size of 7 or more, we imputed household size based on the average size (7.88) of food stamp recipient households of 7 or more in Wave 1 of the Survey of Income and Program Participation for 2008. We used this figure for all years.

### *Assistance Units Count*

The estimate of the number of FSP cases reported in Table 1 is calculated by combining estimates of the number of one-person FSP recipient households (adjusting, again, for missing data) with estimates of the number of recipient households with more than one member increased

by an estimate of the fraction of such households that include more than one AU. The estimated number of recipient households with more than one member is the sum across all SPs in multiple-person FSP recipient households of the SP person weight divided by household size. An estimate of the fraction of multi-person FSP recipient households that includes more than one Administrative Unit was developed from the Survey of Income and Program participation. The adjustment factors by year are displayed in Table A3. Note that SIPP-based case and recipient counts fall short of administrative totals; our estimates assume that under-reporting does not significantly bias our estimates of the prevalence of multiple AUs in households.

[Table AUADJ about here]
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Table A3: Estimated Prevalence of Households with Multiple FSP/SNAP Administrative Units,

## Appendix B: The Match Protocol

The administrative data for this pilot were derived from the Texas System of Application, Verification, Eligibility, Referral and Reporting system (SAVERR) and the Texas Integrated Eligibility Redesign System (TIERS). SAVERR is a legacy system used to process applications for FSP, Temporary Assistance for Needy Families (TANF), and Medicaid with data going back to 1978. Implementation of TIERS began in 2003 and continued over several years. Operating under contract to the Texas Health and Human Services Commission, the Ray Marshall Center regularly receives a concatenated file of SAVERR and TIERS records covering the entire state FSP caseload.

The NHANES data are the standard public-use files expanded by NCHS to include non-NHANES records (to preserve confidentiality) and personally identifiable information (PII) to be used by RMC in the linking process (together with race and gender—variables already on the public-use files). These non-public-use identifiers are not included in the linked files to be analyzed here, although the linked files do indicate match scores for all the variables. The expanded file is called the “submission” file.

Match procedures were divided into two matching phases and a “finalization” phase, with the first phase yielding a large pool of potential pair-wise matches between submission records and administrative records. The second phase used more conservative match criteria to yield a reduced sample of potential linked records and an indicator score for the degree of conformance between the submission observation and the candidate for matching from the administrative files. The third and final step involved establishing a cut-off match score for identifying accurate linkage and a computer-assisted clerical review of the results. This final phase produce a linked records dataset that was sent back to NCHS. NCHS removed the PII and non-NHANES records, added records that were not included in the submission file (see the discussion on Match Eligibility below), and provided the resulting file to ERS to be utilized in the analysis reported in this paper.

The overall match process was informed by the seminal work by Fellegi and Sunter ( 1969) and further discussion by Winkler ( 1993). The match protocol may be fairly characterized as a hybrid approach between purely probabilistic and deterministic matching that allows users to

introduce their own estimates of the discriminatory power of a matching variable by assigning how many points that variable may potentially contribute to the overall match score. More detail is provided in Kirlin et al. (2012).

### Appendix C: Match Eligibility

A subset of the NHANES observations in the Texas Pilot was determined by NCHS to be eligible for linkage if they did not refuse to provide their Social Security number at the time of the interview and/ or if they provided sufficient personally identifiable information (PII) for linkage. In the sample of 1,004 NHANES records from 2005-2006, 122 (or 14.7 percent of the weighted sample<sup>22</sup>) were determined ineligible and were not included in the file submitted for matching against Texas administrative records. During the 2007-2008 cycle of interviews, 333 of the 1,751 Texas interviews (22.2 percent weighted) were not eligible for matching. The data do not provide detail on reasons for exclusion of the combined 455 records.

A comparison of the characteristics of SPs eligible for matching with those for which matching was not attempted indicated that the likelihood of being match-eligible was not independent of reported food stamp participation or of various SP characteristics that, in turn, might be correlated with the likelihood of misreporting. With over 20 percent of the combined Texas sample not included in the file submitted for matching, the risk of biased estimates due to data censoring was high. To reduce this risk, we reweighted the match-eligible records by multiplying the NHANES weight for each observation by the inverse of its estimated probability of being eligible for matching. The probability models, one for each of the two waves of data, were estimated using the SAS weighted logit procedure, with observation weights normalized to the actual record counts.<sup>23</sup>

The variables used in the probability models are defined in Table C1, which also displays their weighted sample means. All of the variables (except for number of persons in the family) are binary, and the table indicates the weighted percentage of members in each indicated group that were match-eligible. Variations in both means and percentages between cycles are not unexpected. Concerns about data confidentiality may have grown over the period covered, and the samples comprising each wave are not representative of the same underlying populations.

[Table MATCHMEAN about here]
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Table C1: Weighted Means of Variables Used in Models of Match Eligibility

Table C2 presents probability models of the likelihood of an NHANES observation being match-eligible. Separate models are estimated for the NHANES interview cycles 2005-2006 and 2007-2008. Statistically significant factors (p-values < 0.10) associated with a decreased probability

<sup>22</sup> Sample observations weighted using NHANES variable WTINT2YR.

<sup>23</sup> This SAS procedure likely provides biased estimates of the standard errors of model parameters by not accounting for the complex survey design used by NHANES. The more appropriate SAS procedure in this situation is usually PROC SURVEYLOGISTIC. However, because the Texas subsample in NHANES is not meant to be representative of Texas, it is not appropriately balanced given its complex design, and in consequence the standard error estimates produced PROC SURVEYLOGISTIC are likely to be biased. We nevertheless used a weighted logit procedure because we expected that factors related to being match-eligible or the likelihood of misreporting also were related to sampling probabilities given the NHANES's oversampling of certain population subgroups.



of being match-eligible in 2005-2006 are: being reported as a current food stamp participant; being in a smaller family; being neither Mexican-Hispanic nor non-Hispanic black; being an adult less than 60 years old; being in a family with an income-to-poverty ratio greater than or equal to 2.0; having missing information on income or education level; having less than a high school diploma; being in a food secure household; being a U.S. citizen; and not having any data from the Food Security Module on the data file.

[Table MATCHPARAM about here]
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Table C2: Parameters from Probability Models of Match Eligibility

Statistically significant factors ( $p$ -values  $< 0.10$ ) associated with a decreased probability of being match-eligible in 2007-2008 are: *not* being reported as a current food stamp participant; being less than 60 years old; being in a family with an income-to-poverty ratio greater than or equal to 2.0; having missing information on income or education level; having a high school diploma or at least some college education; being in a food secure household; and not having any data from the Food Security Module on the data file.

Results are often not consistent across the two interview cycles but, as noted previously, the two cycles represent different time periods and different underlying populations. Observations with a decreased probability of being match-eligible receive greater weight in the analysis of the matched Texas sample.

Tables and Figures

Executive Summary

Figure ES 1: Using Household Reference Increases Consistency of Survey Results for Individual FSP Participation with Administrative Data

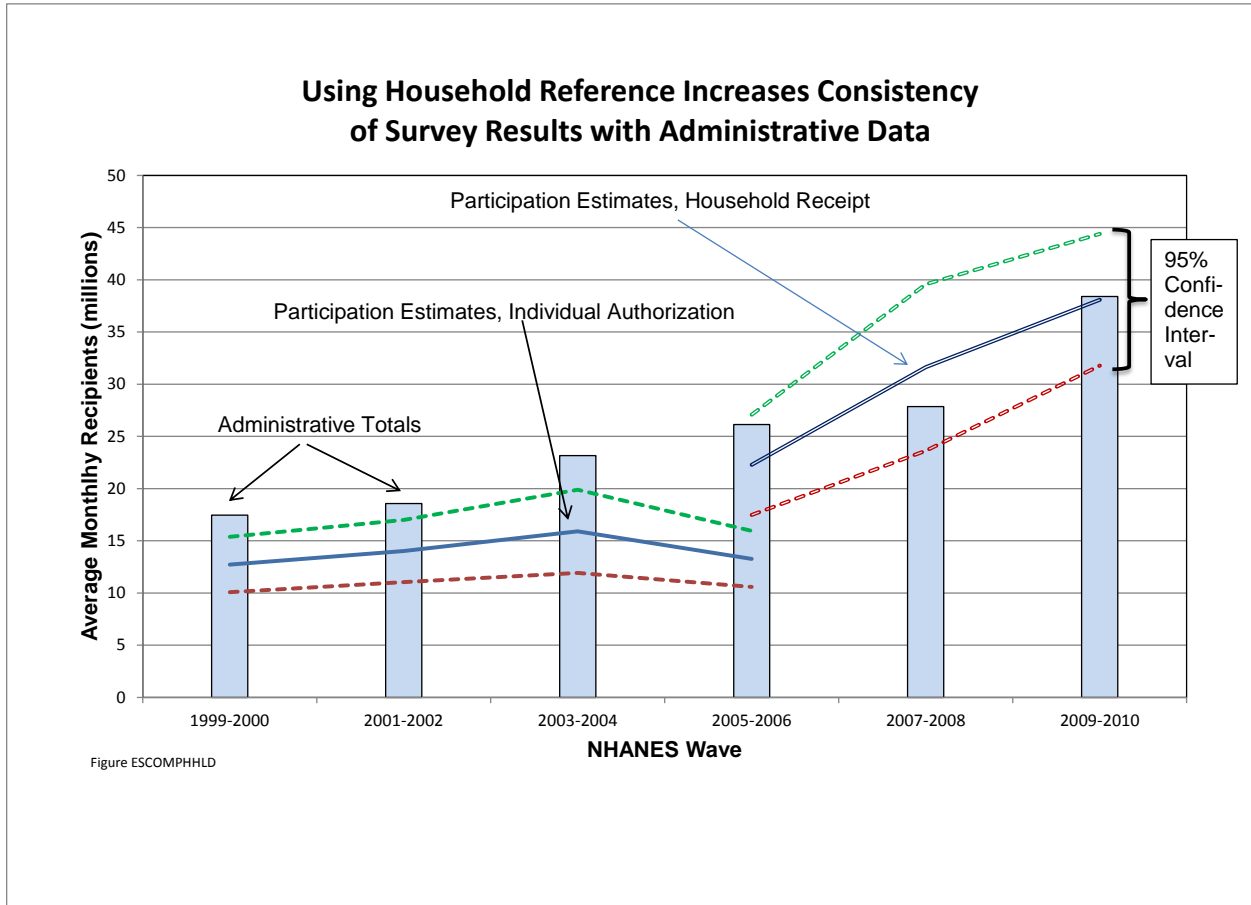


Figure ES 2: Under- and Over-Reporting of Food Stamp Receipt, NHANES 2005-2006 Wave, Texas Subsample

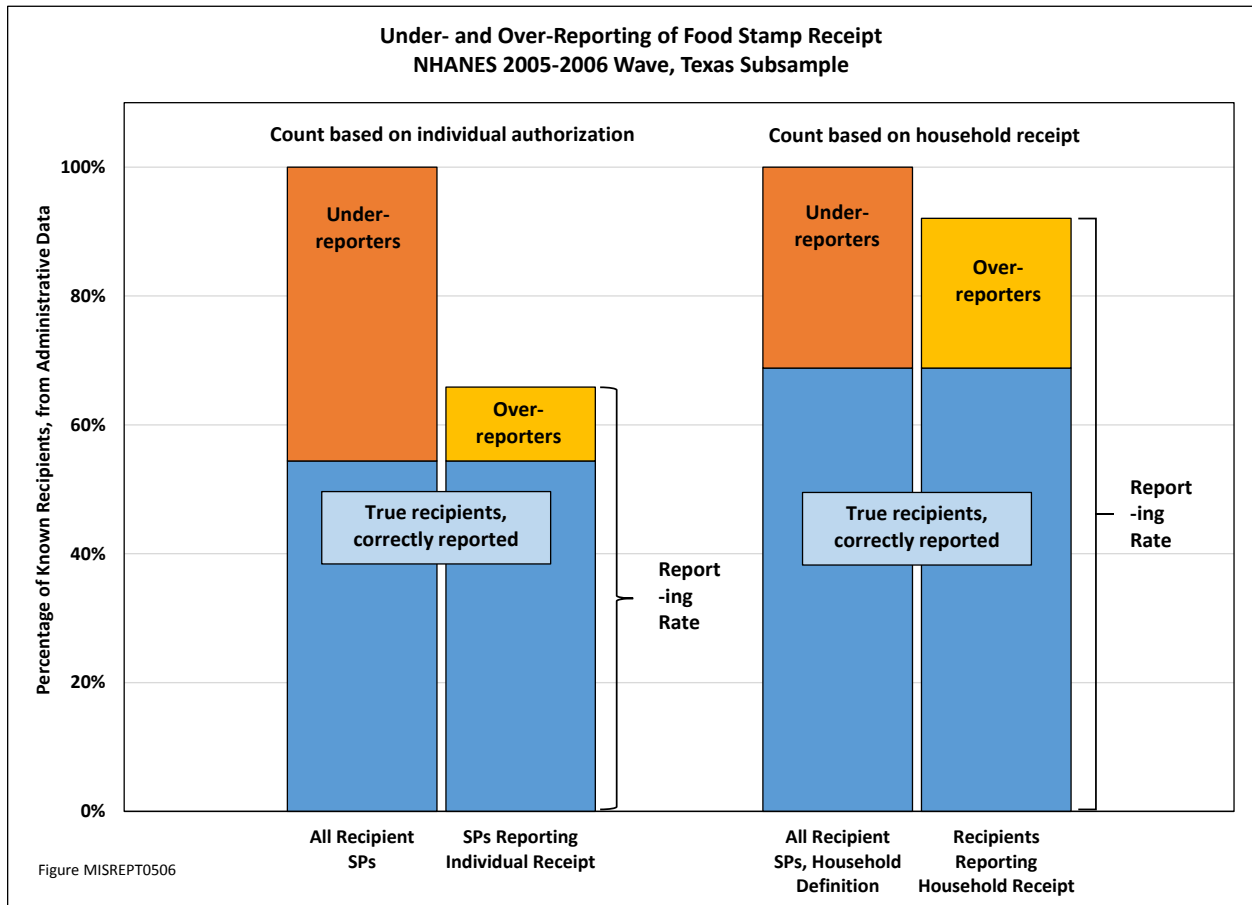
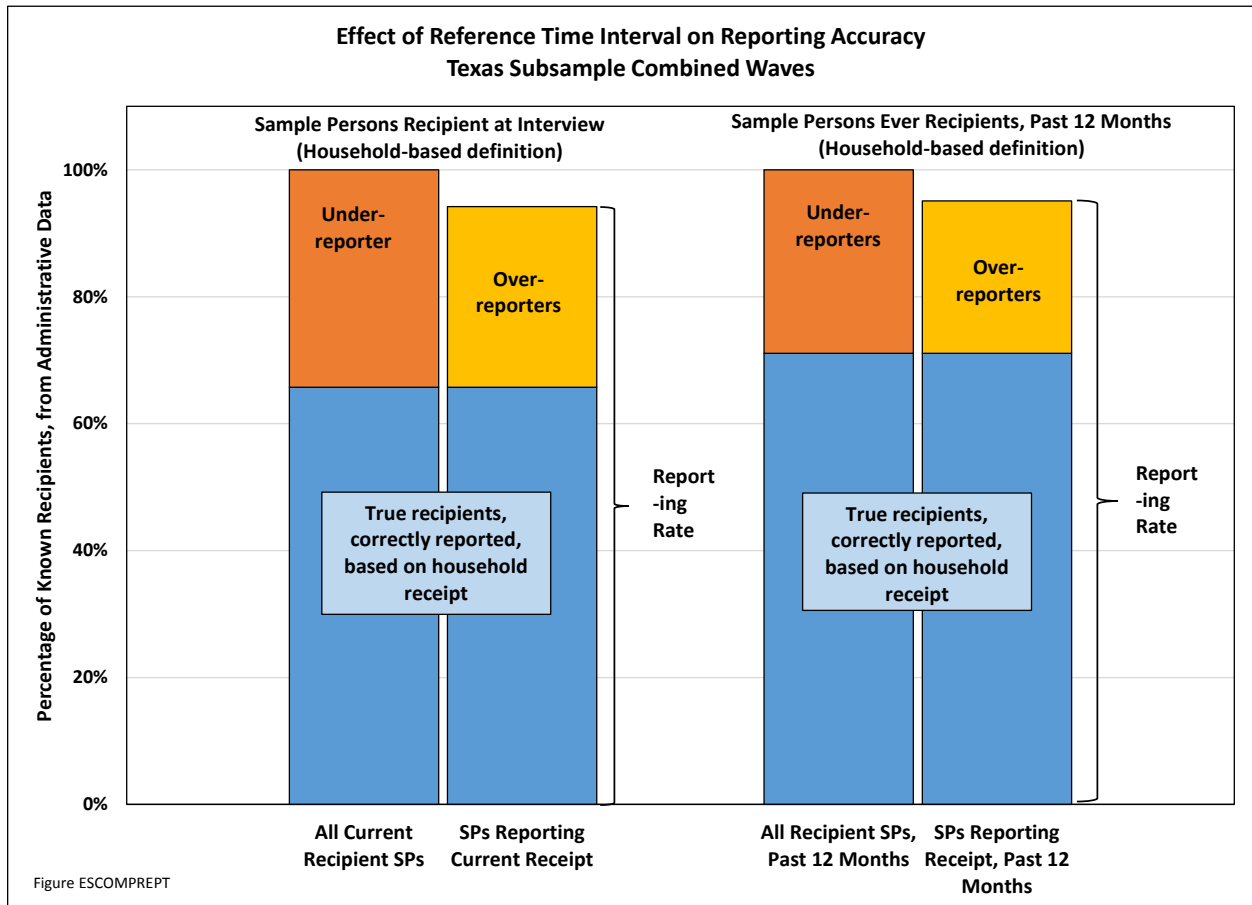


Figure ES 3: Effects of Reference Time Interval on Reporting Accuracy, Texas Subsample Combined Waves



Main Text

Figure 1: Under-Reporting of Food Stamp Participation in the NHANES, 1999-2006

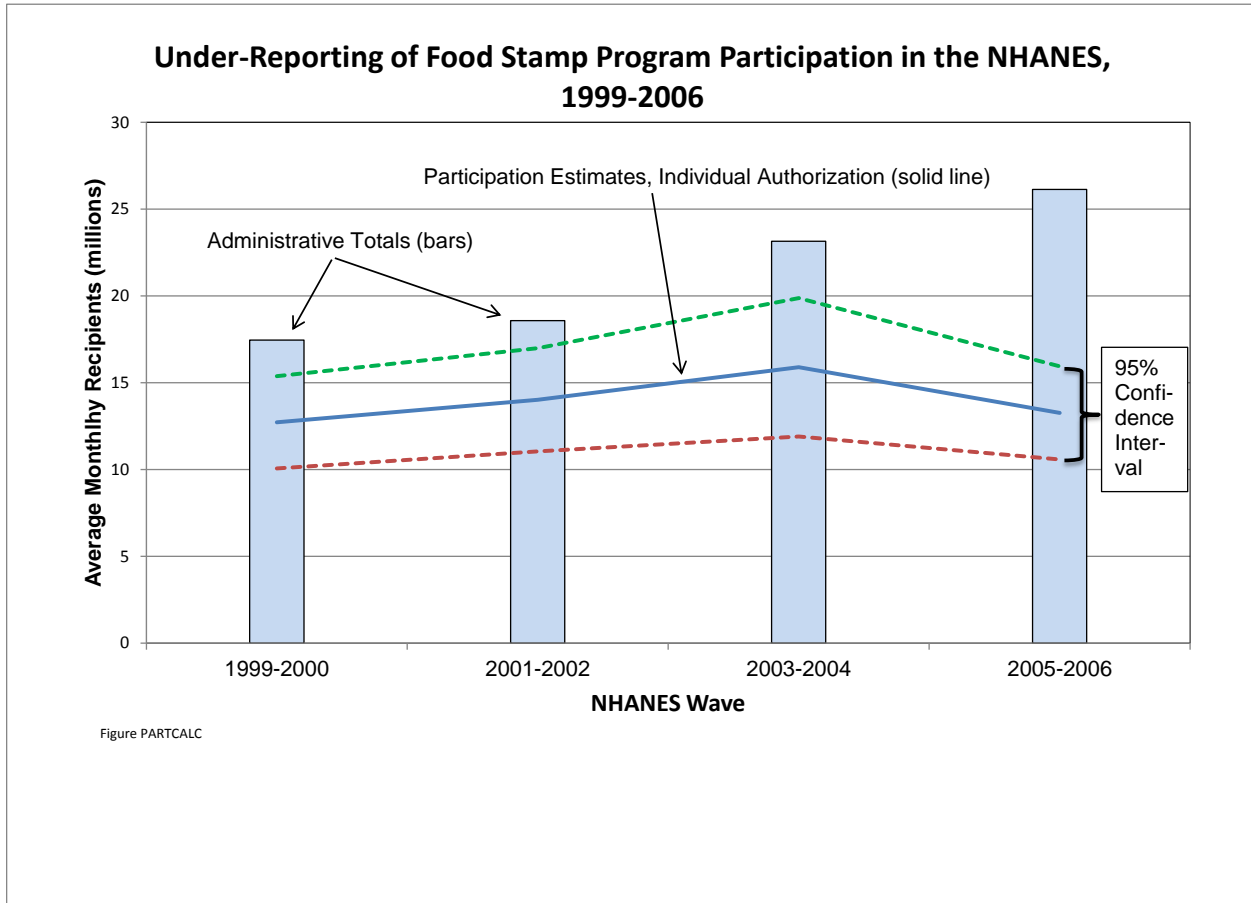


Figure 2: Using Household Reference Increases Consistency of Survey Results for Individual FSP Participation with Administrative Data

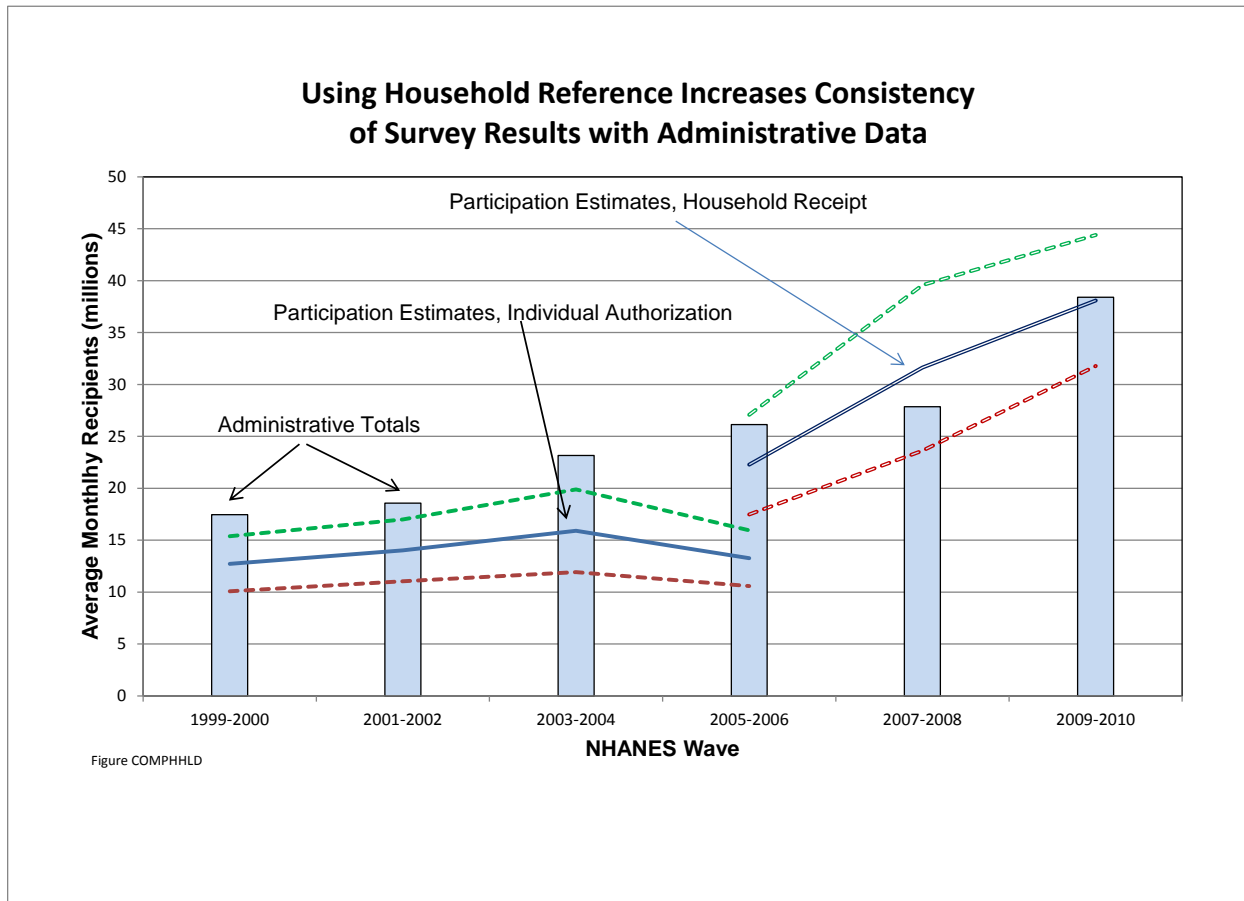


Figure 3: Estimated Average Total Monthly FSP/SNAP Benefits Compared to Administrative Data, by NHANES Release

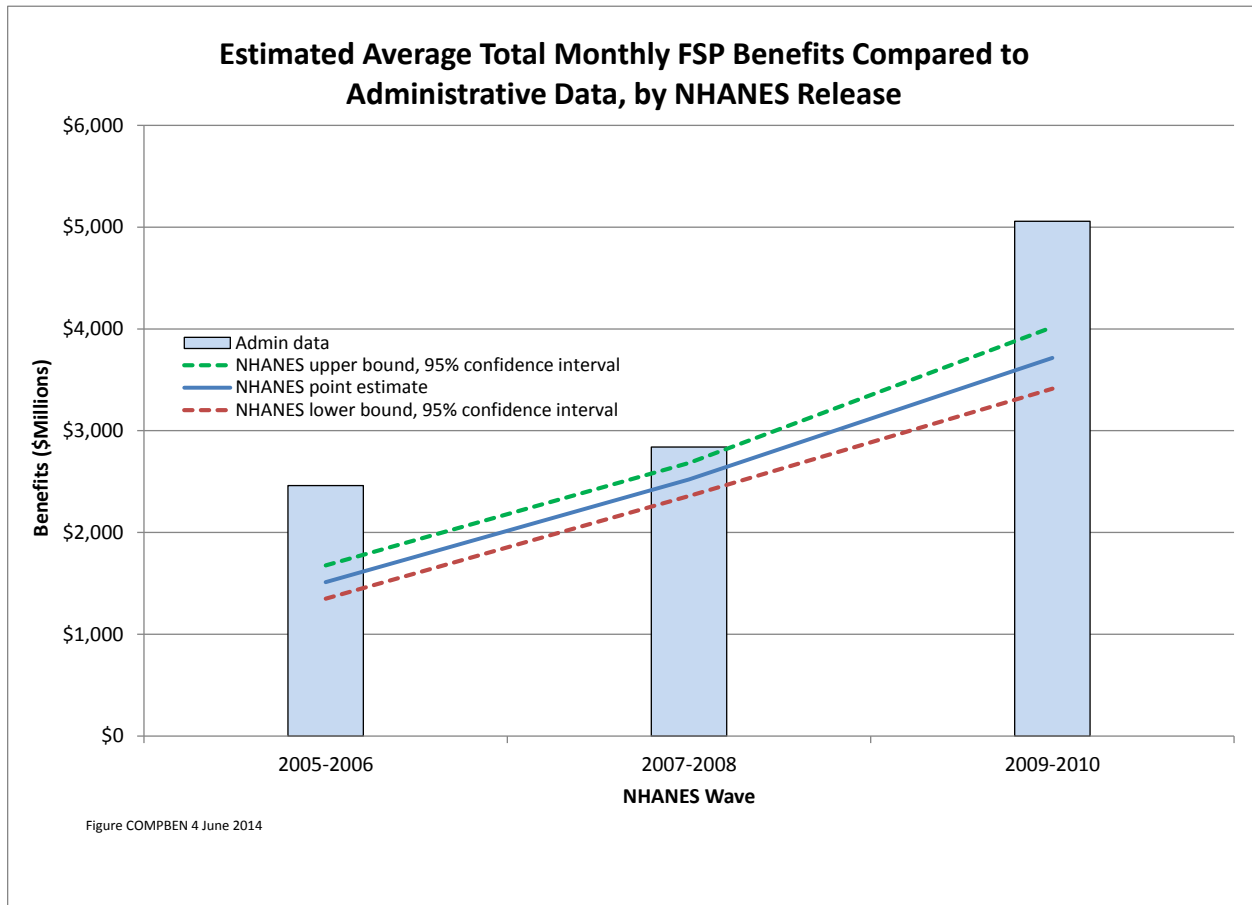


Table 1: Comparison of Estimated Participation and Benefit Reporting Rates

Comparison of NHANES-based Participation, Benefits, and Caseload Estimates to Administrative Data			
NHANES wave	Ratio, NHANES estimate to		
	Persons authorized*	Total benefits**	Total cases***
2005-2006	85.2%	--	67.0%
2007-2008	113.6%	88.7%	86.7%
2009-2010	99.2%	73.5%	75.6%

\*Based on household receipt, adjusted for probability of eligibility

\*\*Estimate for 2005-2006 omitted due to NHANES data error.

\*\*\*Derived from household estimate adjusted for households with multiple FSP/SNAP cases.

Source: Calculation by authors from NHANES public use data and administrative data. See text.

Table COMPRATES; Last Update 5 June 2014



Table 2: Disposition of Match Attempts, Texas NHANES Subsamples

Disposition of Match Attempts, Texas NHANES Subsamples			
Match Disposition	Wave		
	2005-06	2007-08	Total
Match ineligible Sample Persons	122	333	455
	12.2%	19.0%	16.5%
Match eligible Sample Persons	882	1,418	2,300
	87.8%	81.0%	83.5%
Total	1,004	1,751	2,755
Missing Food Security Supplement (all)	24	18	42
Missing FS Supplement (match eligible)	23	16	39
Match eligible with FSS Data	859	1,402	2,261
Match achieved during period covered by NHANES questions	182	386	568
	21.2%	27.5%	25.1%
Source: Calculations by authors from NHANES, Food Stamp Program files. See text.			
Table MATCHDIS; Last Update 11 October 2012			

Table 3: Consistency Indicators, NHANES Food Stamp Program Status Reports, Texas Subsample, 2005-2006 and 2007-2008 Waves

Consistency Indicators, NHANES Food Stamp Program Status Reports 2005-2006 and 2007-2008 Waves				
	Authorized current month		Authorized any time in last 12 months	
	Wave: 2005-2006	2007-2008	2005-2006	2007-2008
<u>Based on Reported SP Authorization</u>				
1 Proportion of SPs receiving FSP that are reported correctly as authorized for food stamps	54.4%	NA	52.6%	NA
2 Proportion of SPs reported as FSP-authorized in NHANES who were not so identified in administrative data (false positives)	21.1%	NA	15.6%	NA
3 Proportion of SPs not reported as FSP-authorized in NHANES but are so identified in administrative data (false negatives)	4.5%	NA	7.2%	NA
4 Proportion of SPs with reported FSP status consistent with administrative data	94.5%	NA	92.1%	NA
<u>Based on Reported Household Receipt</u>				
5 Proportion of SPs reported as residing in recipient households that are themselves authorized for food stamps	68.8%	62.7%	71.1%	74.4%
6 Proportion of SPs reported as residing in a recipient household who were not identified as recipients in administrative data (possible false positives)	33.8%	26.6%	25.2%	30.6%
7 Proportion of SPs not reported as residing in FSP participant household in NHANES but are themselves identified as recipients in administrative data (false negatives)	3.2%	6.2%	4.6%	6.9%
8 Proportion of SPs with reported household FSP status consistent with administrative data on SP status	93.9%	91.3%	92.7%	89.2%
Source: Calculations by authors from merged NHANES/ FSP administrative data. See text. Sample weights have been adjusted to account for the probability that consent was provided for record matching.				
Table 05060708ACCUIND Last update 5 November 2013				

Table 4: Ratio of Total Reported to Total Actual FSP Participation, Texas NHANES Subsamples

Ratio of Total Reported to Total Actual FSP Participation					
Texas NHANES Subsamples					
Basis and Wave	Sample	Recipient NHANES count	Recipient adminis- trative count	Ratio, NHANES count/ administrative count	
				Un- weighted	Weighted
Individual, 2005-2006	859	53	124	0.427	0.544
Household, 2005-2006	859	76	124	0.613	0.688
Household, 2007-2008	1402	207	327	0.633	0.627
Source: Calculations by authors from NHANES, Food Stamp Program files. See text.					
Table EXTXCOMP, Last Update 8 May 2013					

Table 5: CPS Reporting Rates, 2004-2010

<b>CPS Food Stamp/ SNAP Reporting Rates, 2004-2010</b>						
Year	Sample Households Estimate (thousands)	FSP/SNAP Administrative Units (Cases) (thousands)	Ratio, Estimate/ Administrative Total	Sample Benefits Estimate (\$millions)	FSP/SNAP Administrative Total Benefits (\$millions)	Ratio, Estimate/ Administrative Total
2004	6,002	10,558	0.568	\$14,622	\$25,811	0.567
2005	6,485	11,471	0.565	\$16,132	\$29,597	0.545
2006	6,148	11,580	0.531	\$15,878	\$29,441	0.539
2007	6,510	11,921	0.546	\$16,905	\$31,018	0.545
2008	7,682	13,177	0.583	\$22,629	\$37,155	0.609
2009	9,356	16,091	0.581	\$33,042	\$54,753	0.603
2010	10,912	19,315	0.565	\$37,617	\$66,615	0.565
Average			0.563			0.568

Source: Meyer, Mok, and Sullivan (2009), Tables 3 and 12; Czajka et al. (2012), Tables C-4 and C-5. The administrative data have been updated from those in the source.

Table REPRATE

Table 6: Comparison of Administrative Data to Sample-Based Estimates, Food Stamp Program, 2005-2010

Comparison of Administrative Data to Sample-Based Estimates, Food Stamp Program, 2005-2010				
Unit	Source	NHANES Wave Interval		
Households (thousands, average monthly)		2005-2006	2007-2008	2009-2010
	Benefit Units (administrative data)	11,525	12,549	17,703
	Conversion factor	0.963	0.962	0.955
	Households estimate	11,105	12,075	16,900
	CPS estimates	6,316	7,096	10,134
	Ratio to households estimate	0.569	0.588	0.600
	NHANES, this paper	7,439	10,469	12,778
	Ratio to households estimate	0.670	0.867	0.756
	NHANES, CEA estimate		11,000	
	Ratio to households estimate		0.911	
Participants (thousands, average monthly)				
	Administrative	26,140	27,843	38,407
	CPS estimates	N.A.	21,430	31,500
	Ratio to administrative total		0.770	0.820
	NHANES, this paper	22,269	31,623	38,086
	Ratio to administrative total	0.852	1.136	0.992
	NHANES CEA estimate		33,591	
	Ratio to administrative total		1.206	
Benefits (\$millions, average annual)				
	Administrative	\$29,519	\$34,087	\$60,684
	CPS estimates	\$16,005	\$19,767	\$35,330
	Ratio to administrative total	0.542	0.580	0.582
	NHANES, this paper	--*	\$30,250	\$44,574
	Ratio to administrative total	--	0.887	0.735
	NHANES CEA estimate		\$30,845	
	Ratio to administrative total		0.905	
* Conversion from FSP/SNAP case counts to households based on data from Survey of Income and Program Participation on the prevalence of multiple AU households; see Appendix A.				
text.				
Source:	Meyer, Mok, and Sullivan (2009), Tables 3 and 12; Czajka et al. (CEA) (2012), Tables C-4 and C-5 and calculations by authors from NHANES Public Use data. The administrative data have been updated from those used in original MMS and CEA calculations.			
Table REPCOMP, 12 June 2014				

Table A1: Adjustment Factors for Cases with Missing Food Security Data

<b>Adjustment Factors for Cases with Missing Food Security Data</b>	
<u>Wave</u>	<u>Adjustment</u>
1999-2000	1.020
2001-2002	1.017
2003-2004	1.014
2005-2006	1.009
2007-2008	1.006
2009-2010	1.006

Source: Calculations by authors; see text.

Table MISSDAT; Last update 6 March 2014

Table A2: Non-participant adjustment factors

<b>Adjustment Factors for Probability of Being a Member of the Food Stamp Unit</b>				
<b>Calender Years</b>	<b>Age</b>	<b>Citizenship Status</b>	<b>Adjustment Factor</b>	<b>Based on QC Data from</b>
2005-06	Child	Citizen	0.9985	FY 2005-07
2005-06	Child	Not Citizen	0.4342	FY 2005-07
2005-06	Adult	Citizen	0.9809	FY 2005-07
2005-06	Adult	Not Citizen	0.3985	FY 2005-07
2007-08	Child	Citizen	0.9978	FY 2007-09
2007-08	Child	Not Citizen	0.4828	FY 2007-09
2007-08	Adult	Citizen	0.9817	FY 2007-09
2007-08	Adult	Not Citizen	0.3728	FY 2007-09
2009-10	Child	Citizen	0.9967	FY 2009-11
2009-10	Child	Not Citizen	0.5257	FY 2009-11
2009-10	Adult	Citizen	0.9839	FY 2009-11
2009-10	Adult	Not Citizen	0.3653	FY 2009-11
Source: Calculations by authors; see text.				
Table ADJFACTORS				
Last update: 28 Feb 2014				

Table A3: Estimated Prevalence of Households with Multiple FSP/SNAP Administrative Units,

<b>Estimated Prevalence of Households with Multiple FSP/SNAP Administrative Units, 2003-2011</b>						
Year	Caseload (Administrative Units, AUs)		Recipient Households (Percentage)		Adjustment Factor for AU Count (Percentage Increase over HHLD Count, HHLDS Size >1)	
	Average Monthly Caseload, Administrative Data (millions)	SIPP-Based Caseload Estimate (millions)	Single Person	With Multiple AUs	Annual (FSP Hhlds of 2 or more)	NHANES Wave
2003	9.4		22.8	3.5	4.5	4.8
2004	10.6	8.6	24.2	3.8	5.0	4.8
2005	11.5	9.4	24.6	3.7	5.0	5.0
2006	11.6	9.5	24.7	3.8	5.1	5.0
2007	11.9	9.4	24.2	3.5	4.6	5.1
2008	13.2	10.3	22.8	4.4	5.6	5.1
2009	16.1	13.0	22.6	4.5	5.8	6.1
2010	19.3	15.0	22.3	5.0	6.4	6.1
2011	21.5	16.5	23.0	5.1	6.7	

Source: Calculated from the Survey of Income and Program Participation, various waves. Monthly caseload data provided by the USDA Food and Nutrition Service. All estimates have substantial standard errors.

Notes: •SIPP caseload estimates are based on first 12 waves of the 2004 and 2008 panels; some data for 2007 and 2008 are imputed. See text.  
•The NHANES adjustment factor is applied only to SPs in NHANES households of more than one person.

Table AUADJ; last update 6 March 2014



Table C1: Weighted Means of Variables Used in Models of Match Eligibility

Weighted Means of Variables Used in Models of Match Eligibility				
	2005-2006		2007-2008	
	Weighted sample mean	Percent matchable within group	Weighted sample mean	Percent matchable within group
Reported as currently FSP authorized	0.09	75.3	0.12	86.0
No FSSM data	0.01	97.2	0.01	82.7
SP Mexican American	0.26	89.6	0.32	81.4
SP non-Hispanic black	0.13	80.5	0.13	81.4
SP $\leq$ 18 years old	0.29	87.2	0.31	81.1
SP $\geq$ 60 years old	0.12	86.8	0.13	79.1
Number of persons in family <sup>a</sup>	3.57	n/a	3.69	n/a
Ratio of total family income to poverty lies between 1.0 and $<$ 2.0	0.21	78.9	0.19	78.6
Ratio of total family income to poverty lies between 2.0 and 5.0	0.58	88.8	0.55	78.8
Ratio of total family income to poverty data missing	0.05	70.7	0.03	57.5
Completed high school	0.23	85.8	0.16	80.3
More than high school diploma	0.53	87.2	0.57	75.1
Education data missing	0.03	45.1	0.03	64.7
Male SP	0.48	83.8	0.50	78.5
SP not a US citizen	0.12	90.2	0.12	76.1
SP in US $<$ 5 years	0.03	84.9	0.03	73.3
Household is food insecure	0.18	87.4	0.14	89.4
Base sample size	1,004	85.3	1,751	77.8

Source: Tabulations by authors from special NHANES extract. See text.

Note: <sup>a</sup>NHANES top codes this variable at 7.

To avoid losing observations, binary variables set to zero when underlying data are missing. Separate variables indicating which observations have missing data are included.

Table MATCHMEAN; last update 20 May 2013

Table C2: Parameters from Probability Models of Match Eligibility

Parameters from Probability Models of Match Eligibility				
	2005-2006		2007-2008	
	Logit Coefficient	Standard Error	Logit Coefficient	Standard Error
Intercept	0.656	0.429	0.812	0.279
Reported as currently FSP authorized	-0.821	0.316	0.404	0.238
No FSSM data	0.116	0.061	0.058	0.043
SP Mexican American	0.609	0.307	0.233	0.157
SP non-Hispanic black	-0.015	0.275	0.257	0.194
SP $\leq$ 18 years old	0.432	0.246	0.168	0.147
SP $\geq$ 60 years old	0.760	0.330	0.330	0.192
Number of persons in family	0.116	0.061	0.058	0.043
Ratio of total family income to poverty lies between 1.0 and $<$ 2.0	-0.263	0.300	0.119	0.193
Ratio of total family income to poverty lies between 2.0 and 5.0	0.618	0.316	0.612	0.178
Ratio of total family income to poverty data missing	-1.211	0.491	-0.846	0.350
Completed high school	0.561	0.305	-0.379	0.217
More than high school diploma	0.361	0.294	-0.568	0.185
Education data missing	-1.915	0.530	-0.936	0.344
Male SP	-0.291	0.190	0.050	0.120
SP not a US citizen	1.018	0.476	-0.259	0.223
SP in US $<$ 5 years	-1.037	0.652	-0.037	0.389
Household is food insecure	0.582	0.291	0.946	0.229
Base sample size	1,004	85.3	1,751	77.8
Percent concordant	71.8%		62.5%	
Somers' D	0.441		0.258	

Source: Tabulations by authors from special NHANES extract. See text.  
 Note: To avoid losing observations, binary variables set to zero when underlying data are missing. Separate variables indicating which observations have missing data are included.  
 Table MATCHPARAM last update 20 May 2013

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