Factors Contributing to High Estimated SNAP Participation Rates:

Insights from Microsimulation Model Comparisons and Analysis of CPS-Linked SNAP Administrative Records Data

Final Report

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1. Introduction

The Supplemental Nutrition Assistance Program (SNAP) is the nation's largest nutrition assistance program; in the average month of federal fiscal year 2019, SNAP helped 36 million poor and low-income Americans in 18 million households purchase food, at a total annual federal cost of $60.4 billion. The program is administered by the Food and Nutrition Service (FNS) of the U.S. Department of Agriculture (USDA) in cooperation with states (USDA, 2021).

Each year, FNS publishes SNAP participation rates, defined as the number of individuals and cases who receive SNAP under federal income and asset rules, divided by the number who are eligible for assistance (Cunnyngham, 2018). The number of participants is obtained from state administrative data. However, administrative data do not contain information on people who are eligible but do not apply for SNAP, so the number of individuals and cases eligible for SNAP is estimated by applying microsimulation models to household survey data.

Microsimulation Models

Microsimulation models apply SNAP eligibility rules to households in survey data to determine if, based on the demographic and income information reported in the survey, the people in the household are eligible for benefits. If a survey household contains one person, a married couple, or parents with minor children, the household is treated as a single "unit" for SNAP purposes. More complex households containing multiple families or unrelated individuals may be divided into more than one unit, with each treated separately for eligibility determination.

The FNS participation rate estimates are developed by Mathematica, using the MATH CPS-based eligibility model. The model produces SNAP eligibility estimates using data from the Current Population Survey Annual Social and Economic Supplement (CPS ASEC). The CPS ASEC is a nationally representative survey of households administered by the Census Bureau in February, March, and April of each year. The survey gathers detailed income and demographic information and is the source of the Census Bureau's official poverty estimates (Semega et al., 2020).

SNAP participation rates and other program participation rates are also generated by the Transfer Income Model Version 3 (TRIM3), a microsimulation model that is developed and maintained by the Urban Institute with funding from the U.S. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation (HHS ASPE) (Zedlewski & Giannarelli, 2015). TRIM3 provides HHS ASPE with Supplemental Security Income (SSI) and Temporary Assistance for Needy Family (TANF) participation rate estimates for use in an annual report to Congress (HHS, 2018) and performs detailed simulations of SNAP and other means-tested benefit programs. The TRIM3 project team provides SNAP eligibility and participation rate estimates to HHS ASPE in annual unpublished baseline reports.

Background and Motivation for the Study

For several years, the FNS and TRIM3 participation rate methodologies have generated SNAP participation rates that are above 100 percent for some demographic subgroups. SNAP participation rates exceeding 100 percent are unexpected. Even with substantial program outreach, some eligible families will elect not to participate, so participation rate estimates should be below 100 percent. A participation rate above 100 percent does not necessarily indicate that ineligible people are receiving assistance—it could arise from any number of issues related to the administrative data, survey data, both, and/or the microsimulation methods used to produce the eligibility estimates.

In 2014, FNS and Mathematica convened an expert panel to discuss the issue of the unexpectedly high participation rates for certain population subgroups. The panel considered various methodological changes, some of which have been implemented; none appear to have the potential to bring participation rates for single-parent families below 100 percent.[1] The panel convened again in 2017, and panelists submitted recommendations for research. An internal memorandum to FNS summarizes the panel's recommendations.[2]

In this report, we follow up on some of the expert panel's research recommendations.[3] We first compare SNAP participation rate estimates across microsimulation models and data sources to determine if the high participation rates are unique to the FNS estimates or are also observed in other models and data sources. We then analyze SNAP administrative data that have been linked with the CPS ASEC to explore data and modeling issues that might explain the high participation rate estimates. We merge TRIM3 eligibility flags with the linked data to investigate the characteristics of SNAP cases simulated as eligible and ineligible in TRIM3.

The linked data analysis builds upon a concerted multiple-year effort by the Census Bureau in cooperation with the USDA to obtain SNAP administrative data from individual states to support research combining administrative and survey data.[4] Our analyses of linked SNAP administrative and survey data use data files produced by Mathematica under contract to FNS, in which the SNAP administrative data for Illinois, Mississippi, and Tennessee were cleaned, standardized, and linked with the CPS ASEC.[5] This report also incorporates unpublished microsimulation model estimates made available to us by Mathematica and FNS.

[1] See Leftin, Smith, & Cunnyngham (2015) for a summary of the expert panel's recommendations.

[2] See Cunnyngham, Gray, & Lauffer (2017) for a summary of the expert panel's recommendations from the 2017 panel.

[3] Laura Wheaton, the lead author for this report, served as a member of both expert panels and offered many of the recommendations pursued here. She co-directs the TRIM3 microsimulation project at the Urban Institute.

[4] https://www.ers.usda.gov/topics/food-nutrition-assistance/food-assistance-data-collaborative-research-programs/census-fns-ers-joint-project/

[5] Czajka & Cunnyngham (2021).

Analyses and Key Findings

We present findings from our analyses in the next three chapters and conclude with a summary of our findings and implications for future research.

SNAP Participation Rate Estimates by Model and Data Source

Chapter 2 presents the findings of our comparisons of microsimulation models and data sources. We compare the FNS participation rate estimates developed using the MATH CPS-based eligibility model with estimates produced by other microsimulation models developed by Mathematica and the Urban Institute. These models can also produce eligibility and participation rate estimates, though their primary purpose is to estimate the effects of potential SNAP policy changes.

We find that certain subgroups have participation rates of 100 percent or more across all microsimulation models and data sources examined. These subgroups include SNAP cases consisting of a single adult with children, people in SNAP cases with countable income below 50 percent of the poverty guideline, and people in SNAP cases eligible for between 76 and 99 percent of the maximum benefit for their case size. Other subgroups, such as one-person SNAP cases, child-only SNAP cases, and cases with adults age 18 to 49 without disabilities in childless households have high participation rates in the MATH CPS estimates, but not in the other models or data sources examined, suggesting that differences in modeling approach may play a role. We examine results both at the national level and in the three states included in the linked data analysis—Illinois, Mississippi, and Tennessee.

Representation of SNAP Cases in the CPS ASEC

In Chapter 3, we analyze linked SNAP administrative data and CPS ASEC data for Illinois, Mississippi, and Tennessee to see if there is evidence of survey under-coverage of SNAP participants overall or for key subgroups. If SNAP participants, or certain subgroups of SNAP participants, are underrepresented in the survey data, then this could contribute to eligibility estimates that are below the actual levels of participation according to administrative data.

We find that the three states differ in whether households with SNAP recipients are more likely, less likely, or about equally likely to respond to the ASEC than are households without SNAP recipients. Combining results for the three states, we find that SNAP cases with one adult and one or more children are less likely to be in households with a CPS ASEC interview than are SNAP cases with multiple adults and children. We find evidence to suggest that SNAP cases with one adult and one or more children may be underrepresented in the final CPS ASEC, though further work is needed to confirm these findings.

TRIM3 Simulated Eligibility of SNAP Cases in Linked Data

In Chapter 4, we present the results of an analysis that merges TRIM3 SNAP unit identifiers and eligibility flags with the linked CPS ASEC and administrative data. We examine SNAP cases in the linked data to see if they are in a TRIM3 unit simulated as eligible or ineligible for SNAP. We

observe the extent to which differences in TRIM3 unit and SNAP case membership affect the TRIM3 eligibility estimates and explore the extent to which imputation of CPS ASEC variables and other factors affect simulated eligibility. We find that differences in TRIM3 unit and SNAP case membership are much more common among TRIM3 units found ineligible for SNAP than among those found eligible. SNAP cases simulated as ineligible in TRIM3 are also much more likely than those simulated as eligible to be "whole imputes" in which the ASEC portion of the survey is imputed, or to have imputed income amounts.

We then focus on a key subgroup—SNAP cases with one adult and one or more children—and find that just 52 percent are identified as eligible one-adult plus child units within TRIM3. Common reasons for this discrepancy include the absence of the SNAP case's children from the ASEC household, the absence of the case adult from the ASEC household (with children living instead with multiple adults, such as grandparents and other relatives), and the inclusion in the TRIM3 unit of a spouse, partner, or other adults. We consider possible explanations for these discrepancies, including movement of children and adults between households and definitional differences regarding how adults who are ineligible due to immigrant status or for other reasons are counted in the administrative data and survey data.

Conclusion and Recommendations for Future Research

In Chapter 5, we conclude with a discussion that highlights the key findings of the analyses and considers their implications for microsimulation modeling and linked administrative data analysis.

Definitions Used in this Report

FNS publications typically use the term "household" to refer to the group of people who apply for and receive SNAP together. We use the term "case" for this concept and reserve the term household to describe the group of people who share a residence. A residence can have more than one SNAP case if individuals or groups of people within the shared residence purchase and prepare food separately.

A TRIM3 "unit" is a "case" as defined by the TRIM3 microsimulation model. Much of our analysis focuses on differences in case, household, and TRIM3 unit membership. We use the term case to refer to the group of people who apply for and receive SNAP together to help keep these concepts distinct.

Key Definitions

Housing Unit: A house, apartment, group of rooms, or single room intended as separate living quarters

Household: The individual or group of people who occupy a housing unit

Microsimulation Model: A sophisticated computer program that applies detailed eligibility rules to individual people and households in household survey data to simulate eligibility and participation in government programs

SNAP Case: The individual or group of people who apply for SNAP together

- Includes people who live together and customarily buy and prepare food together
- There can be more than one "case" in a "household" as defined above

SNAP Participant: A person or case receiving SNAP benefits

SNAP Participation Rate: The number of SNAP participants divided by the number eligible for SNAP

- The number of participants is obtained from FNS administrative data.
- The number eligible for SNAP is estimated using microsimulation models.
- Participation rates are estimated at both the person level and case level.

TRIM3 Unit: The "case" as defined by the TRIM3 microsimulation model

2. SNAP Participation Rate Estimates by Model and Data Source

In this chapter, we examine the extent to which participation rate estimates vary by the microsimulation model and survey used to produce the estimate, and also by whether eligibility is determined under federal rules alone or when also including participants made eligible through state broad based categorical eligibility rules (BBCE).

If a demographic subgroup has an unexpectedly high participation rate according to one model but not another, it might be useful to explore how different modeling approaches affect the estimate. But if a demographic subgroup has an unexpectedly high participation rate across models, it might be best to focus on issues in the underlying survey data and SNAP administrative data, while also considering how commonalities in approach across models might influence the result.

Although we are primarily concerned with groups that have estimated participation rates above 100 percent, we expand the analysis to include groups with participation rates above 90 percent. While it is possible that a subgroup truly has a participation rate above 90 percent but below 100 percent, it is also possible that the participation rate is overstated.

We begin by describing the models, surveys, and data years included in the analysis. We then briefly describe the methodology used to produce participation rate estimates, eligibility estimates, and information about participants. Next, we summarize participation rates for key subgroups across models, surveys, and data years—highlighting key differences by source. We then turn our focus to subgroups with estimated participation rates exceeding 90 percent, according to 2016 participation rates developed by Mathematica for FNS. We examine how results for these subgroups compare across models, data sources, and data years at the national level and for the three states included in the linked data analysis. We conclude by discussing the implications of the findings for the remainder of our analysis and for future research.

Models, Surveys, and Data Years

Our analysis examines participation rates in 2016 (the most recent available estimate across models at the time work began) and 2011 (selected to allow comparison with results generated from Survey of Income and Program Participation (SIPP) data).

We obtained results from the following models, surveys, and data years:

CPS-based models

- **MATH CPS-based eligibility model** *(developed by Mathematica under contract with FNS).* This model provides the eligibility estimates used to develop the participation rates released annually by FNS (Cunnyngham, 2018). The model operates on data from the CPS ASEC.

  We obtained 2011 and 2016 estimates from published data, where available. With permission from FNS, Mathematica provided us with estimates for subgroups with

participation rates above 100 percent (which are masked in the published data), eligibility estimates for the three linked data study states, and eligibility estimates including BBCE.

- **TRIM3 model** *(developed by the Urban Institute under contract with HHS ASPE)*. We generated 2011 and 2016 TRIM3 eligibility estimates from publicly available TRIM3 baseline data at the national level and for the three states. TRIM3 uses data from the CPS ASEC.

SIPP–based model

- **MATH SIPP+** *(developed by Mathematica under contract with FNS)*. The MATH SIPP+ model operates on SIPP data. With permission from FNS, Mathematica provided national level eligibility estimates for 2011 from the MATH SIPP+ model. We calculated participation rates from these eligibility estimates using the same numerator as in the CPS-based estimates. Due to sample size limitations in the SIPP, we do not include state estimates.

ACS-based model

- **Urban Institute ATTIS model** *(developed by the Urban Institute with foundation funding)*. The Analysis of Transfers, Taxes, and Income Security (ATTIS) Model adapts TRIM3 simulation methods to the American Community Survey (ACS).[6] We prepared the 2016 eligibility estimates presented here, at the national level and for the three states.

Methodology

The participation rates presented here are calculated by dividing the number of people or cases that participate in SNAP according to SNAP administrative data by the number that are eligible for SNAP. Mathematica estimates the number of participants using data from the SNAP QC data file, an edited version of a raw data file generated by the SNAP Quality Control System, based on a sample of participating cases (Cunnyngham, 2018). The eligibility estimates are obtained by applying microsimulation models to survey data. The SNAP QC estimates reflect participation in the "average month" of the federal fiscal year. The eligibility estimates are also designed to reflect an "average month," although the models vary in their definition.[7]

Because the eligibility estimates and participant counts are drawn from different sources, it is possible for the estimated participation rate to exceed 100 percent. This occurs if there are more participants, according to the administrative data, than there are people eligible, according to the

[6] ATTIS uses an augmented version of the ACS produced by the University of Minnesota's Integrated Public Use Microdata Series project (Ruggles et al., 2020); (ATTIS stands for *Analysis of Transfers, Taxes, and Income Security*; TRIM3 is the *Transfer Income Model, version 3*). See Pyati (2020) for an overview of the ATTIS model.

[7] The MATH CPS model combines data from two consecutive years of CPS ASEC data to construct an average monthly eligibility estimate representing the federal fiscal year. The TRIM3 and ATTIS average monthly estimates reflect the calendar year. The MATH SIPP+ model uses eligibility estimates from a single month of SIPP data.

microsimulation estimates. As noted above, this is not necessarily due to ineligible people receiving SNAP; various data and methodological issues could contribute to the result.

Rates are Shown Under Federal Rules Alone and then Including BBCE

We provide two different sets of participation rate estimates. We first provide estimates calculated according to the methodology used to produce the official FNS participation rate estimates (e.g., Cunnyngham, 2018). These estimates reflect eligibility and participation among cases that are eligible for SNAP under federal rules. The estimates exclude additional cases made eligible through state BBCE rules.[8] In addition to showing participation rate estimates under this primary definition, we also show participation rate estimates when BBCE policies are included.

The models estimate eligibility by first determining which members of a survey household apply together for SNAP. This creates one or more potential SNAP units within a survey household. The models then use SNAP eligibility and benefit rules to determine the eligibility and benefits of each potential SNAP unit, based on the income and demographic information of the unit members. When simulating eligibility under the federal SNAP rules, the simulation models "turn off" eligibility through state BBCE policies. The state BBCE eligibility rules are then "turned on" to produce eligibility estimates including BBCE.

When calculating participation rates under the first definition (federal rules) we use participation counts from the published participation rate estimates (Cunnyngham, 2018). These estimates are derived from SNAP Quality Control (QC) data, but are adjusted to exclude cases that would be ineligible for SNAP under federal rules.[9] With permission from FNS, Mathematica provided additional unpublished estimates for the states included in this analysis. When calculating participation rates under the broad definition of eligibility (including BBCE) we use data for all SNAP participants based on SNAP QC data. If the required participant count for the subgroup is available in the 2011 or 2016 *Characteristics of Supplemental Nutrition Assistance Program Households* report, we use the published figure.[10] Otherwise, we calculate the number of participants from the SNAP QC data.

Participation Rate Estimates for Key Subgroups

We present key findings from the analysis in Tables 2.1, 2.2, and 2.3 (below). Appendix Tables A.1 and A.2 provide the underlying eligibility and participation numbers used to calculate the national participation rate estimates, as well as results for additional subgroups. Detailed findings for Illinois, Mississippi, and Tennessee are provided in Appendix Tables A.3 through A.8.

[8] BBCE provides states the flexibility to waive assets tests or increase the asset limit. States can also increase the gross income eligibility limit as high as 200 percent of the poverty guideline, making additional households eligible for assistance. However, states cannot change the phase-out of the SNAP benefit, and so households may have their benefit phased out or reduced to a small benefit amount before the higher eligibility limit is reached.

[9] The adjustment involves imputation, because states that have opted to waive the assets test lack data on assets that would be needed to determine if a household is eligible according to federal rules.

[10] See USDA 2012 and 2017.

Table 2.1 shows participation rates for cases, individuals, individuals by age, and adults age 18 to 49 without disabilities in childless households. The top panel shows participation rates estimated under federal rules (excluding the effect of BBCE), and the bottom panel shows results for all participants and eligible people, including those made eligible through state BBCE policies. We show results for 2016 for the MATH CPS-based eligibility model (referred to here as MATH CPS), TRIM3, and ATTIS. We show results for 2011 for MATH CPS, TRIM3, and the MATH SIPP+ model.

Key findings from Table 2.1 include the following:

- Participation rates are higher in 2016 than 2011 for both TRIM3 and the MATH CPS model and for both sets of eligibility rules. The case participation rates are 7 percentage points higher in 2016 than in 2011 according to MATH CPS and 8 percentage points higher in 2016 according to TRIM3.
- The overall 2011 MATH SIPP+ case and individual participation rate estimates are approximately halfway between the MATH CPS and TRIM3 estimates.
- The 2016 ATTIS participation rate estimates are generally lower than the participation rate estimates for the other two models. This may be because the ACS does not capture as much "other income" (income types not specifically addressed in the questions) as is captured in the CPS, so fewer cases are found ineligible based on aggregated sources of income.
- MATH CPS participation rates are higher than TRIM3 when modeling federal rules, but closer to TRIM3 for most key subgroups when modeling BBCE rules. A possible explanation is that some parts of each model requiring greater imputation (i.e., asset values and net income amounts) are not as critical when simulating BBCE, so are less likely to contribute to variation in the estimates.
- Participation rate estimates vary more for cases than for individuals under federal rules, but not under BBCE rules. The 2016 case participation rate is 14 points higher in MATH CPS than TRIM3 under federal rules, but just 2 points higher with BBCE. The MATH CPS individual participation rate is 5 points higher than TRIM3 under federal rules, and 4 points lower than TRIM3 under BBCE.
- The 2016 child participation rates are at least 100 percent for both TRIM3 and the MATH CPS model when simulating federal rules and are 90 percent or more when simulating BBCE rules.
- The participation rate for adults age 18 to 49 without disabilities in childless households is 97 percent for the MATH CPS model (in 2016 under federal rules), but much lower in TRIM3 (63 percent). This gap is also large under BBCE estimates.

Table 2.1 National SNAP Participation Rates, as Defined by Number Participating According to SNAP QC Based Estimates Divided by Number Eligible, by Data Source, Model, Year, and whether Estimate includes State BBCE

	2016			2011		
	CPS		ACS	CPS		SIPP
	MATH	TRIM3	ATTIS	MATH	TRIM3	MATH
Federal Rules						
All cases	89	75	66	82	67	74
All individuals	85	80	72	78	72	75
Age						
Children (17 or younger)	104	100	91	96	89	84
Pre-school age (0-4)	105	103	91	101	96	95
School-age (5-17)	104	98	91	93	86	79
Nonelderly adults (18 to 59)	88	80	70	79	71	76
Elderly individuals (60+)	45	43	41	38	38	44
Adults age 18 to 49 without disabilities in childless households	97	63	47	83	54	77
Including Broad Based Categorical Eligibility (BBCE)						
All cases	63	61	58	58	57	58
All individuals	62	66	63	58	63	60
Age						
Children (17 or younger)	90	91	85	82	83	75
Pre-school age (0-4)	92	94	85	89	92	87
School-age (5-17)	89	90	85	79	79	70
Nonelderly adults (18 to 59)	70	70	63	63	64	63
Elderly individuals (60+)	25	30	32	19	26	27
Adults age 18 to 49 without disabilities in childless households	70	52	41	63	48	62

Source: Developed from eligibility estimates from the MATH CPS-Eligibility model, MATH SIPP+ model, TRIM3, and ATTIS combined with participation estimates based on SNAP QC data (as processed by Mathematica)

Subgroups with Participation Rates above 90 Percent

Table 2.2 presents participation rate estimates for subgroups with MATH CPS participation rates above 90 percent in 2016 according to published estimates (Cunnyngham, 2018). Although our primary focus is on subgroups with participation rates above 100 percent, we are also interested in subgroups with participation rates above 90 percent. As noted in the introduction, while it is possible that a subgroup truly has a participation rate above 90 percent but below 100 percent, it is also possible that the participation rate is overstated.

Key findings from Table 2.2 include the following (for 2016 under federal rules):

- Participation rates for cases consisting of a single adult with children are far above 100 percent for MATH CPS (133 percent) and TRIM3 (129 percent). ATTIS also has a 109 percent participation rate for this group.
- Both TRIM3 and MATH CPS have participation rates of at least 100 percent for the following groups:
  - Children
  - People in cases with no countable income
  - People in cases with income between 1 and 50 percent of the poverty guideline for a case of their size
  - People in cases eligible for benefits equal to 76 to 99 percent of the maximum benefit for a case of their size, and people in cases eligible for the maximum benefit
  - Cases composed of a single adult with children (as noted above)
- The MATH CPS participation rate is at least 100 percent but TRIM3 is below 100 percent for the following subgroups:
  - Child-only cases (135 percent MATH CPS, 85 percent TRIM3)
  - Cases with SSI (102 percent MATH CPS, 94 percent TRIM3)
  - Cases with no countable income or income below 100 percent of the poverty guideline
- The MATH CPS participation rate is between 91 and 99 percent but TRIM3 is below 91 percent for the following subgroups:
  - Adults age 18 to 49 without disabilities in childless households (as noted for Table 2.1)
  - People in one-person cases (98 percent MATH CPS, 67 percent TRIM3)
  - People in cases without earned income (94 percent MATH CPS, 86 percent TRIM3)
  - People in cases with income between 51 percent and 100 percent of the poverty guideline (95 percent MATH CPS, 80 percent TRIM3)

Participation rate estimates are also high for some subgroups when simulating BBCE rules, although BBCE does attenuate overall participation levels. Subgroups with high participation rates include (for 2016):

- People in cases with no income (98 percent MATH CPS, 112 percent TRIM3)
- People in cases with countable income between 1 and 50 percent of the poverty guideline (104 percent MATH CPS, 99 percent TRIM3)
- People in cases eligible for 76 to 99 percent of the maximum benefit (115 percent MATH CPS, 111 percent TRIM3)
- People in cases eligible for the maximum benefit (99 percent for both MATH CPS and TRIM3)
- Cases with a single adult and children (120 percent MATH CPS and 118 percent TRIM3)

In addition, the MATH CPS participation rate estimates for child-only cases remain high under BBCE: 123 percent in MATH CPS under BBCE rules in 2016, compared with 74 percent for TRIM3.

Table 2.2 Subgroups with Estimated Participation Rates above 90 Percent According to 2016 FNS Mathematica Estimates, by Data Source, Model, Year, and whether Estimate Includes State BBCE

	2016			2011		
	CPS		ACS	CPS		SIPP
	MATH	TRIM3	ATTIS	MATH	TRIM3	MATH
Federal Rules						
Individual Characteristics						
Age						
Children (17 or younger)	104	100	91	96	89	84
Pre-school age (0-4)	105	103	91	101	96	95
School-age (5-17)	104	98	91	93	86	79
Adults age 18 to 49 without disabilities in childless households	97	63	47	83	54	77
In one-person cases	98	67	58	90	58	73
In cases without earned income	94	86	83	88	81	90
Countable income as a percentage of poverty guidelines						
No income	102	105	86	75	78	90
1 to 50 percent	118	105	104	119	97	108
51 to 100 percent	95	80	75	87	75	73
Benefit as a percentage of maximum benefit						
76 to 99 percent	124	113	109	109	95	106
Maximum benefit	111	101	86	90	89	97
Case Characteristics						
Case composition						
Single-adult with children	133	129	109	125	114	99
Child only	135	85	78	136	68	83
Cases containing						
Non-elderly individuals with disabilities	93	93	96	84	83	90
Adults age 18 to 49 without disabilities in childless households	115	71	54	100	61	79
Case countable income source						
SSI	102	94	95	93	86	90
Countable income as a percentage of poverty guidelines						
No income	118	99	81	91	74	102
1 to 50 percent	123	95	91	131	93	109
51 to 100 percent	100	77	72	92	72	74

(Table continues)

Table 2.2 (continued)

	2016			2011		
	CPS		ACS	CPS		SIPP
	MATH	TRIM3	ATTIS	MATH	TRIM3	MATH
Including Broad Based Categorical Eligibility (BBCE)						
Individual Characteristics						
Age						
Children (17 or younger)	90	91	85	82	83	75
Pre-school age (0-4)	92	94	85	89	92	87
School-age (5-17)	89	90	85	79	79	70
Adults age 18 to 49 without disabilities in childless households	70	52	41	63	48	62
In one-person cases	72	56	52	64	50	55
In cases without earned income	70	72	74	66	69	72
Countable income as a percentage of poverty guidelines						
No income	98	112	91	71	81	91
1 to 50 percent	104	99	103	107	94	99
51 to 100 percent	88	79	75	80	75	70
Benefit as a percentage of maximum benefit						
76 to 99 percent	115	111	110	100	94	102
Maximum benefit	99	99	87	82	88	90
Case Characteristics						
Case composition						
Single-adult with children	120	118	103	113	108	92
Child only	123	74	73	128	66	80
Cases containing						
Non-elderly individuals with disabilities	80	86	92	71	76	81
Adults age 18 to 49 without disabilities in childless households	84	60	47	76	56	64
Case countable income source						
SSI	99	91	93	87	83	86
Countable income as a percentage of poverty guidelines						
No income	115	107	87	87	77	102
1 to 50 percent	102	88	90	111	88	96
51 to 100 percent	93	76	72	85	71	71

Source: Developed from eligibility estimates from the MATH CPS-Eligibility model, MATH SIPP+ model, TRIM3, and ATTIS combined with participation estimates based on SNAP QC data (as processed by Mathematica)

Subgroups defined based on "Trends in Supplemental Nutrition Assistance Program Participation rates: Fiscal Year 2010 to Fiscal Year 2016"

Subgroups with Participation Rates above 90 Percent in 2016, including State Results

Table 2.3 provides Illinois, Mississippi, and Tennessee estimates under federal rules and BBCE in 2016 for the subgroups of interest. We present estimates from the MATH CPS and TRIM3 models, omitting some subgroups due to low sample sizes.

All the state estimates should be interpreted with caution due to sample size limitations.[11] These are not the official FNS state participation estimates. The official estimates use shrinkage methodology to overcome the limitations of small sample sizes (Cunnyngham, 2019). Nevertheless, the MATH CPS estimates presented here are close to the official estimates. The estimate for Illinois is 103 percent (the published estimate indicates Illinois has a participation rate of at least 100 percent), the estimate for Mississippi (78 percent) is lower than the point estimate in the published results (83 percent) but is within the confidence interval in the published results. The estimate for Tennessee (93 percent) matches the point estimate in the published data.

We provide the state estimates so that we can see if subgroups with unexpectedly high participation rates in the national data have similarly high participation rates in the state data. If so, analysis of the linked survey and administrative data for the state might offer helpful insights into the reasons for high participation rates at the national level. But if the participation rate for the subgroup is much lower than at the national level, analysis of the state may not be as informative. We describe results for each state, after first giving a brief description of key policies in effect in the state in 2016.

Illinois

Illinois had BBCE in 2016—there was no asset test and the gross income limit was 165 percent of poverty (relative to 130 percent under federal rules for cases without an elderly member or person with disabilities).

Another area of state policy variation involves whether a state has a waiver from the 3-month time limit for able-bodied adults without children (ABAWDs) who do not meet work requirements. States can apply for waivers from the ABAWD time limit for the full state or for parts of the state due to high unemployment or insufficient jobs.[12] Eligibility estimates for adults age 18 to 49 without disabilities in childless households are likely to be affected by whether the state has an ABAWD waiver; Illinois had an ABAWD waiver covering the entire state in 2016.

Key findings for Illinois include the following:

- The MATH CPS estimates for Illinois (under federal rules) exceed 100 percent in all subgroups of interest. The estimates from Illinois exceed the national estimates for all subgroups.

[11] We have shaded cells in the table that have 50 or fewer observations, to identify cells where sample sizes are particularly low.

[12] FNS issued revised regulations in 2019. The policy described here reflects the rules in effect in 2016.

- The TRIM3 estimates for Illinois also equal or exceed the national TRIM3 estimates for all subgroups, though remain below 100 percent for some.
- Estimated participation rates are substantially lower in Illinois when BBCE eligibility is simulated, but still substantially exceed 100 percent for some subgroups, suggesting that it is not just the additional imputations needed to estimate participation rates under federal rules that causes the high participation rates. The overall reduction in participation rates with BBCE is not surprising, since the cases that become eligible for SNAP due to Illinois' higher income limit likely qualify for smaller benefits than other participants and may therefore be less likely to participate.

Mississippi

Asset limits were waived in 2016 under Mississippi's BBCE policy, but income eligibility limits were the same as federal rules. Mississippi did not have a waiver from ABAWD time limits in 2016.

Key findings for Mississippi (under the federal rules) include the following:

- Mississippi has lower estimated participation rates than the national estimates; this holds true across most of the subgroups shown in Table 2.3, for both MATH CPS and TRIM3.
- However, participation rates in Mississippi are particularly high for single-adult cases with children (142 percent in MATH CPS and 129 percent in TRIM3).
- The participation rate estimates for adults age 18 to 49 without disabilities in childless households exceed the national rate in both MATH CPS and TRIM3 and is above 100 percent in MATH CPS.
- In contrast, the participation rate for child-only cases is very low in Mississippi in both models (20 percent in MATH CPS and 11 percent in TRIM3).

Tennessee

Tennessee did not have BBCE in 2016. Therefore, we provide results only for eligibility under the federal rules. Tennessee reintroduced ABAWD time limits in 2016, though it did have waivers covering counties with the highest unemployment rates.

Key findings for Tennessee include the following:

- The Tennessee participation rate is higher than the national estimates for both models, and this holds true for most of the subgroups shown in Table 2.3. However, the participation rates for most subgroups are not quite as high as in Illinois.
- Most of the subgroups have MATH CPS participation rate estimates close to or exceeding 100 percent. Child-only cases are an exception, with an estimated participation rate equal to 72 percent in Tennessee, compared with 135 percent in the national MATH CPS estimate.

Table 2.3 All Participating Individuals and Cases and Subgroups with Estimated Participation Rates above 90 percent According to 2016 FNS Mathematica National Estimate, 2016 CPS Estimates for MATH CPS and TRIM3, Nationally and for Three States

(Data cells shaded in grey indicate sample size less than 50)

	MATH CPS				TRIM3			
	National	IL	MS	TN	National	IL	MS	TN
Federal Rules								
Individual Characteristics								
All individuals	85	103	78	93	80	94	79	89
Age								
Children (17 or younger)	104	114	99	112	100	103	97	108
Adults age 18 to 49 without disabilities in childless households	97	160	105	163	63	80	79	88
In one-person cases	98	124	79	113	67	89	57	74
In cases without earned income	94	133	90	106	86	123	87	99
Countable income as a percentage of poverty guidelines								
No income	102	172	94	156	105	178	106	125
1 to 50 percent	118	137	106	111	105	109	89	111
51 to 100 percent	95	116	91	102	80	95	79	83
Benefit as a percentage of maximum benefit								
76 to 99 percent	124	129	92	104	113	125	105	122
Maximum benefit	111	146	86	114	101	111	96	108
Case Characteristics								
All cases	89	115	78	97	75	95	71	81
Case composition								
Single-adult with children	133	174	142	136	129	149	129	120
Child only	135	186	20	72	85	110	11	53
Cases containing								
Adults age 18 to 49 without disabilities in childless households	115	191	123	209	71	94	82	96
Countable income as a percentage of poverty guidelines								
No income	118	234	107	185	99	183	93	127
1 to 50 percent	123	144	113	108	95	95	80	82
51 to 100 percent	100	117	89	102	77	95	71	78

(Table continues)

Table 2.3 (continued)

	MATH CPS				TRIM3			
	National	IL	MS	TN	National	IL	MS	TN
Including Broad Based Categorical Eligibility (BBCE)								
Individual Characteristics								
All Individuals	62	72	71		66	74	79	
Age								
Children (17 or younger)	90	89	92		91	90	98	
Adults age 18 to 49 without disabilities in childless households	70	109	100		52	71	83	
In one-person cases	72	84	74		56	69	57	
In cases without earned income	70	90	81		72	96	87	
Countable income as a percentage of poverty guidelines								
No income	98	153	89		112	192	110	
1 to 50 percent	104	105	96		99	101	87	
51 to 100 percent	88	102	84		79	94	80	
Benefit as a percentage of maximum benefit								
76 to 99 percent	115	111	84		111	121	105	
Maximum benefit	99	116	80		99	111	97	
Case Characteristics								
All cases	63	78	72		61	72	71	
Case composition								
Single-adult with children	120	144	137		118	125	128	
Child only	123	172	20		74	101	11	
Cases containing								
Adults age 18 to 49 without disabilities in childless households	84	135	122		60	84	86	
Countable income as a percentage of poverty guidelines								
No income	115	212	102		107	199	96	
1 to 50 percent	102	99	98		88	84	75	
51 to 100 percent	93	103	85		76	93	72	

Source: Developed from eligibility estimates from the MATH CPS-Eligibility model and TRIM3 combined with participation estimates based on SNAP QC data (as processed by Mathematica).

Subgroups defined based on "Trends in Supplemental Nutrition Assistance Program Participation rates: Fiscal Year 2010 to Fiscal Year 2016"

IL: Illinois; MS: Mississippi; TN: Tennessee

Light shading reflects cells with 50 or fewer observations. Tennessee did not have BBCE in 2016.

Chapter 2 Summary and Recommendations

The comparisons provided here helped inform the linked data analyses to be described in Chapters 3 and 4 and also have implications for future research.

Implications for Linked Data Analysis

Based on the findings presented here, we conclude that single adult cases with children are an important subgroup to investigate using the linked data. Single adult cases with children have estimated participation rates above 100 for all models and data years, except for MATH SIPP+ (which had a participation rate of 99 percent in 2011).

The results for the three states suggest that they are all appropriate states to include in the linked administrative and CPS data analysis.

- Illinois is a good candidate because its participation rate issues seem even more pronounced than at the national level.
- Tennessee is a good state to include for policy reasons—because it does not have BBCE, its participation rate estimates are not affected by the assumptions needed to "back out" participants who would have failed the federal assets test.
- Participation for some subgroups of interest nationally are below 100 percent in Mississippi. Nevertheless, Mississippi, like the other states, has participation rates far above 100 percent for single adult cases with children. Mississippi is also of interest for policy reasons, as it is the only one of the three states that had ABAWD time limits in place for the full state for the entire year. Mississippi had BBCE in 2016, but unlike Illinois, the BBCE rules were only used to waive the asset test.

Implications for Future Research on Microsimulation Modeling Methodology

The findings presented here can also inform future work beyond what could be accomplished in this study.

Examining high participation rates in MATH CPS

Certain population subgroups have unexpectedly high participation rates in the MATH CPS estimates but not in TRIM3 and MATH SIPP+. These subgroups may benefit from analyzing differences in modeling approaches. For example:

- Differences in methods to divide survey households into potential SNAP units could be contributing to fewer eligible cases (and higher participation rates) in MATH CPS for adults age 18 to 49 without disabilities in childless households and for one-person cases. It is worth noting that the 2011 MATH CPS participation rate for one-person cases (90 percent) is well above the 2011 MATH SIPP estimate (73 percent) which is itself substantially above the TRIM3 estimate (58 percent).

- Differences across models in participation rates for adults age 18 to 49 without disabilities in childless households could be affected by methods to simulate ABAWD time limits. However, this is probably not the main factor behind the differences. The gap between the MATH CPS and TRIM3 participation rates is only slightly larger in 2016 (when over half of states had ABAWD time limits) than in 2011 (when almost all states had waivers).
- The 2016 MATH CPS participation rate for child-only cases (135 percent) is much higher than the 2016 TRIM3 rate (85 percent). The 2011 MATH CPS estimate (136) is also much higher than the 2011 TRIM3 estimate (68 percent), as well as the 2011 MATH SIPP estimate (83 percent). More detailed analyses of the modeling approaches affecting this group might provide insight.

Correcting for SSI Underreporting

It is not surprising to see high SNAP participation rates (above 90 percent) for cases receiving SSI. SSI recipients have low income and states are likely to encourage or facilitate their application to SNAP; joint processing allows states to do so automatically. SSI is underreported in the CPS ASEC (Meyer, Mok, & Sullivan, 2009) and both MATH CPS and TRIM3 correct for this known underreporting. The MATH CPS model has a 102 percent participation rate for cases with SSI in 2016, compared with 94 percent in TRIM3. It might be helpful to compare how the TRIM3 and MATH CPS methodologies correct for underreporting of SSI, to see if changes to the MATH CPS methodology might reduce estimated participation rates below 100 percent.

Exploring Differences in MATH CPS and TRIM3 Estimates

Although we have pointed to instances where TRIM3 participation rates are below 100 percent while MATH CPS estimates are above 100 percent, this does not mean that the TRIM3 modeling approach is necessarily "better." For example, it might be the case that an underlying issue in the survey data explains the high MATH CPS participation rate estimate for a subgroup; perhaps the same result does not appear in TRIM3 because the model is not capturing a particular rule at the same level of detail as the MATH CPS, and thus overstates eligibility for the subgroup. Further investigation would be needed to shed additional light on these issues. Such research could improve estimates produced by both models.

3. Representation of SNAP Cases in the CPS ASEC

In this chapter, we analyze linked CPS and SNAP administrative case record data for Illinois, Mississippi, and Tennessee to explore whether SNAP cases overall or for key subgroups are underrepresented in the CPS. If SNAP cases are underrepresented, this could contribute to the high participation rate estimates for certain subgroups described in Chapter 2.

We first examine CPS response rates of sampled households with and without a SNAP case. We find that the three states differ in whether households with a SNAP case are more likely, less likely, or about equally likely to respond to the CPS survey as are those without a SNAP case, given that the household has been found eligible for an interview

We next examine differences in interview rates by type of SNAP case. Combining data for the three states, we find that housing units with a one-adult plus child case are less likely to have a CPS interview than are housing units with a multiple-adult plus child case. We also observe lower interview rates for SNAP cases with income up to 50 percent of the poverty guideline than for those with income above 50 percent of poverty.

Finally, we compare the weighted number of SNAP cases in the linked CPS ASEC data with the actual number of SNAP cases in the administrative data. We find that multiple-adult plus child cases are overrepresented in the linked data for each year between 2012 and 2016, whereas child-only cases and one-adult plus child cases are underrepresented. In addition, one-person cases with a member between 18 and 59 are substantially underrepresented in the linked data. Our estimates do not adjust for match error, so further research is needed to confirm the findings for underrepresented groups. We provide implications and suggestions for future research at the end of this chapter.

Interview Rate Analysis

We begin by investigating whether CPS response rates differ for households with and without a SNAP case and whether interview rates vary for different types of SNAP cases. We use SNAP receipt as obtained from state SNAP administrative case records.

Some of our results include all sampled housing units, including those that are found ineligible for the CPS ASEC interview—for example, because the housing unit is found by the CPS interviewer to be vacant or demolished. We also present response rates for the sampled households that are found eligible for the interview.

We use the term “housing unit” to refer to the broader concept that includes both ineligible and eligible units, and “household” when referring to the housing units found eligible for the interview. Similarly, we use the term “interview rate” when describing all sampled units, and “response rate” when describing responses to the interview among housing units found eligible for an interview.

Data for Interview Rate Analysis

We analyze interview rates using a dataset that links SNAP cases in the standardized Illinois, Mississippi, and Tennessee administrative SNAP data prepared by Mathematica with housing units in the 2016 basic March CPS sample. The SNAP data include all SNAP cases in the standardized administrative data for the three states in March 2016. By selecting the same month for the CPS and administrative data, we hope to achieve the greatest possible consistency between the two data sources. However, if a SNAP participant has moved and not notified the SNAP agency about the change of address, it is possible that the SNAP participant no longer resides at that address.

Our interview rate estimates are based on the March CPS sample, rather than the full CPS ASEC. The CPS ASEC is a supplement to the basic CPS—a monthly survey sponsored by the Census Bureau and the Bureau of Labor Statistics to collect data for unemployment statistics. Households selected for the CPS are interviewed in four consecutive months, are then out of the survey for eight months, and are then interviewed for another four consecutive months. The ASEC interview is administered to all households in the basic March CPS sample plus additional households identified in other months that meet designated criteria for Hispanic ethnicity, race, and presence of children. These additional households receive the ASEC interview in February, April, and (for one group of Hispanic households) in March, thus expanding the size of the CPS ASEC sample (U.S. Census Bureau, 2019).

We exclude the groups interviewed in February and April and the additional Hispanic households interviewed in March to avoid overstating the response rate. These additional groups have already shown a willingness to be interviewed. Otherwise, the Census Bureau would not know their race, ethnicity, and whether children are present. Including these households, without also including corresponding non-interview households from the same months, would likely overstate the response rate estimates.

We use the Master Address File Identifier (MAFID) to link the SNAP administrative data and CPS data. The MAFID is a unique housing unit identifier assigned by the Census Bureau to both the SNAP administrative data and CPS data to facilitate address-level matches without revealing personally identifying information. We use MAFID for this part of the analysis because it allows us to match the SNAP administrative data with all sampled housing units, including those that are found ineligible for the interview or are unable to be interviewed. MAFID is available for 88 percent of the SNAP administrative case records[13] and 100 percent of CPS housing units in the March 2016 data.[14]

Data Linkage Identifiers

The Census Bureau provides housing identifiers and person-level identifiers for use in linking survey data with administrative data files. The identifiers are unique and enable matches between different data sources without revealing personally identifying information. We use the following variables to link data files for this analysis.

Master Address File Identifier (MAFID)

- Unique housing unit identifier for address-level matches
- Allows address-level matches even when no information is collected about the people at the address
- Used for the interview rate analysis

Protected Identification Key (PIK)

- Unique person-level identifier
- Allows information about an individual in the administrative data to be attached to the same individual in the survey data
- Used for the Subgroup Representation Analysis
- Used for the TRIM3 Simulated Eligibility Analysis in Chapter 4

The interview rate estimates use the CPS base weight.[15] Most housing units within a state have the same probability of selection and the same base weight, and the Census Bureau advises using unweighted data or the base weight to analyze interview rates.[16] Additional adjustments are applied to the base weight to produce the final survey weights (U.S. Census Bureau, 2019).

[13] SNAP administrative data for March 2016 include a MAFID for 86 percent of cases in Illinois, 85 percent in Mississippi, and 92 in Tennessee.

[14] We focus on 2016 for this analysis because MAFIDs are missing for all or some non-interviewed households in earlier year internal Census Bureau CPS data files available to us at the time of our analysis, and because we did not have access to standardized SNAP administrative data for Illinois for 2017.

[15] We use the GESBWGT weight variable available on internal Census Bureau files. GESBWGT includes housing units that were added to the basic CPS beginning in 2001 to meet the requirements of the State Children's Health Insurance Program (SCHIP, now CHIP) legislation. The CHIP expansion increased sample size in many states to better support estimates of low-income children without health insurance. The Census Bureau also maintains a GEBWGT basic weight in internal files that excludes the expanded CHIP sample (personal communication, Greg Weyland, Census Bureau). Our analysis pertains to all housing units in the basic March sample, and so we use GESBWGT when analyzing interview rates.

[16] See discussion in Chapter 4-1 Nonsampling Error, U.S. Census Bureau (2019).

Interview Status

We present results for housing units with and without a MAFID-linked SNAP case by interview status, including interview or Type A, B, or C non-interview. "Type A" non-interviews refer to households that are eligible for an interview but could not be contacted or refused to participate. "Type B" housing units are temporarily ineligible for an interview, such as those that are vacant or temporarily occupied by people with another permanent address. "Type C" housing units are permanently ineligible for interview, such as housing units that have been demolished. The Census Bureau drops housing units identified as Type C from subsequent interview months but continues to contact Type A and Type B housing units for each month that they remain in sample.

Whole Imputation

We disaggregate interviewed households into those with an ASEC interview and "whole imputes." A whole impute refers to a household that responded to the basic CPS interview but did not complete the ASEC portion of the interview. When this occurs, the Census Bureau keeps the information from the basic CPS interview but fills in the ASEC variables with values from similar surveyed respondents.

Whole impute households are likely to have accurate information for basic demographic information like age, relationship, race, and ethnicity (which are available in the basic CPS). However, microsimulation model estimates rely on detailed income variables and other data provided by the ASEC portion of the interview. No imputation method can assign values perfectly to each respondent, and so it is likely that the Census Bureau's procedures assign some SNAP households to have income and other characteristics that are inconsistent with SNAP eligibility. We identify a household as a whole impute if at least one household member is a whole impute—as any one member's income could be enough to raise the household's income above the SNAP eligibility limit.

CPS Interview Status for Households with and without SNAP

Table 3.1 shows the interview status of March 2016 CPS housing units in the combined data for Illinois, Mississippi, and Tennessee.[17] A housing unit is counted as having a SNAP case if the unit's MAFID matches the MAFID of at least one SNAP case in the state administrative data.[18] The combined weighted results are affected by the relative population sizes of the three states. Illinois represents 56 percent of the weighted total of March sampled housing units, Tennessee represents 30 percent, and Mississippi represents 14 percent (not shown).[19]

[17] Results by state are provided in Appendix Table B.1.

[18] We use "housing unit" instead of "household" to describe interview rates involving Type B and Type C housing units. "Household" refers to the group of people living in a housing unit and some Type B and all Type C units are uninhabited.

[19] Among sampled housing units with a matched SNAP case, 49 percent of the weighted total reflects Illinois, 38 percent reflects Tennessee, and 13 percent reflects Mississippi.

Overall, 72 percent of housing units in the basic March CPS sample for the three combined states are interviewed; 12 percent are type A non-interviews (eligible for interview, but not interviewed); 16 percent are type B non-interviews (temporarily ineligible, such as vacant or temporarily occupied by members whose usual residence is elsewhere); and 1 percent are type C non-interviews (permanently ineligible, such as demolished).

Table 3.1 Interview Status by Whether SNAP Case at Housing Unit Address, 2016[1]

	All CPS sampled housing units	SNAP case at CPS address?	
		Yes	No
N	4,600	650	4,000
Weighted (thousands)	9,132	1,220	7,912
Interview status			
Percentage distribution	100%	100%	100%
Interview	72%	79%	70%
Non-interview (Type A/B/C)	28%	21%	30%
Detailed interview status			
Percentage distribution	100%	100%	100%
Interview	72%	79%	70%
Non-interview: Type A	12%	14%	11%
Type B: Usual residence elsewhere	4%	1%	4%
Type B: Vacant	11%	5%	12%
Type B: All other	1%		2%
Type C Housing units	1%		1%
Type B: All other and Type C housing units		1%	

Sources: Decision Demographics & Urban Institute tabulations of linked 2016 CPS ASEC and SNAP administrative data for Illinois, Mississippi, and Tennessee

Universe: Housing units in the basic March CPS sample (excluding Hispanic oversample)

[1]Bottom row combines cells to avoid disclosure. Addresses are matched by MAFID to preserve confidentiality.

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Interview rates are higher for housing units with a SNAP case, but this primarily reflects lower rates of Type B and Type C non-interviews among housing units with SNAP participants. Type B and C housing units comprise 7 percent of housing units with a SNAP case and 19 percent of housing units without a SNAP case. The SNAP administrative data should reflect the current address of a SNAP case, unless the members have moved and not informed the SNAP agency of the change in address. Therefore, we would expect that housing units with SNAP participants would be less likely to be identified as Type B or Type C than other sampled CPS housing units.

Table 3.2 excludes Type B and C non-interviews and disaggregates the interviewed households into those that responded to the ASEC portion of the interview and those where at least one household member is a whole impute, for whom all ASEC variables are obtained from another

household's response. We also refer to whole impute households as households that responded to the Basic CPS but not the ASEC supplement.

We find that when the three states are combined, the rates of interview, whole imputation, and Type A non-interview are very similar for households with and without a SNAP case. About 70 percent of households have ASEC interviews, 16 percent are wholly imputed, and 14 percent are Type A non-interviews.

Table 3.2 Interview Status and Whole Imputation by Whether SNAP Case at Household Address, 2016[1]

	CPS Sampled households	SNAP case at CPS address?	
		Yes	No
	ILLINOIS, MISSISSIPPI, & TENNESSEE		
N	3,800	600	3,200
Weighted (thousands)	7,613	1,141	6,472
Interview status			
Percentage distribution	100%	100%	100%
Interview, not whole impute	70%	69%	70%
Basic CPS interview, whole impute to ASEC	16%	15%	17%
Non-Interview: Type A	14%	15%	14%
	ILLINOIS		
N	1,600	200	1,400
Weighted (thousands)	4,334	562	3,771
Interview status			
Percentage distribution	100%	100%	100%
Interview, not whole impute	71%	69%	71%
Basic CPS interview, whole impute to ASEC	17%	18%	16%
Non-Interview: Type A	13%	13%	12%
	MISSISSIPPI		
N	1,100	150	900
Weighted (thousands)	984	146	838
Interview status			
Percentage distribution	100%	100%	100%
Interview, not whole impute	75%	84%	73%
Basic CPS interview, whole impute to ASEC	10%	6%	11%
Non-Interview: Type A	15%	10%	16%

(Table continues)

Table 3.2 (continued)

	CPS Sampled households	SNAP case at CPS address?	
		Yes	No
TENNESSEE			
N	1,100	200	900
Weighted (thousands)	2,295	433	1,863
Interview status			
Percentage distribution	100%	100%	100%
Interview, not whole impute	65%	65%	65%
Basic CPS interview, whole impute to ASEC	19%	15%	19%
Non-Interview: Type A	17%	20%	16%

Sources: Decision Demographics & Urban Institute tabulations of linked 2016 CPS ASEC and SNAP administrative data for Illinois, Mississippi, and Tennessee

Universe: Households in the basic March CPS sample (excluding Hispanic oversample). Excludes Type B and Type C non-interview housing units.

[1]Addresses are matched by MAFID to preserve confidentiality.

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This overall finding masks differences by state, with Illinois having the greatest representation in the combined results due to its larger population.[20] Households with a SNAP recipient have similar Type A nonresponse rates to households without a SNAP recipient in Illinois, lower nonresponse rates in Mississippi, and higher nonresponse rates in Tennessee. In Illinois, 13 percent of households with a SNAP recipient and 12 percent of non-SNAP households eligible for the CPS interview are Type A non-interview, compared with 10 percent and 16 percent in Mississippi and 20 and 16 percent in Tennessee, respectively. We see similar patterns of Type A nonresponse for Mississippi and Tennessee in 2017 (Appendix Table B.2), though the difference between households with a SNAP recipient and non-SNAP households is somewhat larger for Mississippi and smaller for Tennessee than in 2016.[21] Given these differing results by state, the implications for national estimates are unclear and further investigation may be warranted.

[20] Approximately 57 percent of the weighted total for March sample households excluding Type B and C is for Illinois, 30 percent is for Tennessee, and 13 percent is for Mississippi based on the weighted totals shown in Table 3.2.

[21] 2017 administrative SNAP case record data for Illinois were not available for inclusion in the study.

CPS Interview Status by SNAP Case Type

We next examine CPS interview status by SNAP case type, focusing on four key subgroups with sufficient sample size to support the analysis:

1) cases with at least one person age 60 or older without children;
2) cases with one adult and one or more children;
3) cases with multiple adults and one or more children; and
4) one-person cases with an adult between the ages of 18 and 59.[22]

Two other subgroups are included in the total but not shown separately. They include child-only cases (in which only the children in the family qualify for SNAP) and cases with multiple adults and no member younger than 18 or older than 59. Case characteristics are defined using the information recorded in the SNAP administrative data.

Whereas Tables 3.1 and 3.2 focused on housing units and households, Table 3.3 focuses on SNAP cases. A CPS household with multiple families or individuals may have more than one SNAP case. For example, a household containing a family and an unrelated individual might have two SNAP cases—one for the family and one for the unrelated individual. Each case would be counted separately in Table 3.3 and tabulated according to the interview status of the CPS housing unit.

Although response rates are often estimated for households found eligible for the interview, we show the interview status for all SNAP cases with a MAFID that matches a sampled housing unit (including the housing units found ineligible for the interview). If addresses in the SNAP administrative data are up to date, we would expect few SNAP cases to be present in type B and type C non-interviewed housing units. Overall, we find that 8 percent of the cases are in type B or C units (Table 3.3). Future research could examine whether such cases appear in the SNAP administrative data at a different address in a subsequent month (suggesting delayed reporting of a change of address to the agency), reflect inaccurate CPS classification of the address as type B or type C, or reflect errors in assignment of MAFID.

[22] We define "child" as anyone under age 18. Examples of cases with multiple adults and children include married parent families, cohabiting couples with children, a parent with a child under 18 and another child aged 18 or above, and cases involving extended families, such as grandparents and adult siblings.

Table 3.3 Interview Status by SNAP Case Type, 2016[1]

		SNAP case type			
	Total[2]	At least one member 60+, without children	One adult with child(ren)	Multiple adults with child(ren)	One person case, age 18 to 59
N	750	150	200	100	200
Weighted (thousands)	1,426	266	392	219	428
Interview status					
Percentage distribution	100%	100%	100%	100%	100%
Interview, not whole impute	64%	66%	64%	72%	63%
Basic CPS interview, whole impute to ASEC	14%	17%	9%	18%	9%
Non-interview: Type A	14%	12%	19%		13%
Non-interview: Type BC	8%	5%	8%		15%
Non-interview: Type ABC				10%	

Sources: Decision Demographics & Urban Institute tabulations of linked 2016 CPS ASEC and SNAP administrative data for Illinois, Mississippi, and Tennessee

Universe: Housing units in the basic March CPS sample (excluding Hispanic oversample) that match the address of a SNAP case. Addresses are matched by MAFID to preserve confidentiality.

[1]Bottom row combines cells to avoid disclosure.

[2]The total includes child-only cases and cases with multiple adults without members younger than 18 or 60 or above, not shown separately.

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We find that a higher share of multiple-adult plus child cases linked with the CPS are in housing units with ASEC interviews (72 percent) than are one-adult plus child cases (64 percent), cases with a person aged 60 or above without children (66 percent), and one-person cases aged 18 to 59 (63 percent). Multiple-adult plus child cases are much less likely to be in Type A, B, or C housing units (not interviewed for the basic CPS). Ten percent of multiple-adult plus child cases are non-interviews, compared with 27 percent of one-adult plus child cases, 17 percent of cases with a member aged 60 or above without children, and 28 percent of one-person cases between the ages of 18 and 59.

We find similar patterns for 2017 when looking at combined results for Mississippi and Tennessee, though the overall interview rate is higher (Appendix Table B.3). Multiple-adult plus child cases linked with the CPS are much more likely to be in housing units with ASEC interviews than are one-adult plus child cases. Eighty-three percent of multiple-adult plus child cases are in housing units with ASEC interviews, compared with 69 percent of one-adult plus child cases. Nine percent of multiple-adult plus child cases are not interviewed for the basic CPS, compared with 19 percent of one-adult plus child cases.

CPS Interview Status by Presence of Earnings and Poverty Level

Table 3.4 examines interview rates of SNAP cases by presence of earnings and poverty level, for the combined three states in March 2016. Earnings status and poverty level are obtained from the administrative data and reflect the SNAP agency's most recent information about the case's monthly income The poverty level reflects the SNAP case's countable gross income as a percentage of the poverty guideline used for eligibility determination.

Table 3.4 Interview Status by Earnings Status and Poverty Level of SNAP Case, 2016

		Case earnings and poverty status			
	Total	Does not have earnings	Has earnings	50% of poverty or below	Above 50% of poverty
N	750	500	200	300	400
Weighted (thousands)	1,426	1,020	405	613	812
Interview status					
Percentage distribution	100%	100%	100%	100%	100%
Interview, not whole impute	64%	66%	61%	60%	68%
Basic CPS interview, whole impute to ASEC	14%	13%	16%	15%	13%
Non-Interview: Type A	14%	14%	13%	16%	12%
Non-Interview: Type BC	8%	7%	10%	9%	7%
Cases with at least one adult and one child and no member aged 60 or above					
N	300	150	150	150	150
Weighted (thousands)	610	325	286	317	293
Interview status					
Percentage distribution	100%	100%	100%	100%	100%
Interview, not whole impute	67%	67%	66%	64%	70%
Basic CPS interview, whole impute to ASEC	13%	10%	16%	15%	10%
Non-Interview: Type A	15%	16%	14%	14%	16%
Non-Interview: Type BC	6%	7%	4%	7%	4%
One person case, age 18 to 59[1]					
N	200	200		100	100
Weighted (thousands)	428	351		223	205
Interview status					
Percentage distribution	100%	100%		100%	100%
Interview, not whole impute	63%	66%		56%	72%
Basic CPS interview, whole impute to ASEC	9%	9%		12%	6%
Non-Interview: Type A	13%	13%		18%	8%
Non-Interview: Type BC	15%	12%		14%	15%

Sources: Decision Demographics & Urban Institute tabulations of linked 2016 CPS ASEC and SNAP administrative data for Illinois, Mississippi, and Tennessee

Universe: Housing units in the basic March CPS sample (excluding Hispanic oversample) that match the address of a SNAP case. Addresses are matched by MAFID to preserve confidentiality.

[1]Data for "One person case, age 18 to 59 with earnings" have been withheld due to small sample size and to avoid disclosure for some cells.

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Overall, cases with earnings are about 5 percentage points less likely to have an ASEC interview than are those that do not have earnings. Cases with income above 50 percent of the poverty guideline are about 8 percentage points more likely to have an ASEC interview.

It may seem counterintuitive that interview rates would be lower for cases with earnings yet higher for cases above 50 percent of poverty, as we might expect that a case with earnings would also be more likely to have income above 50 percent of poverty. Household composition likely contributes to this effect. Cases with older members are less likely to have earned income than other types of SNAP cases and are more likely to have income above 50 percent of poverty.[23] To provide further insight, we show results separately for cases with at least one adult and one child and no member aged 60 or above, and for one-person cases between the ages of 18 and 59.

Focusing first on cases with at least one adult and one child and no member aged 60 or older, we see little difference in ASEC interview rates for cases with and without earnings. Cases without earnings are somewhat more likely to be Type A, B, or C non-interview (23 percent relative to 18 percent). ASEC interview rates are higher for cases with income above 50 percent of the poverty guideline than for the poorest cases (70 percent relative to 64 percent) and rates of whole imputation are lower (10 percent relative to 15 percent).

Relatively few one-person cases between the ages of 18 and 59 have earned income, and we lack sufficient sample size to show interview rates separately for this group.[24] The ASEC interview rate is substantially higher for one-person cases with income above 50 percent of the poverty guideline than for the poorest cases (72 relative to 56 percent), the rate of whole imputation is lower (6 percent relative to 12 percent), and the combined type A, B, and C non-interview rate is lower (23 percent relative to 32 percent).

SNAP Subgroup Representation in the ASEC

In this section we expand our focus to the full CPS ASEC for Illinois, Mississippi, and Tennessee. We examine the representation of SNAP cases in the final linked data to see if differences in interview rates among SNAP subgroups result in differences in the extent to which these subgroups are represented in the final CPS ASEC data.

[23] According to national estimates, 6.7 percent of SNAP cases with members aged 60 or more had earnings in 2016, compared with 55.3 percent of cases with children. Eighty-six percent of SNAP cases with members aged 60 and above had gross countable income above 50 percent of the poverty guideline, compared with 54.6 percent of cases with children. See tables A.3 and A.6, USDA (2017).

[24] Nationally, 38 percent of one-person cases (excluding people aged 60 and over) had a disability and another 16 percent had earned income in 2016. These estimates are calculated from Table 3.2 in USDA 2017.

The interview rate analysis presented above uses the Census Bureau's base weights, before adjustment for nonresponse. The Census Bureau adjusts for household nonresponse by increasing the weights of interviewed households that are in sample areas like those of the non-interviewed households. Nonresponse bias will remain if interviewed households differ with respect to the income and demographic characteristics of non-interviewed households (Census Bureau, 2019). Bias may also be introduced through whole imputation, if households that do not respond to the ASEC portion of the interview differ from those who respond in ways that are not controlled for by the imputation procedures.

In addition to adjusting for household nonresponse, the Census Bureau adjusts the basic CPS weights to reach population targets at the state level and by race, ethnicity, sex, and age. The ASEC weighting procedure includes various adjustments beyond those required for the basic CPS. These include adjustments needed to incorporate the additional samples from the ASEC interviews conducted in February, April, and for the additional Hispanic households in March; to account for certain armed forces members who are excluded from the basic CPS but included in the ASEC;[25] and to equalize weights of husbands and wives (Census Bureau, 2019).[26]

Although weights are adjusted for race, ethnicity, sex, and age, they are not adjusted for family composition—such as one-adult with child and multiple-adult with child family status. If one-adult with child families are less likely to respond to the basic CPS than multiple-adult families, then it is possible that they will be underrepresented in the basic CPS and CPS ASEC.

Data for SNAP Subgroup Representation Analysis

For this analysis, we use data sets for 2012 through 2016 constructed by Mathematica.[27] The Mathematica data sets are constructed by linking the CPS ASEC data with SNAP administrative data for Illinois, Mississippi, and Tennessee by Protected Identification Key (PIK). PIKs are unique identifiers created by the Census Bureau to facilitate matches between survey and administrative data without revealing personally identifying information. The match is performed at the person level. SNAP administrative data for the linked participant and information about his or her case are appended to the individual's record in the CPS ASEC. People in the CPS ASEC are matched with the SNAP administrative data month corresponding to their interview month—February, March, or April.

Starting from the linked datasets prepared by Mathematica, we tabulate cases where at least one case member in the SNAP administrative data has a PIK match with a person in the CPS ASEC. We weight each SNAP case using the ASEC supplement weight of the case head. If the case head is not matched with a person in the CPS ASEC, we use the weight of the oldest case member who

[25] Armed forces members are excluded from the basic CPS but are included in the ASEC if they live off post or on post with family members and have at least one civilian adult in the household.

[26] More recent years of CPS ASEC data also equalize weights for cohabiting partners, but that does not affect the data years presented here.

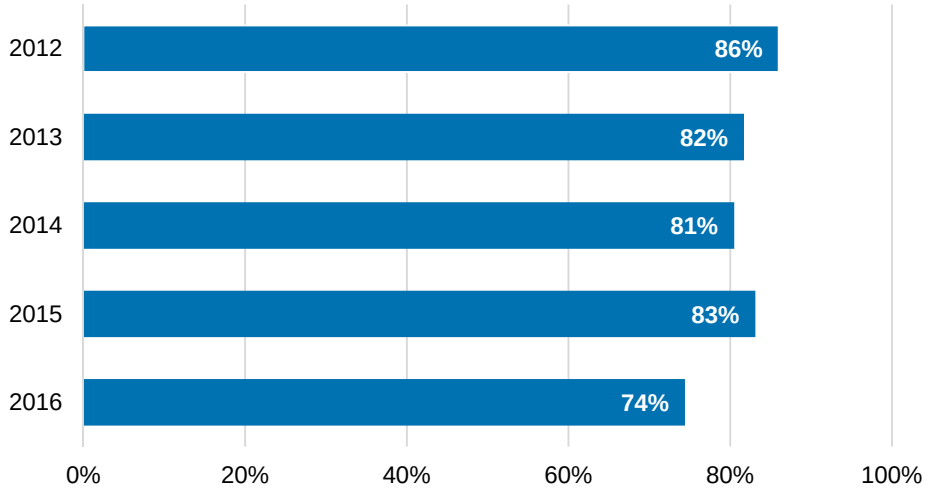
[27] Czajka & Cunnyngham (2021).

has a PIK match with a person in the CPS ASEC.[28] We classify cases according to their composition in the administrative data.

Although nearly all administrative data records have a PIK, PIKs are missing for between 14 and 16 percent of people in the 2012 to 2016 CPS ASEC data for Illinois, between 6 and 8 percent in Mississippi, and between 9 and 15 percent in Tennessee (Czajka, 2021). Our estimates do not adjust for missing PIKs and so our weighted counts of SNAP cases should be somewhat below those in the SNAP administrative data.[29] The SNAP administrative data contain some types of cases (such as for homeless individuals) that are outside the scope of the CPS ASEC. This should also lower our weighted results somewhat, relative to the administrative data.

As expected, the overall weighted number of SNAP cases in the linked data is lower than the actual number of cases in the administrative data. The weighted linked data represent 74 percent of SNAP administrative data cases in 2016 (Figure 3.1 and Appendix Table B.4). A somewhat higher share (between 81 and 83 percent) is represented in the 2013 to 2015 linked data. The 2012 linked data capture 86 percent of the SNAP administrative data total. Some of the reduction in represented cases between 2012 and 2016 is likely attributable to declining CPS ASEC PIK rates in Mississippi and Tennessee over these years. PIK rates fluctuated within a 2-percentage point range in Illinois during this time period.

Figure 3.1 Share of SNAP Cases Represented in the Linked Data, by Year



Sources: Decision Demographics & Urban Institute tabulations of 2012–2016 linked CPS ASEC and SNAP administrative data for Illinois, Mississippi, and Tennessee.
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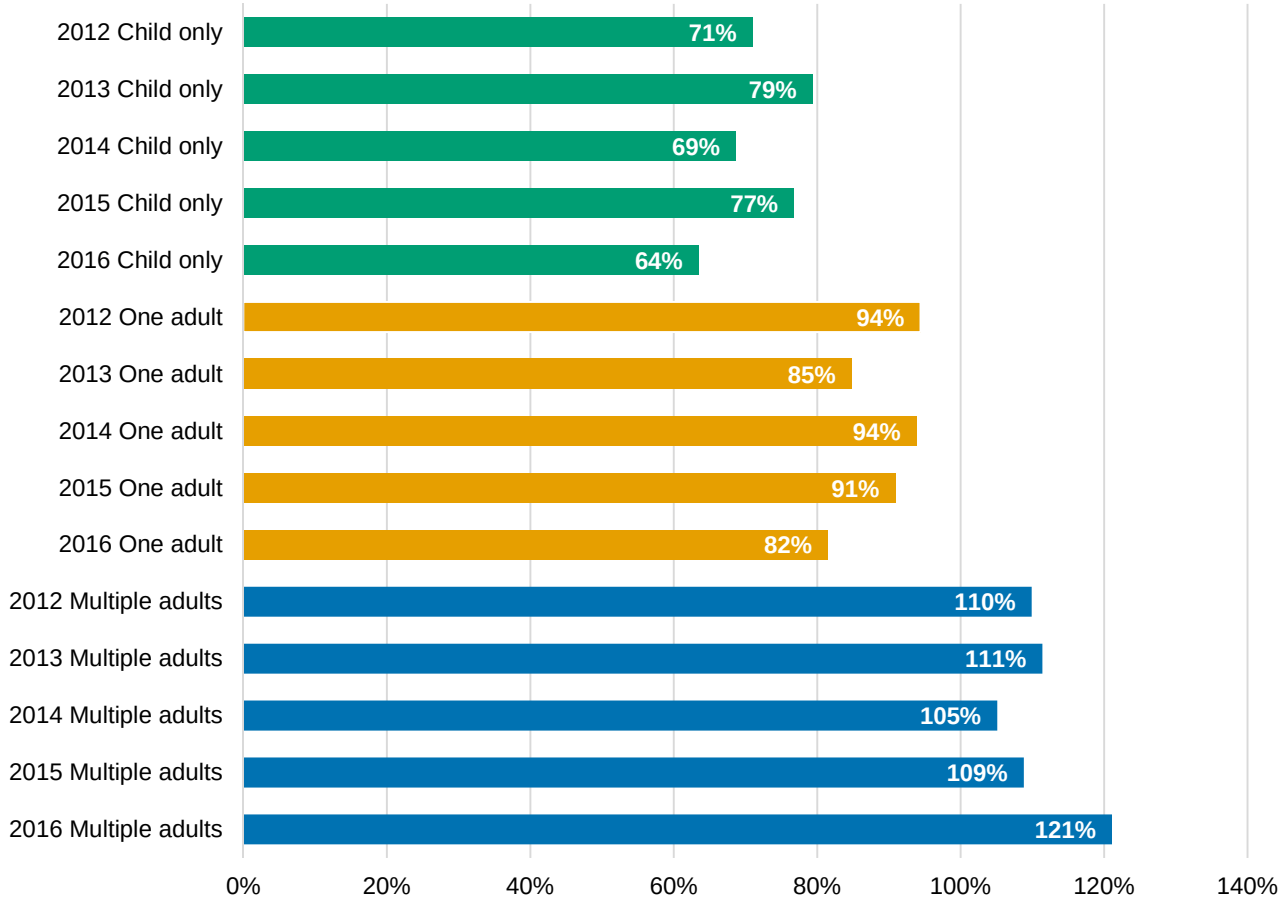
[28] The Mississippi and Tennessee state SNAP administrative data identify the head of the case. If the case head is linked to the CPS ASEC, we use the weight of the case head to weight the results. If the case head is not linked to the CPS ASEC, we use the weight of the oldest linked case member. We use the weight of the oldest linked member for all cases in Illinois because case head is not identified in the SNAP administrative data.

[29] This may affect some subgroups more than others, as a Census Bureau study using the 2009 ACS found that young children, minorities, immigrants, recent movers, low-income individuals, and non-employed individuals are less likely to receive a PIK. However, changes to the PIK assignment process in 2010 did significantly address the PIK deficit among young children (Bond et al., 2014).

We next examine the representation of SNAP cases with children in the linked CPS ASEC data. We show results for the one-adult plus child and multiple-adult plus child subgroups included in our interview rate analysis, and also examine "child-only" cases. Child-only cases are cases in which only the children in the SNAP case are eligible for benefits. For example, under SNAP rules, a citizen child can be eligible for SNAP even if the child's parents are ineligible due to their immigrant status. All or a portion of the parents' income would be deemed to the child when determining eligibility, but they would not be taken into consideration when determining the household's size for eligibility and benefit calculation. Child-only cases represent a relatively small share of all cases. They are excluded from other tables due to sample size limitations, but are included in the totals.

We find that the linked data represent between 64 and 79 percent of child-only cases, between 82 and 94 percent of one-adult plus child cases, and between 105 and 121 percent of multiple-adult plus child cases (Figure 3.2). Multiple-adult plus child cases are most overrepresented and child-only and one-adult plus child cases are most underrepresented in the 2016 data.

Figure 3.2 Share of SNAP Cases with Children Represented in the Linked Data, by Year



Sources: Decision Demographics & Urban Institute tabulations of 2012–2016 linked CPS ASEC and SNAP administrative data for Illinois, Mississippi, and Tennessee.
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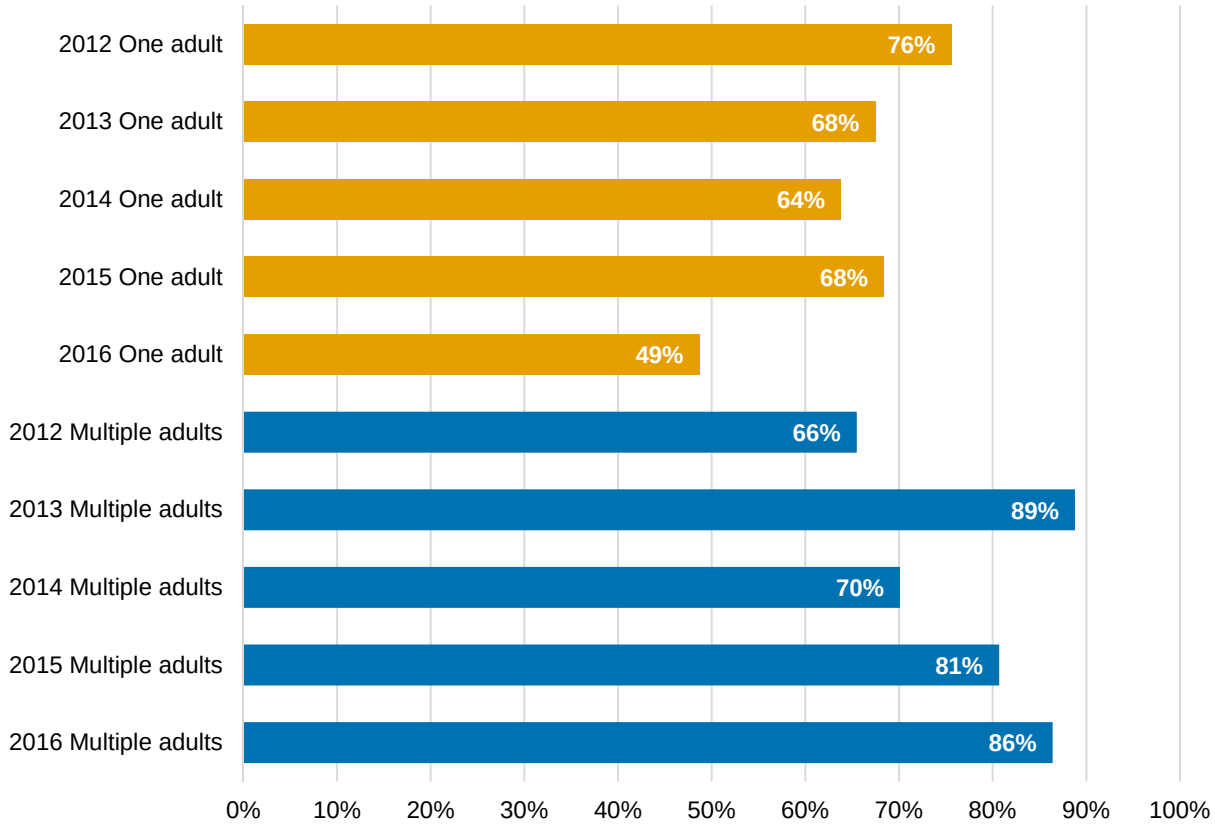
Finally, we examine cases without children or people over 59. In addition to showing results for one-person cases, we provide results for cases with multiple adults and no members below 18 or above 59. This latter group was not shown separately in the interview rate analysis due to sample size limitations, though was included in the totals.

One-person cases are the least represented group among the subgroups examined in all years but 2012, when multiple-adult cases had the least representation (Appendix Table B.4). The linked data represent between 49 and 76 percent of the SNAP administrative data cases for one-person cases, with the lowest share in 2016 and the highest share in 2012 (Figure 3.3). The data represent between 66 percent and 89 percent of cases with multiple adults.

Figure 3.3 Share of SNAP Cases with Adults between 18 and 59 Represented in the Linked Data, by Year



Sources: Decision Demographics & Urban Institute tabulations of 2012–2016 linked CPS ASEC and SNAP administrative data for Illinois, Mississippi, and Tennessee.

Note: This figure reflects cases consisting of at least one adult aged 18 to 59 and no younger or older members.
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These findings suggest that a contributing factor to the high estimated participation rates for one-adult plus child cases and possibly child-only cases may be their underrepresentation in the CPS ASEC. Although we have not adjusted for missing PIKs, multiple-adult plus child cases are consistently overrepresented in the linked data for the combined states of Illinois, Mississippi, and Tennessee across five years of CPS ASEC data. Because the CPS ASEC is weighted to control totals by age, this consistent overrepresentation of multiple-adult plus child cases suggests that other types of cases with children may be underrepresented.[30]

The underrepresentation of one-person cases aged 18 to 59 is also noteworthy, particularly the low level of representation in 2016 (49 percent). This finding differs from the interview rate analysis, in which the interview rate for one-person cases aged 18 to 59 is close to the overall interview rate for SNAP cases. Missing PIKs likely contribute to the lower rate observed here. Cases with more than one member may be more likely to be represented in the linked data because there is a greater chance that at least one member will match by PIK. One-person adult cases may also be more likely to be homeless and outside the scope of the CPS ASEC. Another possibility is that the incorporation of other samples into the final ASEC increases the representation of SNAP cases with children more so than for one-person cases aged 18 to 59.

Chapter 3 Summary and Recommendations

Our goal in investigating SNAP case interview rates and representation in the CPS ASEC is to see if there is evidence to suggest that SNAP cases are underrepresented in the survey data. If households with SNAP recipients are less likely to respond to the CPS ASEC than households without SNAP recipients, and if subsequent weighting steps do not account for these differences, then the weighted SNAP eligibility estimates produced by microsimulation models may be too low. SNAP participation rates are calculated by dividing the number of participants according to administrative data by the number simulated as eligible by microsimulation models. If eligibility estimates are too low, then estimated participation rates will be too high, particularly for some subgroups.

The interview rate analysis links sampled March CPS housing units with SNAP cases in the Illinois, Mississippi, and Tennessee SNAP administrative data by MAFID. The results reflect findings for these three states for 2012 to 2016. Sample sizes are modest for some of our subgroup analyses, rounding to as few as 100 unweighted cases. Further work with additional states and years of data would be needed to confirm these findings and address their implications for national estimates. Nevertheless, these results do provide evidence suggesting that certain key subgroups are underrepresented in the CPS ASEC.

[30] We refer to this as suggestive rather than conclusive because population controls are at the individual level whereas we examine results at the case level.

Summary of Findings

Results from this analysis show:

- Differing results by state as to whether a sampled household with a SNAP case is more likely or less likely to complete the CPS ASEC interview than a sampled household without a SNAP case
- Lower CPS ASEC interview rates for sampled housing units containing a one-adult plus child case than for sampled housing units containing a multiple-adult plus child case
- Substantially lower CPS ASEC interview rates among one-member cases aged 18 to 59 with income up to 50 percent of the poverty guideline relative to those with income above 50 percent of the poverty guideline
- Somewhat lower CPS ASEC interview rates for one-adult plus child cases with income up to 50 percent of the poverty guideline relative to those above 50 percent of the poverty guideline

The representation analysis links the CPS ASEC with SNAP cases from the state administrative data by PIK and compares the resulting weighted number of SNAP cases with the total number from the administrative data. The analysis finds:

- Generally declining representation of SNAP cases in the CPS ASEC data from 2012 to 2016
- Overrepresentation of multiple-adult plus child cases in each year examined and underrepresentation of other cases with children
- Declining representation of one-member cases aged 18 to 59, with just 49 percent represented in 2016

Implications for Participation Rate Estimates

The three states differ in whether response rates among households with SNAP are higher or lower than among households without SNAP. Thus, it is difficult to draw conclusions at the national level as to whether SNAP cases are overrepresented or underrepresented. Nevertheless, we do find evidence of underrepresentation of some subgroups relative to others, potentially contributing to the high participation rate estimates for the underrepresented groups.

Initial findings from another ongoing study support many of the findings we present here. The study examines the representation of SNAP cases overall and for different subgroups using SNAP administrative case records for 21 states and 10 years that have been linked with the CPS ASEC and ACS (Meyer and Wu 2021). The estimates adjust for missing PIK and find a 95 percent coverage rate for SNAP individuals in the CPS ASEC, with variations by subgroup as noted below.

One-Adult Plus Child Cases

The lower interview rates for one-adult plus child cases relative to multiple-adult plus child cases, combined with the overrepresentation of multiple-adult plus child cases across five years of CPS ASEC data suggest that one-adult plus child cases are underrepresented and multiple-adult plus child cases are overrepresented in the CPS ASEC for these states and data years. The CPS is weighted to population totals for age, sex, race, and ethnicity—but not for family composition, so lower interview rates for one-adult plus child cases can lead to lower representation of these cases in the final CPS ASEC data. Meyer and Wu (2021) also find evidence of overrepresentation of married parent cases in the CPS and underrepresentation of single parent cases.[31] Underrepresentation of one-adult plus child cases may therefore contribute to unrealistically high participation rate estimates for this subgroup.

SNAP Cases Below 50 Percent of Poverty

SNAP cases with income below 50 percent of the poverty guideline are another subgroup with unrealistically high participation rate estimates (Chapter 2). The relatively lower CPS interview rates observed for this group among one-member cases aged 18 to 59 and among cases with children and adults aged 18 to 59 may suggest that they are underrepresented in the CPS ASEC, contributing to the higher than expected participation rates.

One-Member Cases Aged 18 to 59

One-member cases have high participation rates according to the MATH CPS+ model, though not for other microsimulation models (Chapter 2). We do not look at all one-member cases but do examine those with members aged 18 to 59. We find that, although interview rates for this group do not differ much from interview rates of SNAP cases on average, their representation in the CPS ASEC has been generally falling across the five years examined. Of particular concern, just 49 percent of one adult cases aged 18 to 59 are represented in the data for these three states in 2016. Further investigation could confirm whether this pattern is observed in other states and years, determine whether these patterns persist when adjusting for missing PIKs, and consider the extent to which some of the people in the administrative data (such as homeless individuals) are outside the scope of the CPS ASEC. Initial findings from Meyer and Wu (2021) find that one-person SNAP cases are underrepresented in the CPS ASEC to a greater extent than are other groups.[32]

Eligible Nonparticipants

It is possible that the underrepresentation of key subgroups of SNAP cases observed in the linked administrative and survey data also occurs for families and individuals in these subgroups who are eligible for SNAP but do not participate. We are not able to investigate this question using the methods and data available for this study. If eligible nonparticipants are also underrepresented,

[31] Meyer and Wu estimate a CPS coverage rate of 92 percent for single parent SNAP cases and 103 percent for married parent SNAP cases.

[32] The single person estimates by Meyer and Wu are for all individuals, not just those aged 18 to 59, and show a CPS coverage rate of 86 percent.

then this would further bias eligibility estimates downward for these subgroups and contribute to higher than expected participation rates.

Future Research to Address Underrepresentation

If findings from this analysis are supported by subsequent research spanning a larger number of states and including more recent data years, approaches could be developed to reweight the CPS ASEC data used as input to the microsimulation models to compensate for the underrepresentation of affected groups.

4. TRIM3 Simulated Eligibility of SNAP Cases in Linked Data

In this chapter, we investigate how differences in simulated and actual case membership, imputation, and other factors contribute to SNAP cases being simulated as ineligible or eligible by the TRIM3 microsimulation model. We find that differences in TRIM3 unit and SNAP case membership are much more common among SNAP cases simulated as ineligible for SNAP than among those simulated as eligible. SNAP cases simulated as ineligible by TRIM3 are also much more likely to be "whole imputes" in which the ASEC portion of the survey is imputed, or to have imputed income amounts. We examine other factors that might complicate eligibility determination, including recent job loss, noncitizen status, and mover status, but find that these are much less common than differences in SNAP case and TRIM3 unit membership and imputation.

We then focus on a key subgroup—cases identified as one-adult plus child in the SNAP administrative data—and find that only about half are identified as an eligible one-adult plus child unit within TRIM3. Common reasons for discrepancies include the absence of the SNAP case's children from the ASEC household, the absence of the case adult from the ASEC household (with children living instead with multiple adults, such as grandparents and other relatives), and the inclusion in the TRIM3 unit of a spouse, partner, or other adults. We explore potential contributing factors, including movement of children and adults between households, and definitional differences regarding how adults who are ineligible due to immigrant status or for other reasons are counted in the administrative data and survey data. We provide suggestions for future research regarding this question in the concluding section of this chapter.

Data for the Eligibility Analysis

The eligibility analysis uses linked CPS ASEC and SNAP administrative data for Illinois, Mississippi, and Tennessee prepared by Mathematica.[33] People in the CPS ASEC are linked by PIK with SNAP administrative data for the month corresponding to their interview month, for each year of CPS ASEC data from 2012 to 2016. We augment the data by attaching simulated TRIM3 SNAP unit identifiers and eligibility flags to the linked data sets. The TRIM3 eligibility flags indicate the number of months a person was found eligible in the prior calendar year according to the TRIM3 simulation.

The data available to this study do not enable analysis of SNAP participation and simulated eligibility in the same month. Instead, SNAP participation reflects the CPS ASEC interview month, and TRIM3 eligibility reflects eligibility in at least one month of the prior calendar year.[34] Some people who were participating in SNAP in February, March, or April may be new entrants

[33] These are the same data used for the SNAP case representation analysis discussed in Chapter 3.

[34] Mathematica linked SNAP participant information to the CPS ASEC based on the CPS ASEC interview month (February, March, or April) in order to reduce the likelihood that a member of a SNAP case is no longer present within the CPS ASEC household at the time of the CPS ASEC interview or that another person has joined the CPS ASEC household since the case was established. The linked data do not include information about whether the SNAP case was participating in SNAP in the prior calendar year, and so we are not able to control for that in this analysis but could do so in future work.

who were ineligible in the prior calendar year. However, based on the amount of time a case typically remains on SNAP, we expect that most cases participating in SNAP in February, March, or April would also have participated in at least some months of the prior calendar year.[35]

We describe the TRIM3 SNAP simulation methodology below and then describe the steps taken to incorporate the TRIM3 data into the linked data.

TRIM3 SNAP Simulation Methodology

TRIM3 follows the steps a caseworker would perform when determining eligibility: identifying whether people meet categorical eligibility requirements, performing assets tests, calculating income and deductions, determining income eligibility, and calculating the benefit amount. The model captures state variation in program rules, including BBCE rules.[36]

The model operates on a monthly basis, simulating eligibility and benefits in each month of the calendar year covered by the survey. TRIM3 allocates the annual income amounts reported in the CPS ASEC across the months of the year, factoring in reported weeks of employment and unemployment, and allocating spells of unemployment across the year to match real-world trends in unemployment.

The TRIM3 eligibility rules reflect the year of the annual income data collected in the CPS ASEC. For example, the 2016 CPS ASEC collects information about annual income for 2015.[37] TRIM3 uses this information and the 2015 eligibility rules to assign eligibility.[38]

SNAP eligibility estimates are sensitive to the methods used to construct SNAP units or "cases" from the members of the CPS ASEC household. The TRIM3 "unit" represents the group of people within the CPS household simulated to apply for SNAP together. This might include everyone in the household, or a subset. For example, a household with a single parent and her child and an unrelated roommate might apply as two SNAP units—one containing the single parent and child and the other including the roommate.

Much of our analysis focuses on the extent to which TRIM3 unit membership matches the membership of the SNAP case. When presenting the results, we use the term "unit" to describe the simulated TRIM3 unit, "case" to describe members of the case according to the SNAP

[35] An analysis of SNAP participants in the 2008 Survey of Income and Program Participation finds that 92 percent of people receiving SNAP in December 2008 received SNAP for more than six months and 86 percent received SNAP for more than a year. The estimate includes time already spent on SNAP as of December 2008 plus subsequent months on SNAP (Leftin et al., 2014).

[36] TRIM3 documentation is available at trim3.urban.org. For additional background, see Zedlewski & Giannarelli (2015).

[37] TRIM3 results are typically presented and described according to the calendar year represented by the data. For ease of presentation, we use the CPS ASEC data year in this chapter and describe the results as showing eligibility in the prior calendar year.

[38] SNAP cost of living adjustments are released at the beginning of each federal fiscal year (October). When eligibility rules and benefit amounts change during a calendar year, the TRIM3 SNAP simulation typically uses a weighted calendar year average. For some state level rules, TRIM3 uses the value that was in effect for the majority of the year.

administrative data, and "household" to refer to the CPS ASEC household. We define "case type" based on the characteristics of case members in the SNAP administrative data and TRIM3 "unit type" based on the characteristics of the people in the TRIM3 unit (also see Definitions, page 5). For example, if a case in the SNAP administrative data consists of a mother and child, we would describe this as a "one-adult plus child" case. If the mother and child are linked with the CPS ASEC data and are part of a TRIM3 unit with the mother's cohabiting partner, then the TRIM3 unit would be described as a "multiple-adult plus child" unit.

According to SNAP regulations, a SNAP case (or, in TRIM3 terms a unit) is comprised of all people in a household who "*customarily purchase and prepare meals together for home consumption*."[39] Married couples are required to apply for SNAP together, and minor children living at home are required to apply with their parents or guardians. Because the CPS does not report information on food purchasing habits, TRIM3 must make assumptions regarding which household members apply together as a single SNAP unit. TRIM3 splits households that receive TANF and households in which fewer people are reported to receive SNAP than are in the household into as many units as possible subject to FNS regulations.[40] TRIM3 then uses logit models to estimate whether two additional types of households are split into multiple units: (1) non-TANF households in which there are multiple potential units and all members are reported to receive SNAP; and (2) non-TANF households that do not report receiving SNAP and have multiple potential units.[41]

Incorporating TRIM3 Variables into the Linked Data

TRIM3 is continuously updated and improved. To provide consistency in the years examined, we reran the SNAP eligibility simulations performed on the 2012 through 2015 CPS ASEC using the methods used for the 2016 CPS ASEC and used the updated estimates for this analysis.

The TRIM3 model "clones" households containing noncitizens and also clones certain high-income households, dividing the weight across the cloned households. Cloning of noncitizen households supports the model's detailed assignment of immigrant status; cloning of high-income households supports the model's tax estimates. For this analysis, we identified the version of each cloned household with the most people simulated as eligible for SNAP and merged the TRIM3 unit and eligibility information from that household to the linked data file.[42]

[39] 7 CFR § 273.1

[40] The CPS ASEC asks about SNAP receipt in the prior calendar year, including how many people in the household received SNAP. TANF status is obtained from the TRIM3 TANF simulation, which corrects for underreporting of TANF in the CPS ASEC data.

[41] The logit models were estimated using data from the 2008 SIPP panel.

[42] We use the original CPS ASEC weight for our estimates rather than the partial cloned weight used for these households in TRIM3.

Results

In the analysis below, we classify SNAP cases that were receiving SNAP at the time of the CPS ASEC survey according to the SNAP administrative data by their simulated TRIM3 eligibility status in the prior calendar year. Some cases found ineligible by TRIM3 may have been truly ineligible in the prior calendar year, and only just recently started SNAP due to a job loss or for other reasons.[43]

We first present the overall TRIM3 eligibility estimates of SNAP cases in the linked data by year and state. We then show the extent to which SNAP cases simulated as eligible and ineligible by TRIM3 have matching administrative data case and TRIM3 unit membership, have whole ASEC imputation or income imputation, or have other factors that might complicate eligibility determination, including recent job loss, noncitizen status, and mover status.

We use the SNAP case as the basis for analysis. We count the case as "eligible" according to TRIM3 if at least one member of the SNAP case is in a TRIM3 unit simulated to be eligible in at least one month of the prior calendar year.

Due to sample size limitations, we pool the results for Illinois, Mississippi, and Tennessee when showing results by year, combine the five years of data when showing results by state, and combine data across the three states and five years when examining results by detailed characteristic. The combined results are affected by the relative population sizes of the three states; approximately 47 percent of the weighted total for the combined states and years is for cases in Illinois, 35 percent is for Tennessee, and 17 percent is for Mississippi.[44]

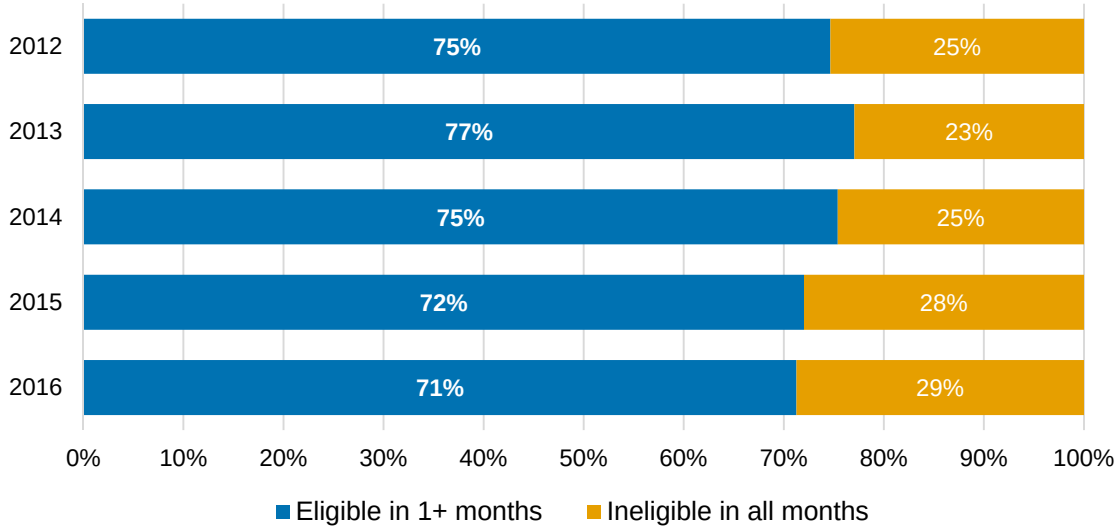
[43] The linked ASEC-SNAP administrative data files available to our study do not provide information on prior year SNAP participation and so we are not able to quantify this effect. (See Data for the Eligibility Analysis, above).

[44] The weighted shares are calculated from the weighted state totals shown in Appendix Table C.2.

TRIM3 Simulated Eligibility

Figure 4.1 presents TRIM3 simulated eligibility estimates for SNAP cases where at least one member is matched by PIK with a person in the CPS ASEC data.[45] TRIM3 simulates a higher share of SNAP cases to be eligible in the 2012 through 2014 CPS ASEC data than in the 2015 and 2016 data. Between 75 and 77 percent of cases receiving SNAP at the time of the 2012 to 2014 CPS ASEC surveys are simulated to be eligible in at least one month of the prior calendar year, compared with 72 percent in 2015 and 71 percent in 2016.

Figure 4.1 Simulated Eligibility of SNAP Cases in ASEC, by Year



Sources: Decision Demographics & Urban Institute tabulations of 2012–2016 linked CPS ASEC, TRIM3, and SNAP administrative data for Illinois, Mississippi, and Tennessee

Note: SNAP case status reflects the CPS ASEC survey month. TRIM3 simulated eligibility reflects eligibility in the prior calendar year.

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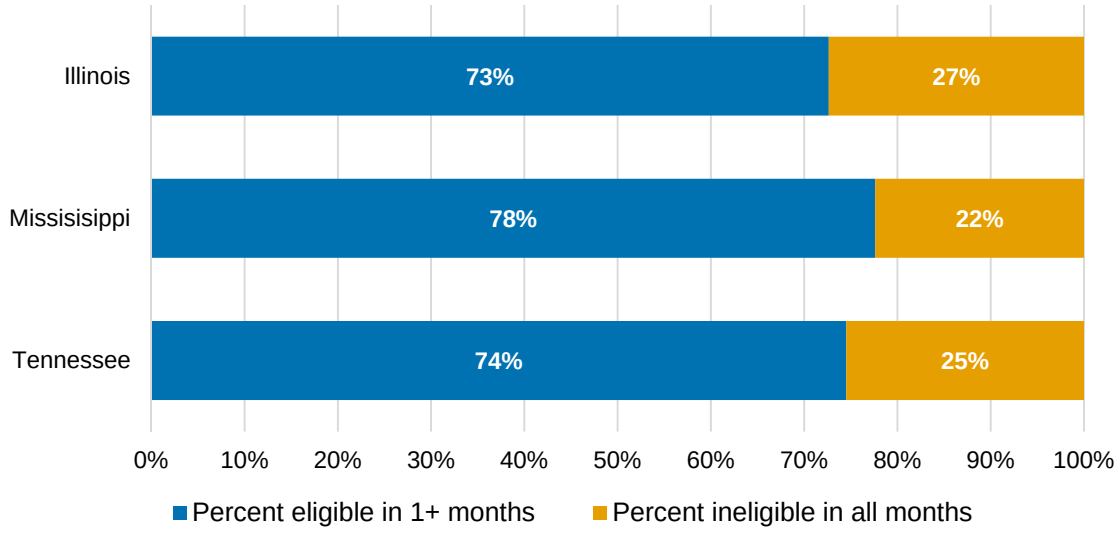
[45] We weight the results using the March supplement weight for the oldest case member matched to the CPS ASEC.

Combining data across the five years, we find that 78 percent of SNAP cases in Mississippi are simulated to be eligible for SNAP, compared with 74 percent in Tennessee and 73 percent in Illinois (Figure 4.2).

Figure 4.2 Simulated Eligibility of SNAP Cases in ASEC, Combined 2012 to 2016 data, by State



Sources: Decision Demographics & Urban Institute tabulations of combined 2012–2016 linked CPS ASEC, TRIM3, and SNAP administrative data for Illinois, Mississippi, and Tennessee

Note: SNAP case status reflects the CPS ASEC survey month. TRIM3 simulated eligibility reflects eligibility in the prior calendar year.

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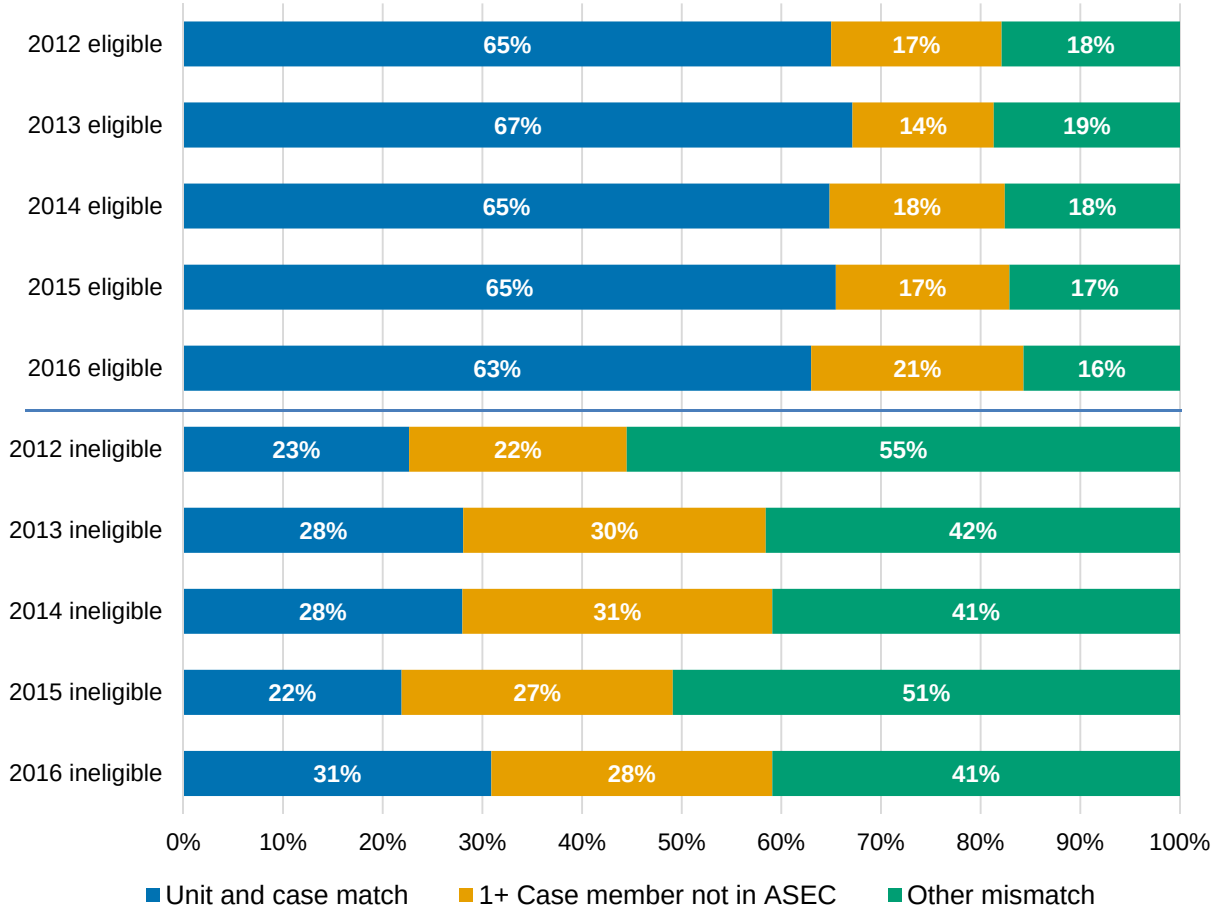
Case and Unit Consistency

Ideally, the TRIM3 unit and SNAP case would have exactly the same members. Eligibility limits and maximum benefit amounts rise as the case or unit size increases. The inclusion or exclusion of an adult from a case or unit increases or decreases the income of the case or unit. If unit membership does not match case membership then both size and income may differ, affecting eligibility. Unit assignment is therefore a critical first step of SNAP eligibility modeling.

We define a TRIM3 unit and SNAP case to have matching membership if each person in the SNAP case is linked by PIK with a member of the same TRIM3 unit, and the TRIM3 unit does not include any member not linked by PIK to the SNAP case. This approach will overstate the extent of unit and case mismatches to the extent that some people have missing or erroneous PIKs.

We find that cases simulated as eligible in TRIM3 are much more likely to have matching case and TRIM3 unit membership than are those simulated as ineligible (Figure 4.3 and Appendix Table C.1). In 2016, 63 percent of the cases simulated as eligible have membership matching the TRIM3 unit. In other words, each case member is linked by PIK with a member of the same TRIM3 unit, and no non-case members are included in the unit. In contrast, just 31 percent of cases simulated as ineligible have matching case and unit membership in 2016.

Figure 4.3 SNAP Case and TRIM3 Unit Consistency by Simulated Eligibility and Year



Sources: Decision Demographics & Urban Institute tabulations of 2012–2016 linked CPS ASEC, TRIM3, and SNAP administrative data for Illinois, Mississippi, and Tennessee

Note: SNAP case status reflects the CPS ASEC survey month. TRIM3 simulated eligibility reflects eligibility in at least one month of the prior calendar year.

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Some case and unit mismatches are unavoidable, because one or more of the case members does not appear in the CPS ASEC. This affects between 14 and 21 percent of the cases simulated as eligible by TRIM3 in the 2012 to 2016 data, and between 22 percent and 31 percent of cases simulated as ineligible. These estimates may be somewhat overstated, if some case members are in the CPS ASEC but are not matched due to missing PIK or other PIK error.[46]

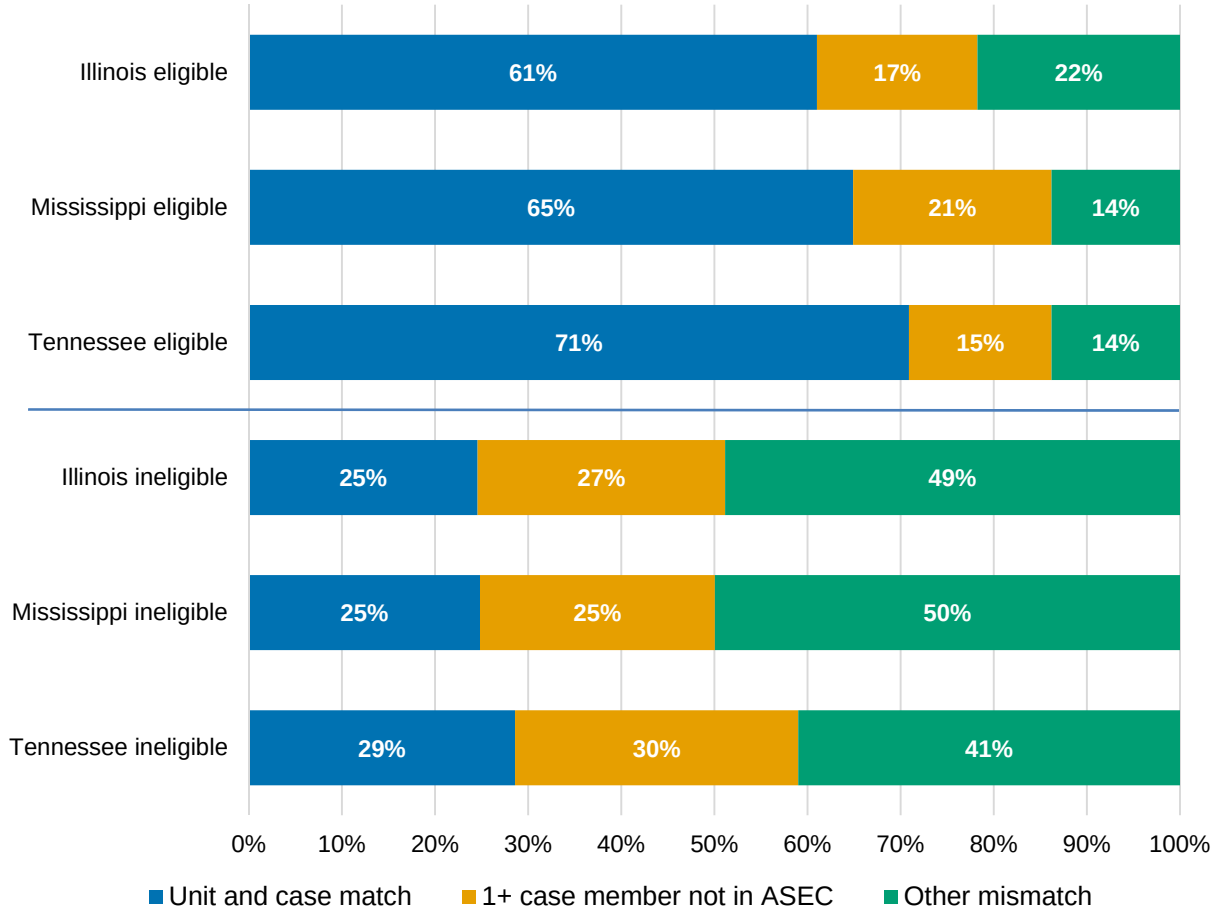
Case and unit membership mismatches also occur when all case members are in the household, usually because a household member who is not a member of the case is assigned to the TRIM3

[46] We perform a sensitivity test for missing PIK when presenting results for one-adult plus child cases. We find that if we exclude cases where the PIK is missing for a member of the SNAP case or CPS ASEC household, we reduce the total number of one-adult plus child SNAP cases with a different TRIM3 unit type by nearly a third.

unit. These mismatches account for between 41 percent and 55 percent of cases simulated as ineligible by TRIM3 in the 2012 to 2016 data.

We find similar patterns when we combine data across years and review results by state (Figure 4.4 and Appendix Table C.2). Unit and case matches are much more common among cases simulated as eligible by TRIM3 than among those simulated as ineligible. Tennessee has slightly greater consistency between case and unit membership than the other two states, regardless of simulated eligibility status.

Figure 4.4 SNAP Case and TRIM3 Unit Consistency by Simulated Eligibility; Combined 2012 to 2016 data, by state



Sources: Decision Demographics & Urban Institute tabulations of combined 2012–2016 linked CPS ASEC, TRIM3, and SNAP administrative data for Illinois, Mississippi, and Tennessee

Note: SNAP case status reflects the CPS ASEC survey month. TRIM3 simulated eligibility reflects eligibility in at least one month of the prior calendar year.

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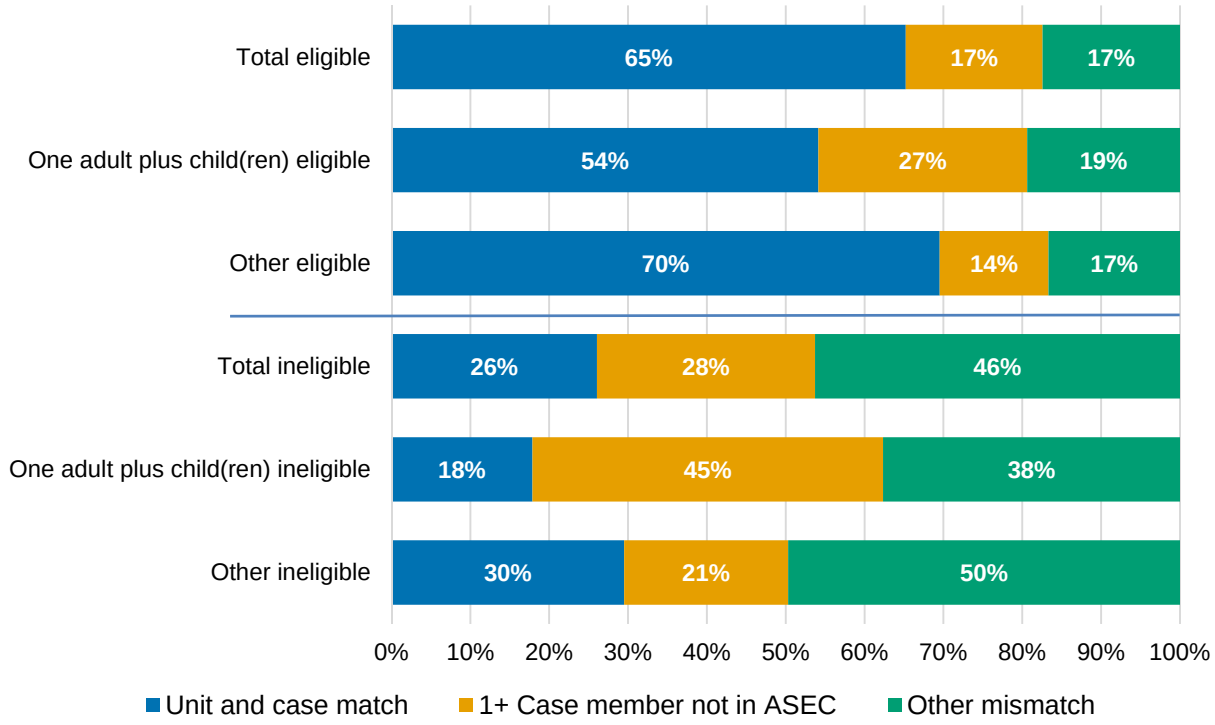
Figure 4.5 aggregates results across the years and the three states and shows results by whether the case is a one-adult plus child case or another type of case. We classify case type by the case characteristics according to the administrative data.

Figure 4.5 SNAP Case and TRIM3 Unit Consistency by Simulated Eligibility and Case Type; Combined 2012 to 2016 data



Sources: Decision Demographics & Urban Institute tabulations of combined 2012–2016 linked CPS ASEC, TRIM3, and SNAP administrative data for Illinois, Mississippi, and Tennessee

Note: SNAP case status reflects the CPS ASEC survey month. TRIM3 simulated eligibility reflects eligibility in at least one month of the prior calendar year.

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One-adult plus child cases are less likely to have matching unit and case membership than are other types of cases, regardless of simulated eligibility status. Fifty-four percent of one-adult plus child cases simulated as eligible by TRIM3 have matching unit and case membership, compared with 70 percent of other eligible cases. Just 18 percent of one-adult plus child cases simulated as ineligible by TRIM3 have matching unit and case membership, compared with 30 percent of other cases simulated as ineligible. Among ineligible one-adult plus child cases, 45 percent have at least one case member who does not have a PIK match with a member of the CPS ASEC household.

Whole ASEC Imputation and Income Imputation

We next examine cases simulated as eligible or ineligible by TRIM3 by whether they have whole imputation of the ASEC supplement, do not have whole ASEC imputation but did not respond to an income item question and have at least one imputed income value, or have neither whole imputation nor income item imputation. We count a case as a whole impute if at least one case member is a whole impute. If no member is a whole impute we classify the case as an "income item impute" if at least one case member has an imputed income value.[47]

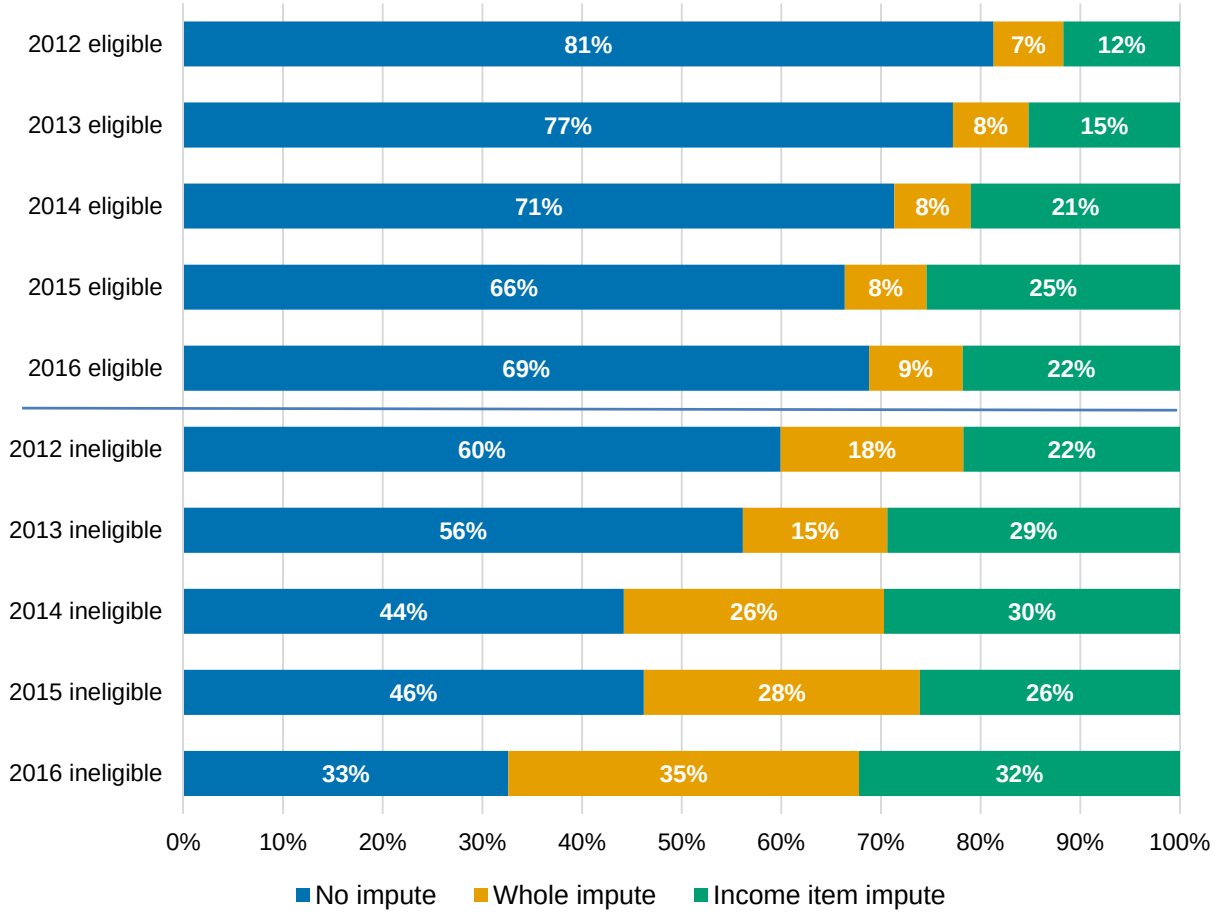
If a SNAP case is linked with a CPS ASEC household that has whole imputation or income item imputation, then it is possible that the income or other characteristics imputed to the household will be inconsistent with SNAP eligibility. For example, if the CPS ASEC respondent did not report the amount of their earnings, he or she might be imputed an earnings amount that places the person over the SNAP eligibility limit. Errors in CPS ASEC reported income could also cause a SNAP participant to be simulated as ineligible by TRIM3, though we do not explore that possibility here.

Although whole imputation and income item imputation can help explain why TRIM3 finds a linked SNAP recipient case to be ineligible for SNAP, imputation does not necessarily affect overall eligibility estimates. The goal of imputation is to assign the right distribution of income or other characteristics to people with missing data. Following up on the example above, if another (non-SNAP) household contained a person with earnings above the SNAP eligibility limit, who did not report their earnings, and this person was imputed earnings below the SNAP eligibility limit, then this household would now represent the "eligible" household in the estimates. If imputations are distributionally accurate, they should not affect eligibility estimates. Even so, they will cause some households in linked administrative and survey data to have income and other characteristics that appear inconsistent with SNAP eligibility.

We find that imputation levels are lowest in 2012 and 2013 regardless of eligibility status and that imputation is much more common among cases simulated as ineligible than among those simulated as eligible (Figure 4.6). In 2012, 81 percent of cases simulated as eligible by TRIM3 and 60 percent of cases simulated as ineligible had neither whole ASEC imputation nor income item imputation. As of 2016, 69 percent of cases simulated as eligible by TRIM3 and 33 percent of cases simulated as ineligible had neither whole imputation nor income item imputation. Thirty-five percent of the cases simulated as ineligible in the 2016 data had whole ASEC imputation, and another 32 percent had income item imputation.

[47] TRIM3 unit eligibility may also be affected by imputation among unit members who are not also members of the SNAP case. We do not identify this effect in this analysis.

Figure 4.6 Imputation Status of SNAP Cases by Simulated Eligibility and Year



Sources: Decision Demographics & Urban Institute tabulations of 2012–2016 linked CPS ASEC, TRIM3, and SNAP administrative data for Illinois, Mississippi, and Tennessee

Note: Cases identified as “No impute” correspond to a TRIM3 unit in which no member has imputation of the entire ASEC supplement (“Whole impute”) or any income value (“Income item impute”).

Note: SNAP case status reflects the CPS ASEC survey month. TRIM3 simulated eligibility reflects eligibility in at least one month of the prior calendar year.

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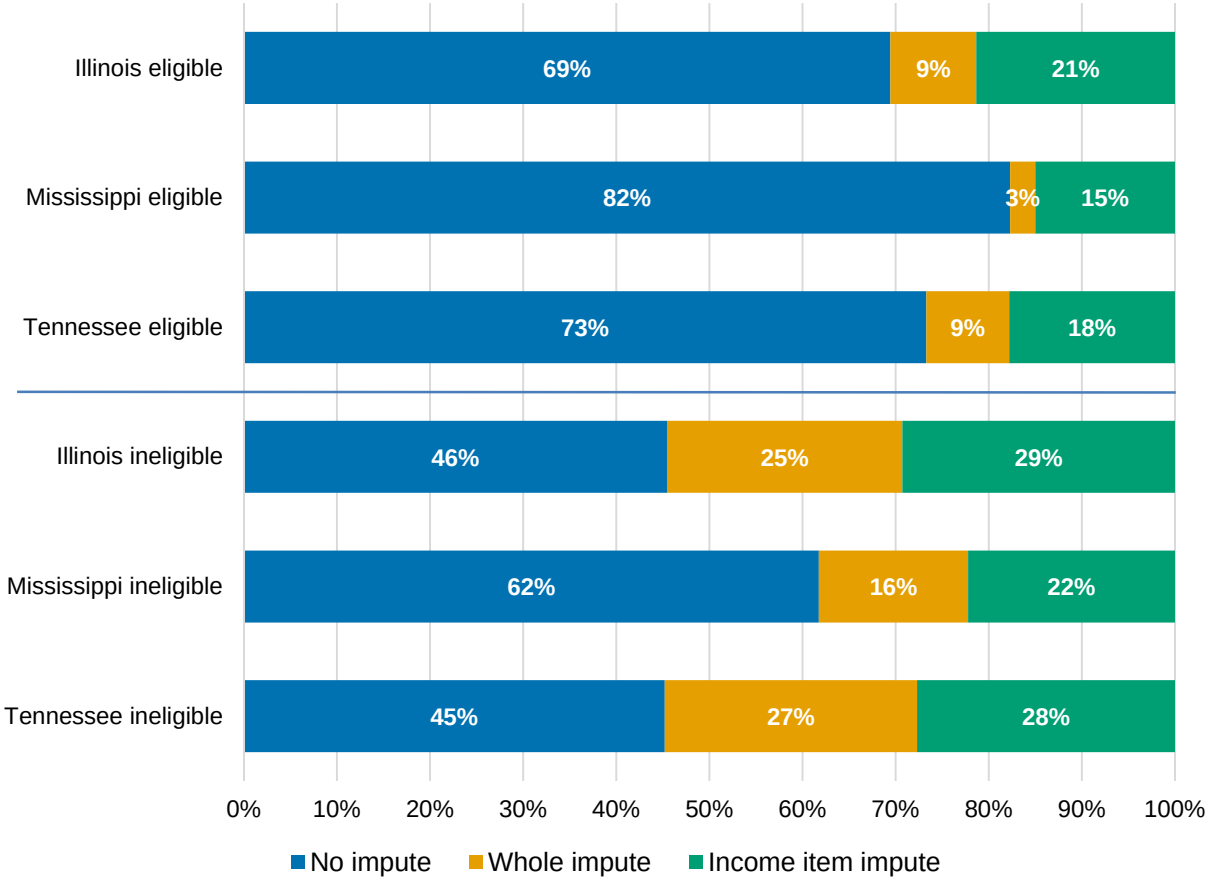
Pooling data across the five years, we find that imputation rates were higher among SNAP cases in Illinois and Tennessee than among SNAP cases in Mississippi. Eighteen percent of SNAP cases simulated as eligible in Mississippi and 38 percent of those simulated as ineligible had whole imputation or income item imputation, compared with roughly 30 percent of cases found eligible and 55 percent of cases found ineligible in the other two states (Figure 4.7).

Figure 4.7 Imputation Status of SNAP Cases by Simulated Eligibility; Combined 2012 to 2016 data, by state



Sources: Decision Demographics & Urban Institute tabulations of combined 2012–2016 linked CPS ASEC, TRIM3, and SNAP administrative data for Illinois, Mississippi, and Tennessee

Note: Cases identified as "No impute" correspond to a TRIM3 unit in which no member has imputation of the entire ASEC supplement ("Whole impute") or any income value ("Income item impute").

Note: SNAP case status reflects the CPS ASEC survey month. TRIM3 simulated eligibility reflects eligibility in at least one month of the prior calendar year.

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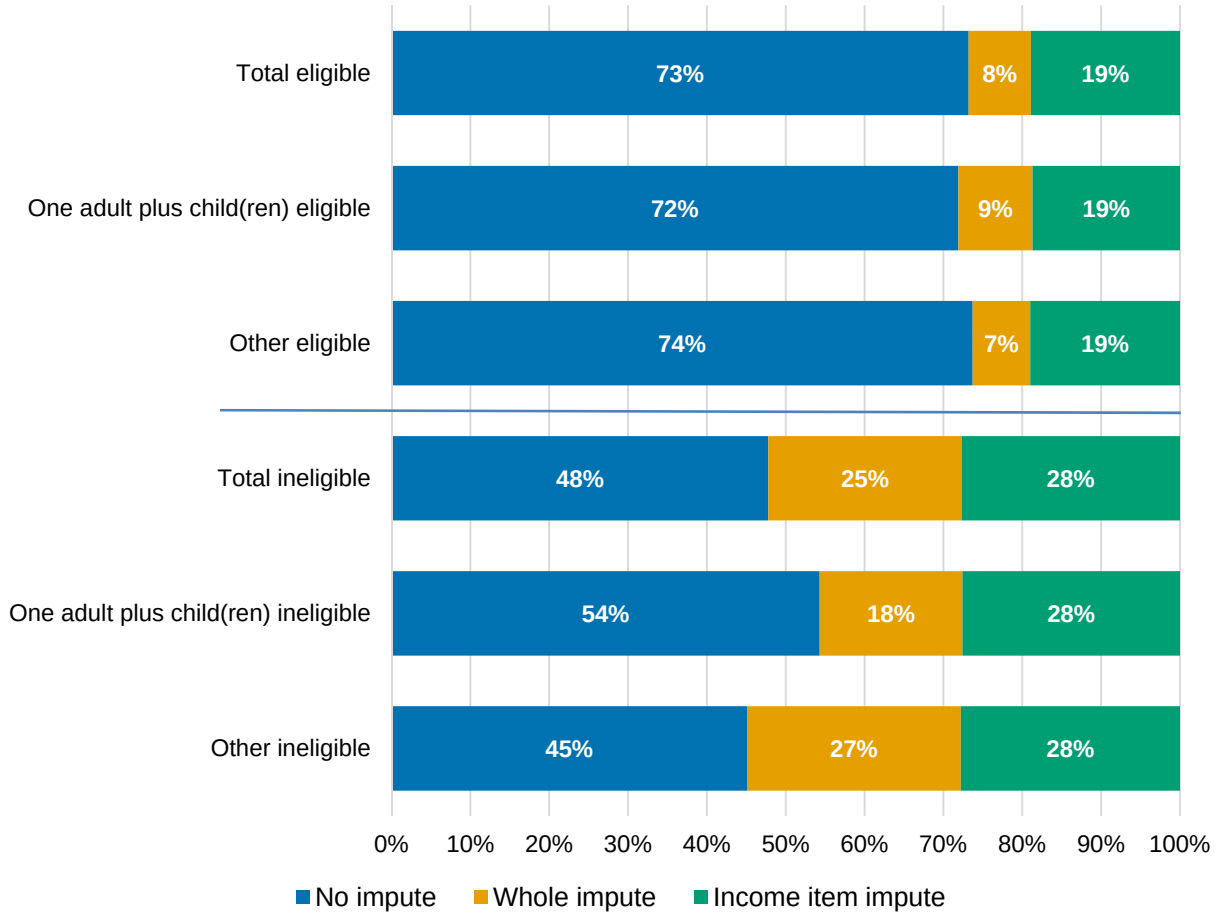
Imputation rates are similar for one-adult plus child cases and other types of cases simulated as eligible by TRIM3 (Figure 4.8). Among cases simulated as ineligible, 46 percent of one-adult plus child cases and 55 percent of other cases have whole imputation or income item imputation.

Figure 4.8 Imputation Status of SNAP Cases by Simulated Eligibility and Case Type; Combined 2012 to 2016 data



Sources: Decision Demographics & Urban Institute tabulations of combined 2012–2016 linked CPS ASEC, TRIM3, and SNAP administrative data for Illinois, Mississippi, and Tennessee

Note: Cases identified as "No impute" correspond to a TRIM3 unit in which no member has imputation of the entire ASEC supplement ("Whole impute") or any income value ("Income item impute").

Note: SNAP case status reflects the CPS ASEC survey month. TRIM3 simulated eligibility reflects eligibility in at least one month of the prior calendar year.

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Match and Imputation Details and Other Factors by Simulated Eligibility

Table 4.1 presents additional details about case and unit mismatches, types of income imputation, and other factors that might affect simulated eligibility. Results are pooled for the three states across the five years of data and are shown separately for one-adult plus child cases and other types of cases.

Table 4.1 ASEC Characteristics of SNAP Cases by SNAP Case Type and TRIM3 Eligibility Status; Combined 2012 to 2016 data

	Total			One-adult plus child(ren)			Other case types		
	Eligible 1+ months	Ineligible in all months	Total	Eligible 1+ months	Ineligible in all months	Total	Eligible 1+ months	Ineligible in all months	Total
Total unweighted counts	3,100	1,000	4,100	900	300	1,200	2,200	750	2,900
Weighted total (in thousands)			7,742			2,190			5,553
TRIM3 unit and case match status									
Percentage distribution	100%	100%	100%	100%	100%	100%	100%	100%	100%
TRIM3 unit matches SNAP case	65%	26%	55%	54%	18%	45%	70%	30%	59%
1+ members not in ASEC household	17%	28%	20%	27%	45%	31%	14%	21%	16%
Other case and unit mismatch	17%	46%	25%	19%	38%	24%	17%	50%	25%
Imputation									
Percentage distribution	100%	100%	100%	100%	100%	100%	100%	100%	100%
No imputation	73%	48%	67%	72%	54%	67%	74%	45%	66%
Whole impute	8%	25%	12%	9%	18%	12%	7%	27%	12%
Not whole impute, any income item imputed	19%	28%	21%	19%	28%	21%	19%	28%	21%
Details on match status[1]									
Percentage distribution	100%	100%	100%	100%	100%	100%	100%	100%	100%
Match: One person household	23%	10%	20%	0%	0%	0%	32%	13%	27%
Match: 2+ person household	42%	17%	36%	54%	18%	45%	38%	16%	32%
1+ case members not in ASEC household	17%	28%	20%	27%	45%	31%	14%	21%	16%
1+ TRIM3 unit members not on case	15%	46%	23%	17%	37%	22%	15%	50%	24%
1+ case members in different TRIM3 unit	2%		2%	2%		2%	2%	0%	2%

(*Table continues*)

Table 4.1, continued

	Total			One-adult plus child(ren)			Other case types		
	Eligible 1+ months	Ineligible in all months	Total	Eligible 1+ months	Ineligible in all months	Total	Eligible 1+ months	Ineligible in all months	Total
Whole imputation or imputation of income type									
Whole impute or earnings imputation	16%	40%	23%	20%	39%	25%	15%	41%	22%
Whole impute or unemployment/workers comp imputation	9%	26%	14%	11%	20%	13%	8%	29%	14%
Whole impute or social security, retirement, disability, or survivor income imputation	12%	31%	17%	11%	19%	13%	12%	36%	18%
Whole impute or asset income imputation	12%	32%	17%	14%	25%	17%	12%	35%	18%
Whole impute or child support or other financial assistance imputation	10%	27%	14%	13%	22%	15%	9%	29%	14%
Whole impute or means-tested assistance imputation	11%	26%	15%	12%	19%	14%	11%	30%	15%
Other characteristics									
Recent job loss by case member	14%	14%	14%	15%	13%	15%	14%	14%	14%
Case has at least one non-citizen	3%	4%	4%	3%	3%	3%	4%	5%	4%
Household has at least one non-citizen	8%	9%	8%	7%	8%	7%	8%	10%	9%
At least one case member moved in last year	19%	14%	18%	27%	17%	24%	16%	13%	16%
Case has any of above factors[2]									
Percentage distribution	100%	100%	100%	100%	100%	100%	100%	100%	100%
Case and unit don't match	35%	74%	45%	46%	82%	56%	31%	71%	41%
Case and unit match, complicating factor	30%	19%	27%	30%	13%	26%	30%	22%	28%
Case and unit match, no complicating factor	36%	7%	28%	24%	5%	19%	40%	7%	32%

Sources: Decision Demographics & Urban Institute tabulations of combined 2012–2016 linked CPS ASEC, TRIM3, and SNAP administrative data for Illinois, Mississippi, and Tennessee.

Note: Cases identified as "No impute" correspond to a TRIM3 unit in which no member has imputation of the entire ASEC supplement ("Whole impute") or any income value ("Income item impute"). SNAP case status reflects the CPS ASEC survey month. TRIM3 simulated eligibility reflects eligibility in at least one month of the prior calendar year.

[1] Each case is placed in the first row that describes it.

[2] Complicating factors include whole imputation, imputation of any income amount, recent job loss by case member, case has at least one non-citizen, and/or at least one case member who is in the ASEC household moved in the last year.

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Case and Unit Mismatches

Among one-adult plus child cases simulated as ineligible by TRIM3, 18 percent have matching case and unit membership, 45 percent have a case member that is not matched with a household member in the ASEC, and 38 percent have a TRIM3 unit member who is not a member of the case (we examine these cases in greater detail in a later section).

Among other types of cases simulated as ineligible by TRIM3, 30 percent have matching case and unit membership, 21 percent have a case member that is not matched with a household member in the ASEC, and 50 percent have a TRIM3 unit member who is not a member of the case.

TRIM3 rarely splits members of the same case across different TRIM3 units. Just 2 percent of cases in which case and unit membership do not match involve situations where members of the same case have been allocated across more than one TRIM3 unit.

Types of Income Imputation

Turning to imputation, we find that 39 percent of one-adult plus child cases simulated as ineligible by TRIM3 either have whole imputation or earnings imputation, compared with 20 percent of those simulated as eligible. Asset income (income from interest, dividends, and rents or royalties) is the next most common type of income imputation for one-adult plus child cases simulated as ineligible. Twenty-five percent of one-adult plus child cases simulated as ineligible by TRIM3 have whole imputation or asset income imputation, compared with 14 percent of cases simulated as eligible.

Among other types of cases simulated as ineligible by TRIM3, imputation of Social Security, retirement, disability, or survivor income is the second most common type of imputation after earnings. Forty-one percent of other types of cases simulated as ineligible by TRIM3 have whole imputation or earnings imputation; 36 percent have whole imputation or imputation of Social Security, retirement, disability, or survivor income, and 35 percent have whole imputation or imputation of asset income. The corresponding figures for other types of cases simulated as eligible for SNAP are 15 percent, 12 percent, and 12 percent respectively.

Other Factors that Might Affect Eligibility

In addition to examining case and unit consistency and imputation status, we review three other factors that might affect eligibility estimates. First, we examine whether the SNAP case has at least one member who had worked in the last year but was not working in the interview month according to the CPS ASEC. If so, then they might recently have lost a job and have truly been ineligible in the prior calendar year.[48] We find that although 14 percent of the linked SNAP cases have such a member, they make up about the same share of TRIM3 units regardless of simulated eligibility status.

[48] The linked SNAP administrative and ASEC data available to this analysis do not identify SNAP participation in the prior calendar year and so we are not able to determine if the case participated in the prior year.

Next, we review noncitizen status. Unauthorized immigrants are ineligible for SNAP and other noncitizens have restricted eligibility. Although native, naturalized, and noncitizen status is reported on the CPS ASEC, other details (such as whether a noncitizen is unauthorized) must be imputed, complicating eligibility determination.

We find little difference in noncitizen status among cases simulated as eligible or ineligible in TRIM3. About 3 to 4 percent of SNAP cases include a noncitizen member regardless of TRIM3 simulated eligibility status, and 8 to 9 percent are in a CPS ASEC household with a noncitizen.[49] It is possible that the approach we use to handle cloned TRIM3 households mitigates differences arising from noncitizen status.[50]

Finally, we examine whether any SNAP case member moved in the last year according to the CPS ASEC.[51] We speculate that simulation estimates might be more reliable for people with stable living conditions. For example, a SNAP recipient might have only recently moved in with other family members whose combined income for the prior year make the simulated TRIM3 unit appear ineligible. However, we find that cases simulated as eligible by TRIM3 are *more* likely to include a case member who moved in the prior year (19 percent) than are those simulated as ineligible (14 percent).

Combined Effect of Various Factors

Taking case and unit mismatch, imputation, and the other factors into consideration, we find that just 7 percent of cases simulated as ineligible in TRIM3 have none of these complicating factors, compared with 36 percent of those simulated as eligible. Among one-adult plus child cases, 5 percent of cases simulated as ineligible in TRIM3 lack any of these complicating factors, compared with 24 percent of those simulated as eligible.

Role of Imputation and Other Factors when Case and Unit Membership Match

If most cases simulated as ineligible in TRIM3 do not have matching SNAP case and TRIM3 unit membership, what role do imputation and other factors play when case and TRIM3 membership match?

Focusing just on cases where SNAP case and TRIM3 unit membership match, we find that 75 percent of cases simulated as eligible and 43 percent of cases simulated as ineligible have neither whole imputation nor income item imputation (Figure 4.9). Of the cases simulated as eligible, 5 percent have whole imputation and 20 percent have income imputation. In contrast, 19 percent of the cases simulated as ineligible have whole imputation and another 37 percent have imputation of at least one income amount. As with the overall results, earnings imputation continues to be the

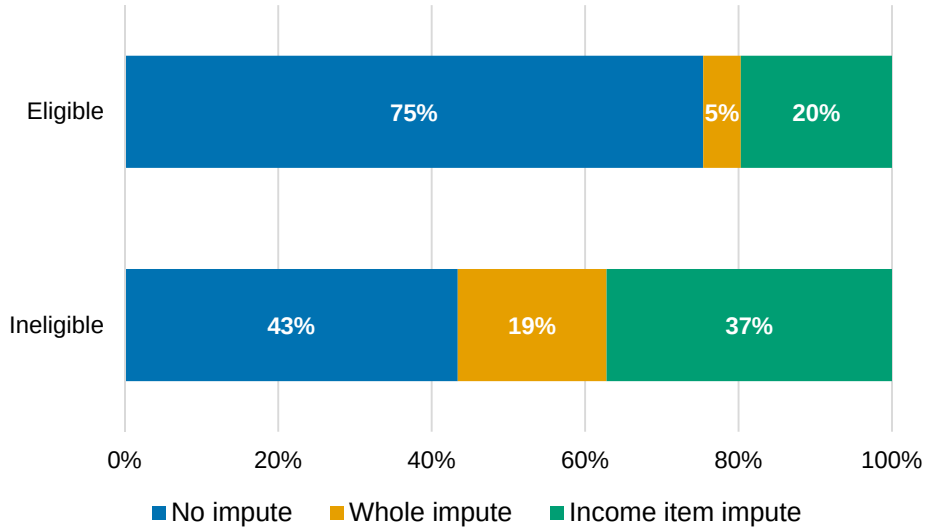
[49] We defined a case as having a noncitizen member if any case member was a noncitizen according to the reported information in the CPS ASEC.

[50] Cloned immigrant households differ in their assignment of immigrant status. Because we select the clone with the most eligible members for inclusion in this analysis, we reduce the situations in which the imputed immigrant status would cause the case to be simulated as ineligible in TRIM3.

[51] We classify a mover as someone who reports that they were not living in the same household one year ago.

most common type of income item imputation among cases simulated as ineligible, followed by Social Security, retirement, disability, or survivor income, and then by asset income (Table 4.2)

Figure 4.9 Imputation Status of SNAP Cases by Simulated Eligibility;
Cases with matching case and TRIM3 unit membership, combined 2012 to 2016 data



Sources: Decision Demographics & Urban Institute tabulations of combined 2012–2016 linked CPS ASEC, TRIM3, and SNAP administrative data for Illinois, Mississippi, and Tennessee

Note: Cases identified as “No impute” correspond to a TRIM3 unit in which no member has imputation of the entire ASEC supplement (“Whole impute”) or any income value (“Income item impute”).

Note: SNAP case status reflects the CPS ASEC survey month. TRIM3 simulated eligibility reflects eligibility in at least one month of the prior calendar year.

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Table 4.2 ASEC Characteristics of SNAP Cases by Simulated Eligibility; Cases with matching case and TRIM3 unit membership, combined 2012 to 2016 data

	Eligible 1+ months	Ineligible in all months	Total
Total unweighted counts	2,000	250	2,200
Weighted total (thousands)			4,266
Imputation			
Percentage distribution	100%	100%	100%
No imputation	75%	43%	71%
Whole impute	5%	19%	7%
Not whole impute, any income item imputed	20%	37%	22%
Whole imputation or imputation of income type			
Whole impute or earnings imputation	12%	41%	16%
Whole impute or unemployment/workers comp imputation	6%	22%	8%
Whole impute or social security, retirement, disability, or survivor income imputation	10%	31%	13%
Whole impute or asset income imputation	10%	29%	12%
Whole impute or child support or other financial assistance imputation	7%	22%	9%
Whole impute or means-tested assistance imputation	8%	21%	10%
Other characteristics			
Recent job loss by case member	13%	19%	14%
Case has at least one non-citizen	2%	6%	3%
Household has at least one non-citizen	3%	6%	3%
At least one case member moved in last year	18%	16%	17%
Case has any of above factors[1]			
Case has at least one of the above factors	46%	74%	49%
Case has none of the above factors	54%	26%	51%

Sources: Decision Demographics & Urban Institute tabulations of combined 2012–2016 linked CPS ASEC, TRIM3, and SNAP administrative data for Illinois, Mississippi, and Tennessee

Note: Cases identified as "No impute" correspond to a TRIM3 unit in which no member has imputation of the entire ASEC supplement ("Whole impute") or any income value ("Income item impute").

Note: SNAP case status reflects the CPS ASEC survey month. TRIM3 simulated eligibility reflects eligibility in at least one month of the prior calendar year.

[1]Complicating factors include whole imputation, imputation of any income amount, recent job loss by case member, case has at least one non-citizen, and/or at least one case member who is in the ASEC household moved in the last year.

DRB Delegated Authority Approval Number CBDRB-FY21-CES014-027 (Ns are rounded to meet disclosure avoidance requirements).

Among the cases with matching SNAP case and TRIM3 unit membership, those simulated as ineligible by TRIM3 are more likely to have a case member with a recent job loss, a case member who is a noncitizen, or to be in a household with at least one noncitizen (regardless of whether the noncitizen is a member of the case). These findings are consistent with our expectation but were not apparent when viewing the results in the context of all cases in Table 4.1. Cases with a member who moved in the last year continue to make up a higher share of cases simulated as eligible (18 percent) than of those simulated as ineligible (16 percent) although the difference is smaller than when viewed in the context of all cases.

Considering these factors in combination, we find that 74 percent of the cases with matching SNAP case and TRIM3 unit membership that are simulated as ineligible in TRIM3 have whole imputation, income item imputation, or one of the other complicating factors compared with 46 percent of those simulated as eligible.

Investigating the Shortfall in One-Adult Plus Child Cases

We use combined linked data for all three states for 2012 to 2016 to investigate factors that might explain the apparent shortfall of one-adult plus child cases in the TRIM3 eligibility estimates. One-adult plus child cases have estimated participation rates well above 100 percent across microsimulation models and data sources (Chapter 2), so factors explaining simulated ineligibility are of key interest.

Ideally, a one-adult plus child SNAP case from the administrative data that is linked with the CPS ASEC would also be a one-adult plus child TRIM3 unit. However, we find that just over half (52 percent) of one-adult plus child SNAP cases in the linked data are one-adult plus child units in TRIM3 that are simulated to be eligible in at least one month of the prior calendar year (Table 4.3). Another 21 percent are a different type of eligible unit, and 20 percent are a different type of unit that is simulated to be ineligible. Just 7 percent are one-adult plus child units simulated to be ineligible in the prior calendar year.

Table 4.3 One-Adult Plus Child Cases by TRIM3 Unit Type and Simulated Eligibility Status; Combined 2012 to 2016 data

	N	Weighted (thousands)	Weighted percentage
Total	1,200	2,190	100%
Eligible 1 adult + child(ren)			52%
Ineligible 1 adult + child(ren)			7%
Eligible other TRIM3 unit type			21%
Ineligible other TRIM3 unit type			20%

Sources: Decision Demographics & Urban Institute tabulations of combined 2012–2016 linked CPS ASEC, TRIM3, and SNAP administrative data for Illinois, Mississippi, and Tennessee

Note: TRIM3 simulated eligibility reflects eligibility in at least one month of the prior calendar year.

DRB Delegated Authority Approval Number CBDRB-FY21-CES014-029 (Ns are rounded to meet disclosure avoidance requirements).

While a substantial number of one-adult plus child SNAP cases in the linked data are not simulated to be one-adult plus child TRIM3 units, the reverse situation can also occur. Some SNAP cases in the linked data that are not one-adult plus child cases according to the SNAP administrative data are simulated to be one-adult plus child TRIM3 units. Among SNAP cases linked with a TRIM3 one-adult plus child unit, 14 percent are another type of SNAP case simulated to be eligible by TRIM3 (Table 4.4).[52]

Table 4.4 SNAP Cases that Correspond to a TRIM3 1 Adult + Child Unit, by SNAP Case Type and TRIM3 Unit Eligibility; Combined 2012 to 2016 data

	N	Total (thousands)	Percentage
Total	900	1,545	100%
Eligible 1 adult + child(ren)			74%
Ineligible 1 adult + child(ren)			10%
Eligible other admin case type			14%
Ineligible other admin case type			2%

Sources: Decision Demographics & Urban Institute tabulations of combined 2012–2016 linked CPS ASEC, TRIM3, and SNAP administrative data for Illinois, Mississippi, and Tennessee

Note: TRIM3 simulated eligibility reflects eligibility in at least one month of the prior calendar year.

DRB Delegated Authority Approval Number CBDRB-FY21-CES014-029 (Ns are rounded to meet disclosure avoidance requirements).

Table 4.5 lists the reasons that one-adult plus child SNAP cases do not meet the one-adult plus child definition in TRIM3. The most common reason, accounting for 28 percent of the cases, is that the SNAP case's children are not present in the corresponding CPS ASEC household. In another 15 percent of cases, the SNAP case's adult is not in the CPS ASEC household and the case children are in a TRIM3 unit with more than one adult. The case adult's spouse is included in the TRIM3 unit along with the case adult in 20 percent of cases, and 18 percent of the cases incorporate the case adult's cohabiting partner into the TRIM3 unit. The remaining 19 percent of the cases are in a TRIM3 unit that does not include the spouse or partner of the case adult but does include some other adult—such as an older relative or adult child of the case adult.[53]

[52] Some of these other case types are child-only SNAP cases in which the adults are ineligible for SNAP. The TRIM3 unit classification used here does not check the eligibility status of the adults on the case and so does not identify "child-only" cases. TRIM3 units consisting of an ineligible adult and a child would be counted as "one-adult plus child" here, but as "child-only" in the SNAP administrative data. Therefore, Table 4.4 probably overstates the extent to which a one-adult plus child unit in TRIM3 has some other case type in the SNAP administrative data.

[53] We find that for 10 percent of these cases, the other adults are the case adult's children between the ages of 18 and 21. These children are included in the TRIM3 unit in accordance with SNAP regulations.

Table 4.5 Reason One-Adult Plus Child Case is not One-Adult Plus Child in TRIM3; Combined 2012 to 2016 data

	N	Weighted (thousands)	Weighted percentage
All units			
Case adult not in ASEC			15%
Case children are not in ASEC			28%
ASEC spouse in TRIM3 unit			20%
ASEC partner in TRIM3 unit			18%
No spouse/partner; other adult in TRIM3 unit			19%
Total	500	898	100%
Excluding units where member is missing PIK			
Case adult not in ASEC			11%
Case children are not in ASEC			25%
ASEC spouse in TRIM3 unit			22%
ASEC partner in TRIM3 unit			22%
No spouse/partner; other adult in TRIM3 unit			20%
Total	350	613	100%

Sources: Decision Demographics & Urban Institute tabulations of combined 2012–2016 linked CPS ASEC, TRIM3, and SNAP administrative data for Illinois, Mississippi, and Tennessee

Note: Each case is placed in the first row that describes it.

Note: TRIM3 simulated eligibility reflects eligibility in at least one month of the prior calendar year.

DRB Delegated Authority Approval Number CBDRB-FY21-CES014-029 (Ns are rounded to meet disclosure avoidance requirements).

These estimates may overstate the extent to which the case adult and case children are absent from the ASEC household. People lacking a PIK in the administrative data or CPS ASEC data are not linked and likely account for some of the case members identified as absent from the household (Czajka, 2021). PIK errors may also prevent some matches. When viewing the data, we observed that some cases have nonmatched members who are the same age and sex as a nonmatched member of the CPS ASEC household but have different PIKs. These could represent different people—such as the current and former partner of the household reference person—but could also reflect errors in PIK assignment in either data source.

As a sensitivity test, we present results at the bottom of Table 4.5 that exclude cases where the PIK is missing for a member of the SNAP case or CPS ASEC household. This reduces the total number of one-adult plus child SNAP cases with a different TRIM3 unit type by nearly a third. The share of cases where the SNAP case's children are not in the CPS ASEC household falls from 28 percent to 25 percent and the share where the case adult is not in the CPS ASEC household falls from 15 percent to 11 percent. This test does not account for possible errors in PIK assignment.

The absence of case members from the CPS ASEC household and the inclusion of a spouse or partner in the TRIM3 unit explain most of the one-adult plus child SNAP cases that are some other type of TRIM3 unit. We take a closer look at each of these groups below.

Case Member Absent from the ASEC household

We examine family relationships and mover status to obtain insight into the characteristics of one-adult plus child cases where the children or adult are missing from the ASEC household. If a child's recent move from one household (where they lived with a parent) to another household explains the discrepancy, we might expect to see that the children are living with grandparents or other relatives and have moved within the last year.

We measure the characteristics of the case children in the CPS ASEC household using the characteristics of the youngest SNAP case child linked with the CPS ASEC data. The results are based on 80 unweighted cases and so should be considered exploratory. We find that just 12 percent of the youngest children in one-adult plus child cases where the case adult is missing from the CPS ASEC household have moved in the prior year (Table 4.6). This is lower than the average for SNAP cases linked with the CPS ASEC. According to Table 4.1, 18 percent of all SNAP cases linked with the CPS ASEC have at least one member who has moved in the prior year.

Table 4.6 ASEC Characteristics of Youngest Case Child; One-adult plus child cases where adult is not in the ASEC, combined 2012 to 2016 data

N	80
Weighted total (in thousands)	133
	Weighted percentage
Presence of parents in ASEC household of youngest case child	
Two parents present	36%
One parent present	24%
No parents present	40%
Relationship to household reference person of youngest case child	
Child	49%
Grandchild	33%
Other Relative	12%
Nonrelative	6%
Youngest case child in same household 1 year ago?	
Under age 1	3%
Yes (non-mover)	85%
No (mover)	12%

Sources: Decision Demographics & Urban Institute tabulations of combined 2012–2016 linked CPS ASEC, TRIM3, and SNAP administrative data for Illinois, Mississippi, and Tennessee

Note: TRIM3 simulated eligibility reflects eligibility in at least one month of the prior calendar year. DRB Delegated Authority Approval Number CBDRB-FY21-CES014-029 (Ns are rounded to meet disclosure avoidance requirements).

In over a third of cases (36 percent) involving a one-adult plus child case where the adult is missing from the CPS ASEC household, the youngest SNAP case child has two parents present within the household. This might seem surprising, if we assume that the absent case adult is also a parent. However, it is possible that the absent case adult is a guardian or caretaker, or that a parent in the household is a stepparent. In some cases, one of the parents may actually *be* the case adult, but not linked with the SNAP administrative data due to missing PIK or PIK error.[54] In about a quarter of cases (24 percent) the youngest child on the SNAP case has one parent present within the ASEC household and in the remaining 40 percent the youngest child has no parents present.

Another possibility is that the case adult recently moved out of a household containing the case children and other family members. This might apply to some of the 33 percent of the children living with a grandparent, for example.[55]

If we turn the focus to case adults who are in CPS ASEC households without case children, we find that 23 percent moved within the last year (Table 4.7). This is a higher share than is observed for children in Table 4.6 and is somewhat higher than the overall average for all SNAP cases linked with the CPS ASEC shown in Table 4.1.

[54] When reviewing example households, we identified cases and households that appeared consistent with each of these explanations.

[55] A child who is the grandchild of the household reference person might also have one or both parents in the household. The table simply shows the relationship of the youngest child to the household reference person.

Table 4.7 ASEC Characteristics of Case Adult; One-adult plus child cases where case children are not in the ASEC, combined 2012 to 2016 data

N	100
Weighted total (in thousands)	248
	Weighted percentage
Marital status of case adult	
Married spouse present or married spouse absent or widowed	24%
Divorced	19%
Separated	3%
Never married	55%
Case adult in same household 1 year ago?	
Yes (non-mover)	77%
No (mover)	23%
Relationship of case adult to household reference person	
Reference person with relatives	28%
Reference person without relatives	30%
Spouse of reference person	4%
Child of Reference person	19%
Other Relative of reference person	7%
Unmarried partner or nonrelative of household reference person	13%

Sources: Decision Demographics & Urban Institute tabulations of combined 2012–2016 linked CPS ASEC, TRIM3, and SNAP administrative data for Illinois, Mississippi, and Tennessee

Note: TRIM3 simulated eligibility reflects eligibility in at least one month of the prior calendar year.

DRB Delegated Authority Approval Number CBDRB-FY21-CES014-029 (Ns are rounded to meet disclosure avoidance requirements).

Over half of the case adults who are in ASEC households without case children have never been married (55 percent), 24 percent are married or widowed, 19 percent are divorced, and 3 percent are separated. Most (62 percent) are a household reference or the spouse of a reference person, 19 percent are the child of a household reference person, and 13 percent are a partner or other nonrelative of the household reference person.

Spouse or Partner Included in the TRIM3 Unit

According to SNAP regulations, married couples who live together must apply for SNAP together. Cohabiting partners are not required to apply together, but children are required to apply with their parents. Therefore, cohabiting parents of the same child should apply together. We find that the cohabiting partner is the parent of at least one of the case adult's children in nearly all (95 percent) of the one-adult plus child SNAP cases with a cohabiting partner in the TRIM3 unit. We

investigated the extent of imputation of married couple and parent-child relationships but found it was rare enough to not affect the estimates.[56]

Different treatment of ineligible unit members in the SNAP administrative data and TRIM3 may explain some cases that appear to have one adult and children in the SNAP administrative data but include a spouse or partner in the TRIM3 unit. If one spouse or partner is ineligible for SNAP—for example, due to immigrant status or a program violation—all or a portion of the income of the ineligible person may be deemed available to other family members, but the person is not taken into consideration when determining the family's benefit and is not considered a SNAP participant.[57]

TRIM3 counts the ineligible spouse or partner as part of the "unit" and applies appropriate income deeming and benefit calculation rules. The model captures restrictions based on immigrant status and student status, but lacks data to simulate other types of ineligibility, such as failure to comply with work requirements or sanctions for drug violations.

It is not clear from the SNAP administrative data used for this study whether ineligible spouses and partners are included in the data.[58] If they are included, we count them as members of the case and we classify the case as having multiple adults and children. If they are not included, then some of the one-adult plus child SNAP cases with a spouse or partner in the TRIM3 unit might be cases where the spouse or partner is ineligible for SNAP.

Even if the SNAP administrative data exclude ineligible spouses and partners, we would not expect that to have much effect on the estimates presented here. According to our tabulations of the 2016 SNAP QC data, just four percent of one-adult plus child cases in the combined data for Illinois, Mississippi, and Tennessee have a nonparticipating adult member.

The 2016 SNAP QC data also show that ineligibility due to immigrant status is the most common reason that a married parent family has only one eligible parent, accounting for 78 percent of these cases.[59] However, ineligibility due to immigrant status appears to explain few of the one-adult plus child cases that include a spouse or partner in the TRIM3 unit. We find that just 29 percent of one-adult plus child SNAP cases in which a spouse is included in the TRIM3 unit involve a spouse who might be ineligible due to immigrant status (data not shown).[60]

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[56] Information about marital status and parent-child relationships is collected in the basic CPS interview and so is not affected by whole imputation.

[57] Deeming rules vary depending on the reason for a person's ineligibility. Depending on the reason, all, some, or none of the income may be deemed available to other case members.

[58] To obtain greater insight, we tabulated participation status variables for each state's administrative data. We find that in Mississippi, about 2 to 3 percent of all people represented in the data are nonparticipants. Nobody is identified as a nonparticipant in the Illinois data, and less than 1 percent are identified as nonparticipants in the Tennessee data (Appendix Table C.3). Based on these results, it appears likely that the Mississippi data include ineligible case members, the Illinois data do not, and the Tennessee data may contain some but not all ineligible members.

[59] These are national estimates. The QC sample for this subgroup is too small to support reliable estimates for Illinois, Mississippi, and Tennessee.

[60] We use the reported CPS ASEC information on citizenship and immigrant status to determine the immigrant status of the people in the TRIM3 unit and count any person who is not native-born as potentially ineligible due to immigrant

Among one-adult plus child SNAP cases where the case adult has a cohabiting partner in the TRIM3 unit, nearly all (almost 100 percent) consist of native-born partners. Thus, ineligibility of the spouse or partner is unlikely to explain most of the cases that appear as a one-adult plus child case in the administrative data but include a spouse or partner in the TRIM3 unit.

We also investigated whether one member of the couple had moved within the last 12 months and the other had not. If a spouse or partner had only recently joined the ASEC household, the family might not yet have informed the SNAP agency. However, we find virtually no instances among the cases under consideration where one spouse or partner had reported to the CPS that they had moved in the last 12 months and the other had not.

Chapter 4 Summary and Recommendations

Our goal in linking the simulated TRIM3 unit identifiers and eligibility flags to the linked CPS ASEC and SNAP administrative data is to better understand the various factors that explain why a case that receives SNAP according to state administrative data is simulated as ineligible for SNAP in TRIM3. This can provide insight regarding unexpectedly high participation rates for some subgroups and can potentially inform improvements in microsimulation modeling.

The eligibility analysis builds on datasets created by Mathematica that link the CPS ASEC and SNAP administrative data for Illinois, Mississippi, and Tennessee. People in the CPS ASEC are linked by PIK with SNAP administrative data for the month corresponding to their interview month, for each year of CPS ASEC data from 2012 to 2016. We augment the data by attaching simulated TRIM3 SNAP unit identifiers and eligibility flags to the linked data sets.

The available data do not align perfectly with respect to the timing of SNAP participation and eligibility. SNAP participation reflects participation at the time of the CPS ASEC interview, and simulated eligibility reflects eligibility in at least one month of the prior calendar year. Thus, some level of ineligibility among participants would be expected, even with perfect data and simulation techniques.

status. We group naturalized citizens with noncitizens because, even though they are eligible for SNAP, there is evidence that some noncitizens report themselves as naturalized in survey data (Passel, Clark, & Fix, 1997, Van Hook & Bachmeier, 2013; Brown et al., 2018). The results provide an upper bound estimate of the extent that ineligibility due to immigrant status might affect the findings, since naturalized citizens and certain categories of legally present noncitizens are eligible for SNAP.

Summary of Findings: All Cases

Results from this analysis show:

- The share of SNAP cases in the linked data that are simulated as eligible by TRIM3 declined from between 75 and 77 percent in the 2012 to 2014 CPS ASEC data to 72 percent in 2015 and 71 percent in 2016.
- Cases simulated as eligible are much more likely to have matching SNAP administrative data case membership and TRIM3 unit membership than those simulated as ineligible.
- Some case members do not appear in the CPS ASEC, and so it is not possible for TRIM3 SNAP unit and administrative case membership to match.
- Whole imputation and income item imputation for linked SNAP cases steadily increased from 2012 to 2016.
- Imputation rates are higher for cases simulated as ineligible than for those simulated as eligible. In 2016, 67 percent of cases simulated as ineligible and 31 percent simulated as eligible had whole imputation or income item imputation.
- Among cases where the SNAP case and TRIM3 unit membership match, 56 percent of SNAP cases simulated as ineligible and 25 percent of those simulated as eligible have whole imputation or income item imputation.

Summary of Findings: One-adult plus child cases

We use combined linked data for all three states for 2012 to 2016 to investigate factors that might explain the apparent shortfall of one-adult plus child cases in the TRIM3 eligibility estimates. We start with a sample of approximately 1,200 linked one-adult plus child SNAP cases, of which about 300 are simulated as ineligible in TRIM3. Some of our estimates come from subgroups of one-adult child SNAP cases with sample sizes as low as 80. In general, results should be regarded as exploratory and confirmed by extending the analysis to additional years and states.

Focusing on one-adult plus child cases, we find that much of the shortfall in eligible one-adult plus child cases is that they do not appear to be one-adult plus child units in TRIM3.

Of one-adult plus child cases in the linked data:

- 52 percent are one-adult plus child units in TRIM3 simulated as eligible
- 21 percent are a different type of TRIM3 unit simulated as eligible
- 20 percent are a different type of TRIM3 unit simulated as ineligible
- 7 percent are one-adult plus child units in TRIM3 simulated as ineligible

Thus, a major part of the shortfall in one-adult plus child cases is that TRIM3 does not identify them as one-adult plus child units. In most cases, this is unavoidable. TRIM3 can't recreate the SNAP case membership and remain consistent with eligibility rules because the case children or the case adult do not appear in the ASEC household, or the TRIM3 unit includes the case head's spouse or cohabiting partner (who is the parent of at least one of the case head's children in 95

percent of the cases). Married couples and cohabiting parents who are both the parents of the same child are required to apply for SNAP together, and so alternative unit types cannot be constructed for these units while remaining consistent with program rules.

Missing PIKs, PIK match error, and definitional issues regarding whether an ineligible spouse is or is not included in the administrative data may cause these issues to be overstated to some extent. Even so, these unit and case definition inconsistencies, combined with the potential underrepresentation of one-adult plus child cases observed in Chapter 3, may explain much of the shortfall in one-adult plus child cases in this combined group of states and data years.

These apparent inconsistencies raise questions about inaccurate reporting of household membership to the SNAP agency, errors in survey reporting of CPS ASEC household membership and relationships, and differences in the residence of children according to survey and administrative data. Further investigation would be needed to explore these issues, but we offer some initial thoughts here.

Ideas for Future Research Arising from Eligibility Analysis

Missing PIK and PIK Error

PIK errors and missing PIKs can make it appear that a case member is not present within the ASEC household even when the case member is included in the data. This can lead the number of participants in linked data to be undercounted and likely causes us to overstate the extent to which there are discrepancies in SNAP case and TRIM3 unit membership. However, this is unlikely to have much effect on the extent to which one-adult plus child cases are identified as one-adult plus child units in TRIM3. For example, if the case adult's children are in the household but PIK errors prevent them from being identified as members of the SNAP case, the case would still be classified in our analysis as a one-adult plus child case (assuming no other adult is included in the unit). It is only when the case adult does not have any children within the household that the case would be classified as one in which the children are absent from the household.

Nevertheless, overcoming the limitations of missing PIK and PIK error—for example by allowing matches between additional case members and CPS household members based on sex and age—would be very beneficial to future research using the linked data files.

Inclusion of Ineligible Spouse or Partner

It was not clear from the data available to us whether a spouse or partner (who was also the parent of a child) was not known to the SNAP agency or was known but not included in the administrative data because the spouse or partner was ineligible for SNAP (for example, due to immigrant status or because of a program violation). If an ineligible spouse or partner was known to the agency but not included in the administrative data files (for example, because the ineligible spouse or partner was not considered a "participant") then the case would be appropriately classified as a one-adult plus child case in the SNAP administrative data but would have been classified as a two adult plus child case in the TRIM3 estimates. However, if a spouse or partner is not known to the agency, then the presence of the spouse or partner in the CPS ASEC data suggests error of some sort—

either in the reporting of relationship information to the SNAP agency or in the reporting of CPS ASEC family relationships.

A suggestion for improvement to the SNAP administrative data files at the Census Bureau would be to document whether ineligible case members are included, and if so, the variables that should be used to identify them. This will differ substantially by state and may not be adequately reflected in state metadata documentation; conversations with state database administrators and case worker supervisors could be revealing in understanding elements of the administrative record data to be considered when expanding this analysis.

Ideally, the SNAP administrative data files collected by the Census Bureau would include data for both the participating and nonparticipating members of a case, with variables that clearly indicate whether a person is a participating member who is taken into consideration when calculating the case's benefit, or a nonparticipating member whose income may be deemed available to the case. This would provide the greatest flexibility in the use of these data. For example, an analysis that focused strictly on people eligible for and receiving SNAP would exclude the ineligible case members. But an analysis that focused on the living arrangements of children receiving SNAP would appropriately identify those living with both parents—even when one or both parents is ineligible for SNAP due to their immigrant status or for some other reason.

Inaccurate Reporting to the SNAP Agency

SNAP agencies perform monthly reviews of sampled cases as part of the QC system. QC reviewers review data on file about the sampled cases and then visit the household to re-interview participants to verify eligibility and the benefit amount. Error rates are generally considered to be low. Ineligible SNAP cases accounted for about 1 percent of participant cases in the average month of 2016.[61] A recommendation for future research would be to assess the extent of error specific to family relationship and residence issues that could affect whether a case is classified as having one or multiple adults with children. Linking SNAP QC data to the PIK-linked datasets could be further revealing.

CPS ASEC Respondent Error

The absence of a SNAP case's children from the household could be due to survey response error. Children, particularly young children, are undercounted in the decennial Census and in household survey data (Jensen & Hogan, 2017). Children in complex households or households with a single parent were most likely to be missed by the 2010 Census (Jensen et al., 2018). In some cases, the child's household was included in the Census, but the child was omitted. In other cases, the entire household was missing (Fernandez, Shattuck, & Noon, 2018). Future research could consider the extent to which under coverage and missed children within the CPS ASEC contribute to the shortfall in one-adult plus child cases and investigate the possibility of reweighting the data to compensate for the shortfall.

[61] This estimate is calculated from Table II.2 in Vigil et al., 2017.

Errors in reporting of family relationships can also occur in survey data. Although we observed negligible imputation rates for marital status and for the variables linking children with parents, future research could consider if and how much misreported relationships might affect results. For example, a survey respondent might report an unrelated couple living in the household as married, not knowing in fact that they are cohabiting.

Movers

Another possibility is that the members of a SNAP case have only recently moved into separate households and have not yet informed the SNAP agency at the time of the CPS ASEC interview. For example, a child might have moved from living with one parent to living with grandparents or with another parent and stepparent.

We investigated movers to some extent in our analysis. When reviewing SNAP cases where the children were in the household, but the case head was missing, we found that the children were less likely to have moved in the prior year than was true for SNAP cases overall. In cases where the case head was in the CPS ASEC household, but the children were not, we found that a higher share (23 percent) had moved within the last 12 months than was found on average for SNAP cases. These findings are based on CPS ASEC responses to questions about whether a person was living in the same household a year ago. Future research could examine prior and subsequent months of administrative data, to see if changes in case membership are revealed that might explain the apparent inconsistency in residency of the case adult and children. Researchers might also look over prior or subsequent months of CPS data to observe if household membership had changed according to the CPS data.

5. Conclusion and Recommendations for Further Research

Developing SNAP eligibility and participation rate estimates is a highly complex task involving two distinct data sources—the household survey data used to develop the eligibility estimates and the SNAP administrative data that provide information on program participants. Participation rate estimates above 100 percent occur when microsimulation models find fewer people eligible for SNAP in survey data than receive SNAP according to administrative data. Understanding these high participation rates is complicated by the fact that the eligibility estimates and counts of participants are drawn from different sources. By analyzing linked SNAP administrative data, CPS ASEC data, and TRIM3 eligibility data for three states, we are able to provide insight into possible explanations for high participation rates in some population subgroups and reasons for inconsistencies in simulated TRIM3 eligibility.

The issues that contribute to participation rates above 100 percent for some subgroups may also affect participation rate estimates for subgroups with lower participation rates. The participation rate for a subgroup could be overstated, despite the fact that the estimate has not yet exceeded 100 percent. Alternatively, the estimated participation rate for a subgroup could be too low, if the subgroup is overrepresented in the CPS ASEC.

At the end of each chapter we have offered summaries and chapter focus-specific recommendations; here we conclude by drawing attention to three key issues—not only relevant to microsimulation modeling and participation rate estimates, but also germane to the use of linked SNAP administrative data files and CPS ASEC files for other research purposes.

Our findings are based on data from three states and five years of data; we recommend that the research be extended to additional states and data years. If our findings hold when analysis is thus extended, the following implications emerge:

1) One-adult plus child SNAP cases are underrepresented and multiple-adult plus child cases are overrepresented in the CPS ASEC due to the lower interview rates for one-adult plus child cases and the higher interview rates of households with multiple-adult plus child cases.

2) Among one-adult plus child SNAP cases identified in the linked SNAP administrative data and CPS data, 41 percent are identified as some other unit type in TRIM3. In most cases this is unavoidable because the case children are not in the CPS household, a spouse or partner (and co-parent of the case adult's child) is present in the household, or the case adult is missing from the household.

3) Imputation rates are much higher for SNAP cases in the linked data that are simulated as ineligible by TRIM3 than for those simulated as eligible. In 2016, 67 percent of cases simulated as ineligible and 31 percent simulated as eligible had whole imputation or income item imputation.

The inconsistencies in household and case membership help to explain why a SNAP case linked with the CPS ASEC data might be simulated as ineligible by TRIM3 and other microsimulation

models. Eligibility limits and maximum benefit amounts increase with case size. Income rises or falls with the addition or subtraction of adults (and their associated income) from the case.

Whole imputation of the CPS ASEC and income item imputation also help explain why a SNAP case linked with CPS ASEC data might be simulated as ineligible by TRIM3 or other microsimulation models. The results show that most linked data cases simulated as ineligible by TRIM3 have whole imputation or income item imputation, suggesting that the income or other characteristics imputed to these cases is inconsistent with SNAP eligibility.

Whole imputation and income item imputation do not necessarily present a problem for microsimulation model estimates or contribute to unrealistically high participation rates. No imputation method is perfect at the individual level. Rather, imputation methods seek to achieve an appropriate distribution of income or other characteristics across individuals with missing data.

The challenge arises when analyzing the simulated eligibility of people who receive SNAP according to linked SNAP administrative data and CPS ASEC data. In this report, we have documented that most of the linked SNAP administrative data cases simulated as ineligible by TRIM3 are whole imputes or have income item imputation. Future research could look more closely at SNAP cases linked with TRIM3 units that lack whole imputation and income item imputation, to identify areas for improvement in microsimulation methods.

Our findings also have implications for the use of linked administrative data and survey data to correct for underreporting of program benefits in the survey data (Fox et al., 2017; Shantz & Fox, 2018; Mittag, 2019; Fox, Rothbaum & Shantz, 2021).

1) Case membership according to the administrative data may be inconsistent with information about the people and relationships among people within a survey household, particularly for cases identified as having one-adult plus children according to the administrative data. The level of inconsistency observed here suggests the need for careful consideration about how such inconsistencies should be handled in analyses that involve linked survey and administrative data.

2) It is important to account for the fact that whole imputation and income item imputation can cause some actual SNAP participants (based on linked administrative data) to have income data in the survey that is too high for program eligibility. This should be taken into consideration when analyzing program receipt (according to administrative data) by income level in the CPS ASEC. Possible approaches to avoiding this problem are to develop estimates that exclude households with imputed data (reweighting appropriately) or to control for SNAP receipt from linked data when performing whole imputation and income item imputation.

Analyses of linked administrative data and survey data offer many opportunities but also raise new questions and challenges. We hope that the information provided here will provide ideas to motivate future research in the areas of microsimulation modeling and linked data analysis.

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Appendices

Appendix A: SNAP Participation Rate Estimates

List of Tables

Table A.1: National Estimated SNAP Individual Participation Rates in 2011 and 2016
By Data Source, Model, and Whether Estimate Includes State Broad Based Categorical Eligibility (BBCE)
(Numbers in thousands)

		Eligible				Participation Rate (Participants/Eligibles)			
		CPS		SIPP	ACS	CPS		SIPP	ACS
Individual Characteristic	Participating	MATH	TRIM3	MATH	ATTIS	MATH	TRIM3	MATH	ATTIS
2016 (Federal Rules)									
All Individuals	39,904	47,070	50,023		55,678	85	80		72
Age									
Children (17 or younger)	17,874	17,193	17,931		19,739	104	100		91
Pre-school age (0-4)	5,430	5,194	5,295		5,995	105	103		91
School-age (5-17)	12,443	11,999	12,635		13,745	104	98		91
Nonelderly adults (18 to 59)	17,613	19,986	21,890		25,071	88	80		70
Elderly Individuals (60+)	4,417	9,890	10,201		10,867	45	43		41
Adults age 18 to 49 without disabilities in childless households	3,452	3,544	5,487		7,280	97	63		47
Noncitizens	1,766	2,788	2,720		2,601	63	65		68
Citizen children living with noncitizen adults	3,556	4,382	5,058		5,072	81	70		70
Case size									
1 person	10,263	10,487	15,243		17,641	98	67		58
2 people	7,175	11,053	9,841		10,847	65	73		66
3 people	7,703	8,673	8,143		8,844	89	95		87
4 or more people	14,764	16,858	16,796		18,345	88	88		80
Case countable income sources									
No Earned income	22,621	23,953	26,165		27,104	94	86		83
Earned income	17,283	23,117	23,857		28,574	75	72		60
TANF	3,092	4,519	3,658		3,573	68	85		87
SSI	7,686	8,934	8,092		7,949	86	95		97
Social Security	7,446	11,332	11,338		12,715	66	66		59
Countable Income as a Percentage of Poverty Guidelines									
No Income	6,450	6,330	6,120		7,528	102	105		86
1 to 50 percent	10,605	8,960	10,081		10,227	118	105		104
51 to 100 percent	17,059	18,044	21,366		22,789	95	80		75
101 percent or more	5,791	13,736	12,455		15,133	42	46		38
Benefit as a percentage of maximum benefit									
low benefits (1 to 50 percent of max)	9,554	18,702	19,446		21,703	51	49		44
high benefits (51 to 99 percent of max)	16,845	16,204	17,237		18,291	104	98		92
51 to 75 percent	8,126	9,200	9,510		10,310	88	85		79
76 to 99 percent	8,719	7,004	7,727		7,981	124	113		109
maximum benefit	13,505	12,164	13,340		15,685	111	101		86

Table A.1: National Estimates (continued)

		Eligible				Participation Rate (Participants/Eligibles)			
		CPS		SIPP	ACS	CPS		SIPP	ACS
Individual Characteristic	Participating	MATH	TRIM3	MATH	ATTIS	MATH	TRIM3	MATH	ATTIS
2016 Including State Broad Based Categorical Eligibility (BBCE)									
All Individuals	43,465	69,611	65,424		68,920	62	66		63
Age									
Children (17 or younger)	19,174	21,368	21,105		22,572	90	91		85
Pre-school age (0-4)	5,818	6,326	6,202		6,817	92	94		85
School-age (5-17)	13,356	15,043	14,903		15,755	89	90		85
Nonelderly adults (18 to 59)	19,180	27,397	27,496		30,427	70	70		63
Elderly Individuals (60+)	5,112	20,845	16,823		15,921	25	30		32
Adults age 18 to 49 without disabilities in childless households	3,825	5,433	7,378		9,316	70	52		41
Noncitizens	1,964	3,752	3,453		3,120	52	57		63
Citizen children living with noncitizen adults	3,824	5,336	6,003		5,845	72	64		65
Case size									
1 person	11,342	15,814	20,230		22,020	72	56		52
2 people	8,043	21,442	15,915		15,793	38	51		51
3 people	8,252	10,574	9,455		9,945	78	87		83
4 or more people	15,828	21,781	19,824		21,162	73	80		75
Case countable income sources									
No Earned income	24,118	34,597	33,653		32,722	70	72		74
Earned income	19,347	35,014	31,771		36,199	55	61		53
TANF	3,123	4,583	3,787		3,661	68	82		85
SSI	7,796	9,482	8,577		8,312	82	91		94
Social Security	8,311	21,820	18,411		18,225	38	45		46
Countable Income as a Percentage of Poverty Guidelines									
No Income	6,877	6,994	6,165		7,595	98	112		91
1 to 50 percent	11,008	10,615	11,069		10,643	104	99		103
51 to 100 percent	17,658	20,151	22,467		23,464	88	79		75
101 percent or more	7,922	31,851	25,723		27,219	25	31		29
Benefit as a percentage of maximum benefit									
low benefits (1 to 50 percent of max)	11,790	36,979	32,809		33,746	32	36		35
high benefits (51 to 99 percent of max)	17,551	18,300	18,313		18,869	96	96		93
51 to 75 percent	8,515	10,463	10,142		10,658	81	84		80
76 to 99 percent	9,035	7,837	8,171		8,211	115	111		110
maximum benefit	14,124	14,332	14,302		16,305	99	99		87

Table A.1: National Estimates (continued)

		Eligible				Participation Rate (Participants/Eligibles)			
		CPS		SIPP	ACS	CPS		SIPP	ACS
Individual Characteristic	Participating	MATH	TRIM3	MATH	ATTIS	MATH	TRIM3	MATH	ATTIS
2011 (Federal Rules)									
All Individuals	40,694	52,161	56,146	54,413		78	72	75	
Age									
Children (17 or younger)	18,455	19,303	20,748	22,101		96	89	84	
Pre-school age (0-4)	6,302	6,258	6,546	6,657		101	96	95	
School-age (5-17)	12,153	13,046	14,202	15,444		93	86	79	
Nonelderly adults (18 to 59)	18,844	23,985	26,529	24,677		79	71	76	
Elderly Individuals (60+)	3,395	8,872	8,869	7,635		38	38	44	
Adults age 18 to 49 without disabilities in childless households	4,132	4,975	7,643	5,349		83	54	77	
Noncitizens	1,604	3,108	2,754	4,116		52	58	39	
Citizen children living with noncitizen adults	3,433	4,831	5,680	3,114		71	60	110	
Case size									
1 or 2 people	16,906	22,447	26,881	23,545		75	63	72	
1 person	9,429	10,509	16,147	12,967		90	58	73	
2 people	7,477	11,938	10,734	10,578		63	70	71	
3 people	8,288	9,968	9,577	9,629		83	87	86	
4 or more people	15,500	19,746	19,688	21,240		78	79	73	
Case countable income sources									
No Earned income	24,565	27,975	30,500	27,324		88	81	90	
Earned income	16,128	24,186	25,646	27,089		67	63	60	
TANF	4,657	5,007	5,438	4,983		93	86	93	
SSI	7,620	9,514	8,980	8,829		80	85	86	
Social Security	6,790	11,515	11,147	11,905		59	61	57	
Countable Income as a Percentage of Poverty Guidelines									
No Income	6,221	8,310	7,945	6,887		75	78	90	
1 to 50 percent	11,718	9,816	12,137	10,897		119	97	108	
51 to 100 percent	16,808	19,410	22,343	22,911		87	75	73	
101 percent or more	5,946	14,624	13,721	13,717		41	43	43	
Benefit as a percentage of maximum benefit									
low benefits (1 to 50 percent of max)	7,834	15,852	17,594	19,066		49	45	41	
high benefits (51 to 99 percent of max)	18,898	20,863	22,808	20,958		91	83	90	
51 to 75 percent	8,806	11,614	12,157	11,430		76	72	77	
76 to 99 percent	10,092	9,249	10,652	9,528		109	95	106	
maximum benefit	13,962	15,445	15,743	14,388		90	89	97	

Table A.1: National Estimates (continued)

		Eligible				Participation Rate (Participants/Eligibles)			
		CPS		SIPP	ACS	CPS		SIPP	ACS
Individual Characteristic	Participating	MATH	TRIM3	MATH	ATTIS	MATH	TRIM3	MATH	ATTIS
2011 Including State Broad Based Categorical Eligibility (BBCE)									
All Individuals	44,087	76,285	70,474	72,893		58	63	60	
Age									
Children (17 or younger)	19,891	24,196	23,928	26,617		82	83	75	
Pre-school age (0-4)	6,767	7,588	7,395	7,809		89	92	87	
School-age (5-17)	13,124	16,608	16,533	18,808		79	79	70	
Nonelderly adults (18 to 59)	20,430	32,517	31,950	32,303		63	64	63	
Elderly Individuals (60+)	3,765	19,571	14,596	13,973		19	26	27	
Adults age 18 to 49 without disabilities in childless households	4,491	7,146	9,307	7,243		63	48	62	
Noncitizens	1,758	4,001	3,238	5,080		44	54	35	
Citizen children living with noncitizen adults	3,731	5,776	6,359	3,630		65	59	103	
Case size									
1 or 2 people	18,348	37,786	36,136	34,268		49	51	54	
1 person	10,118	15,700	20,254	18,300		64	50	55	
2 people	8,230	22,086	15,882	15,968		37	52	52	
3 people	8,902	12,570	11,159	11,715		71	80	76	
4 or more people	16,837	25,929	23,179	26,911		65	73	63	
Case countable income sources									
No Earned income	25,874	39,296	37,625	35,717		66	69	72	
Earned income	18,213	36,990	32,849	37,177		49	55	49	
TANF	4,700	5,268	5,579	5,132		89	84	92	
SSI	7,684	10,441	9,631	9,744		74	80	79	
Social Security	7,393	22,242	17,607	19,105		33	42	39	
Countable Income as a Percentage of Poverty Guidelines									
No Income	6,529	9,196	8,034	7,167		71	81	91	
1 to 50 percent	12,203	11,436	12,942	12,294		107	94	99	
51 to 100 percent	17,450	21,940	23,383	25,016		80	75	70	
101 percent or more	7,905	33,713	26,115	28,416		23	30	28	
Benefit as a percentage of maximum benefit									
low benefits (1 to 50 percent of max)	9,701	34,373	29,958	33,486		28	32	29	
high benefits (51 to 99 percent of max)	19,756	24,098	23,956	23,152		82	82	85	
51 to 75 percent	9,246	13,543	12,816	12,816		68	72	72	
76 to 99 percent	10,510	10,555	11,140	10,336		100	94	102	
maximum benefit	14,630	17,814	16,560	16,255		82	88	90	

Subgroups defined based on "Trends in Supplemental Nutrition Assistance Program Participation rates: Fiscal Year 2010 to Fiscal Year 2016"

Source: Developed from eligibility estimates from the MATH CPS-Eligibility model, MATH SIPP+ model, TRIM3, and ATTIS combined with participation estimates based on SNAP QC data, as processed by Mathematica

Table A.2: National Estimated SNAP Case Participation Rates in 2011 and 2016
By Data Source, Model, and Whether Estimate Includes State Broad Based Categorical Eligibility (BBCE)
(Numbers in thousands)

		Eligible				Participation Rate (Participants/Eligibles)			
		CPS		SIPP	ACS	CPS		SIPP	ACS
Case Characteristic	Participating	MATH	TRIM3	MATH	ATTIS	MATH	TRIM3	MATH	ATTIS
2016 (Federal Rules)									
All Cases	19,556	21,982	26,159		29,509	89	75		66
Case composition									
Children (17 or younger)	8,524	8,183	8,527		9,402	104	100		91
Single-adult	5,106	3,832	3,971		4,680	133	129		109
Married-head	1,443	2,319	2,277		2,359	62	63		61
Other	1,976	2,031	2,279		2,363	97	87		84
Multiple-Adult	932	1,259	1,047		1,020	74	89		91
Child Only	1,044	772	1,231		1,343	135	85		78
No Children	11,032	13,799	17,632		20,107	80	63		55
Cases Containing									
Elderly individuals	4,057	8,532	8,999		9,458	48	45		43
Non-elderly individuals with disabilities	4,172	4,486	4,467		4,358	93	93		96
Adults age 18 to 49 without disabilities in childless households	3,187	2,771	4,469		5,913	115	71		54
Noncitizens	1,195	2,032	1,900		1,933	59	63		62
Case countable income source									
Earned Income	6,005	7,898	9,057		11,442	76	66		52
TANF	1,026	1,272	1,192		1,178	81	86		87
SSI	4,546	4,439	4,843		4,794	102	94		95
Social Security	5,070	7,187	7,805		8,825	71	65		57
Countable Income as a Percentage of Poverty Guidelines									
No Income	4,056	3,448	4,083		5,017	118	99		81
1 to 50 percent	4,074	3,307	4,300		4,488	123	95		91
51 to 100 percent	8,710	8,713	11,348		12,086	100	77		72
101 percent or more	2,716	6,514	6,428		7,919	42	42		34

Table A.2: National Estimates (continued)

		Eligible				Participation Rate (Participants/Eligibles)			
		CPS		SIPP	ACS	CPS		SIPP	ACS
Case Characteristic	Participating	MATH	TRIM3	MATH	ATTIS	MATH	TRIM3	MATH	ATTIS
2016 Including State Broad Based Categorical Eligibility (BBCE)									
All Cases	21,483	34,011	35,197		37,179	63	61		58
Case composition									
Children (17 or younger)	9,209	10,292	10,212		10,872	89	90		85
Single-adult	5,492	4,588	4,653		5,313	120	118		103
Married-head	1,593	3,266	2,862		2,872	49	56		55
Other	2,123	2,438	2,697		2,688	87	79		79
Multiple-Adult	1,008	1,532	1,194		1,165	66	84		87
Child Only	1,115	906	1,503		1,523	123	74		73
No Children	12,274	23,718	24,985		26,307	52	49		47
Cases Containing									
Elderly individuals	4,676	16,605	14,087		13,342	28	33		35
Non-elderly individuals with disabilities	4,366	5,437	5,059		4,759	80	86		92
Adults age 18 to 49 without disabilities in childless households	3,524	4,218	5,895		7,438	84	60		47
Noncitizens	1,341	2,769	2,442		2,347	48	55		57
Case countable income source									
Earned Income	6,865	12,912	12,797		15,114	53	54		45
TANF	1,036	1,286	1,230		1,210	81	84		86
SSI	4,584	4,645	5,037		4,917	99	91		93
Social Security	5,709	13,918	12,731		12,619	41	45		45
Countable Income as a Percentage of Poverty Guidelines									
No Income	4,389	3,802	4,113		5,061	115	107		87
1 to 50 percent	4,250	4,153	4,842		4,741	102	88		90
51 to 100 percent	8,990	9,671	11,887		12,427	93	76		72
101 percent or more	3,853	16,384	14,354		14,950	24	27		26

Table A.2: National Estimates (continued)

		Eligible				Participation Rate (Participants/Eligibles)			
		CPS		SIPP	ACS	CPS		SIPP	ACS
Case Characteristic	Participating	MATH	TRIM3	MATH	ATTIS	MATH	TRIM3	MATH	ATTIS
2011 (Federal Rules)									
All Cases	19,221	23,495	28,680	25,916		82	67	74	
Case composition									
Children (17 or younger)	9,047	9,325	10,102	10,800		97	90	84	
Single-adult	5,227	4,187	4,569	5,277		125	114	99	
Married-head	1,675	2,831	2,764	272		59	61	616	
Other	2,145	2,307	2,769	5,250		93	77	41	
Multiple-Adult	1,094	1,534	1,225	3,978		71	89	28	
Child Only	1,051	773	1,544	1,272		136	68	83	
No Children	10,175	14,170	18,578	15,117		72	55	67	
Cases Containing									
Elderly individuals	3,108	7,666	7,861	6,852		41	40	45	
Non-elderly individuals with disabilities	4,051	4,825	4,880	4,505		84	83	90	
Adults age 18 to 49 without disabilities in childless households	3,773	3,777	6,153	4,775		100	61	79	
Noncitizens	1,107	2,161	1,897	2,855		51	58	39	
Case countable income source									
Earned Income	5,593	8,113	9,756	9,890		69	57	57	
TANF	1,536	1,485	1,769	1,637		103	87	94	
SSI	4,180	4,504	4,855	4,625		93	86	90	
Social Security	4,250	7,076	7,553	7,637		60	56	56	
Countable Income as a Percentage of Poverty Guidelines									
No Income	3,940	4,327	5,334	3,873		91	74	102	
1 to 50 percent	4,514	3,447	4,871	4,145		131	93	109	
51 to 100 percent	8,188	8,920	11,424	11,050		92	72	74	
101 percent or more	2,579	6,802	7,050	6,848		38	37	38	

Table A.2: National Estimates (continued)

Case Characteristic	Participating	Eligible				Participation Rate (Participants/Eligibles)			
		CPS		SIPP	ACS	CPS		SIPP	ACS
		MATH	TRIM3	MATH	ATTIS	MATH	TRIM3	MATH	ATTIS
2011 Including State Broad Based Categorical Eligibility (BBCE)									
All Cases	20,782	35,793	36,574	35,827		58	57	58	
Case composition									
Children (17 or younger)	9,788	11,759	11,749	13,097		83	83	75	
Single-adult	5,587	4,953	5,169	6,051		113	108	92	
Married-head	1,870	4,006	3,462	348		47	54	537	
Other	2,331	2,801	3,117	6,698		83	75	35	
Multiple-Adult	1,200	1,917	1,413	5,289		63	85	23	
Child Only	1,131	884	1,705	1,409		128	66	80	
No Children	10,993	24,034	24,825	22,730		46	44	48	
Cases Containing									
Elderly individuals	3,422	15,593	12,218	11,923		22	28	29	
Non-elderly individuals with disabilities	4,198	5,886	5,504	5,168		71	76	81	
Adults age 18 to 49 without disabilities in childless households	4,088	5,411	7,326	6,364		76	56	64	
Noncitizens	1,211	2,803	2,252	3,551		43	54	34	
Case countable income source									
Earned Income	6,356	13,214	12,781	14,018		48	50	45	
TANF	1,546	1,533	1,818	1,678		101	85	92	
SSI	4,195	4,819	5,073	4,871		87	83	86	
Social Security	4,657	13,770	11,907	12,635		34	39	37	
Countable Income as a Percentage of Poverty Guidelines									
No Income	4,148	4,769	5,390	4,066		87	77	102	
1 to 50 percent	4,710	4,233	5,333	4,922		111	88	96	
51 to 100 percent	8,466	10,001	11,910	11,994		85	71	71	
101 percent or more	3,458	16,790	13,941	14,845		21	25	23	

Subgroups defined based on "Trends in Supplemental Nutrition Assistance Program Participation rates: Fiscal Year 2010 to Fiscal Year 2016"

Source: Developed from eligibility estimates from the MATH CPS-Eligibility model, MATH SIPP+ model, TRIM3, and ATTIS combined with participation estimates based on SNAP QC data, as processed by Mathematica

Table A.3: Estimated State-Level SNAP Individual Participation Rates for Illinois in 2016
By Data Source, Model, and Whether Estimate Includes State Broad Based Categorical Eligibility (BBCE)
(Numbers in thousands)

sample size < 50

		Eligible			Participation Rate (Participants/Eligibles)		
		CPS		ACS	CPS		ACS
Individual Characteristic	Participating	MATH	TRIM3	ATTIS	MATH	TRIM3	ATTIS
2016 (Federal Rules)							
All Individuals	1,745	1,698	1,865	2,120	103	94	82
Age							
Children (17 or younger)	737	648	717	742	114	103	99
Nonelderly adults (18 to 59)	835	714	808	961	117	103	87
Elderly Individuals (60+)	174	335	340	417	52	51	42
Adults age 18 to 49 without disabilities in childless households	207	129	260	298	160	80	70
Case size							
1 person	500	402	560	684	124	89	73
2 or more people	1,245	1,296	1,305	1,436	96	95	87
Case earned income status							
No Earned income	1,006	754	816	992	133	123	101
Earned income	739	944	1,049	1,128	78	70	66
Countable Income as a Percentage of Poverty Guidelines							
No Income	372	216	209	304	172	178	122
1 to 50 percent	428	312	392	384	137	109	111
51 to 100 percent	755	652	791	858	116	95	88
101 percent or more	190	517	472	573	37	40	33
Benefit as a percentage of maximum benefit							
low benefits (1 to 50 percent of max)	355	672	699	854	53	51	42
high benefits (51 to 99 percent of max)	826	642	659	652	129	125	127
maximum benefit	564	385	506	614	146	111	92

Table A.3: Illinois (continued)

		Eligible			Participation Rate (Participants/Eligibles)		
		CPS		ACS	CPS		ACS
Individual Characteristic	Participating	MATH	TRIM3	ATTIS	MATH	TRIM3	ATTIS
2016 Including State Broad Based Categorical Eligibility (BBCE)							
All Individuals	1,894	2,614	2,558	2,780	72	74	68
Age							
Children (17 or younger)	783	876	867	884	89	90	89
Nonelderly adults (18 to 59)	910	1,042	1,026	1,188	87	89	77
Elderly Individuals (60+)	201	696	666	708	29	30	28
Adults age 18 to 49 without disabilities in childless households	228	210	322	375	109	71	61
Case size							
1 person	553	661	800	907	84	69	61
2 or more people	1,341	1,953	1,758	1,873	69	76	72
Case earned income status							
No Earned income	1,086	1,204	1,134	1,301	90	96	83
Earned income	808	1,409	1,425	1,478	57	57	55
Countable Income as a Percentage of Poverty Guidelines							
No Income	402	262	209	304	153	192	132
1 to 50 percent	445	425	442	405	105	101	110
51 to 100 percent	794	781	848	886	102	94	90
101 percent or more	253	1,147	1,059	1,184	22	24	21
Benefit as a percentage of maximum benefit							
low benefits (1 to 50 percent of max)	426	1,313	1,301	1,467	32	33	29
high benefits (51 to 99 percent of max)	863	779	713	673	111	121	128
maximum benefit	605	523	544	640	116	111	95

Subgroups defined based on "Trends in Supplemental Nutrition Assistance Program Participation rates: Fiscal Year 2010 to Fiscal Year 2016"

Source: Developed from eligibility estimates from the MATH CPS-Eligibility model, MATH SIPP+ model, TRIM3, and ATTIS combined with participation estimates based on SNAP QC data, as processed by Mathematica

Table A.4: Estimated State-Level SNAP Case Participation Rates in Illinois in 2016
By Data Source, Model, and Whether Estimate Includes State Broad Based Categorical Eligibility (BBCE)
(Numbers in thousands)

sample size < 50

		Eligible			Participation Rate (Participants/Eligibles)		
		CPS		ACS	CPS		ACS
Case Characteristic	Participating	MATH	TRIM3	ATTIS	MATH	TRIM3	ATTIS
2016 (Federal Rules)							
All cases	902	785	953	1,140	115	95	79
Case composition							
Children (17 or younger)	366	282	310	357	130	118	102
Single-adult	224	129	150	180	174	149	124
Married-head	51	78	75	82	65	68	62
Other	91	75	85	95	121	108	95
Multiple-adult	39	47	37	40	83	104	98
Child Only	52	28	47	55	186	110	94
No Children	536	503	643	782	107	83	69
Adults age 18 to 49 without disabilities in childless households	195	102	208	234	191	94	83
Case earned income status							
No Earned income	628	470	567	686	134	111	92
Earned income	274	315	386	453	87	71	60
Countable Income as a Percentage of Poverty Guidelines							
No Income	248	106	135	206	234	183	120
1 to 50 percent	161	112	170	179	144	95	90
51 to 100 percent	391	333	411	459	117	95	85
101 percent or more	102	234	237	295	44	43	35

Table A.4: Illinois (continued)

Case Characteristic	Participating	Eligible			Participation Rate (Participants/Eligibles)		
		CPS		ACS	CPS		ACS
		MATH	TRIM3	ATTIS	MATH	TRIM3	ATTIS
2016 Including State Broad Based Categorical Eligibility (BBCE)							
All cases	987	1,264	1,366	1,526	78	72	65
Case composition							
Children (17 or younger)	390	386	390	427	101	100	91
Single-adult	236	164	189	208	144	125	114
Married-head	57	124	100	107	46	57	53
Other	97	99	101	113	98	96	86
Multiple-adult	42	67	46	46	63	90	92
Child Only	55	32	55	67	172	101	82
No Children	597	878	975	1,099	68	61	54
Adults age 18 to 49 without disabilities in childless households	214	158	254	285	135	84	75
Case earned income status							
No Earned income	687	789	816	916	87	84	75
Earned income	301	475	549	610	63	55	49
Countable Income as a Percentage of Poverty Guidelines							
No Income	269	127	135	207	212	199	130
1 to 50 percent	169	170	201	193	99	84	88
51 to 100 percent	410	397	441	474	103	93	87
101 percent or more	139	571	588	652	24	24	21

Subgroups defined based on "Trends in Supplemental Nutrition Assistance Program Participation rates: Fiscal Year 2010 to Fiscal Year 2016"

Source: Developed from eligibility estimates from the MATH CPS-Eligibility model, MATH SIPP+ model, TRIM3, and ATTIS combined with participation estimates based on SNAP QC data, as processed by Mathematica

Table A.5: Estimated State-Level SNAP Individual Participation Rates for Mississippi in 2016
By Data Source, Model, and Whether Estimate Includes State Broad Based Categorical Eligibility (BBCE)
(Numbers in thousands)

sample size < 50

		Eligible			Participation Rate (Participants/Eligibles)		
		CPS		ACS	CPS		ACS
Individual Characteristic	Participating	MATH	TRIM3	ATTIS	MATH	TRIM3	ATTIS
2016 (Federal Rules)							
All Individuals	562	724	708	747	78	79	75
Age							
Children (17 or younger)	253	256	260	259	99	97	98
Nonelderly adults (18 to 59)	260	313	320	355	83	81	73
Elderly Individuals (60+)	49	154	129	132	32	38	37
Adults age 18 to 49 without disabilities in childless households	43	41	54	86	105	79	50
Case size							
1 person	124	157	218	227	79	57	55
2 or more people	439	566	490	520	78	90	85
Case earned income status							
No Earned income	329	367	379	404	90	87	81
Earned income	233	357	330	342	65	71	68
Countable Income as a Percentage of Poverty Guidelines							
No Income	101	108	96	118	94	106	86
1 to 50 percent	135	127	152	140	106	89	96
51 to 100 percent	270	298	340	327	91	79	83
101 percent or more	56	190	121	161	29	46	35
Benefit as a percentage of maximum benefit							
low benefits (1 to 50 percent of max)	172	289	322	347	60	53	50
high benefits (51 to 99 percent of max)	234	253	222	208	92	105	112
maximum benefit	157	182	164	192	86	96	82

Table A.5: Mississippi (continued)

Individual Characteristic	Participating	Eligible			Participation Rate (Participants/Eligibles)		
		CPS		ACS	CPS		ACS
		MATH	TRIM3	ATTIS	MATH	TRIM3	ATTIS
2016 Including State Broad Based Categorical Eligibility (BBCE)							
All Individuals	579	819	730	757	71	79	76
Age							
Children (17 or younger)	260	283	265	261	92	98	100
Nonelderly adults (18 to 59)	268	350	329	358	77	81	75
Elderly Individuals (60+)	51	187	136	138	27	38	37
Adults age 18 to 49 without disabilities in childless households	45	45	54	86	100	83	52
Case size							
1 person	128	174	223	231	74	57	55
2 or more people	451	646	507	526	70	89	86
Case earned income status							
No Earned income	339	420	391	411	81	87	82
Earned income	240	399	338	346	60	71	69
Countable Income as a Percentage of Poverty Guidelines							
No Income	105	118	96	118	89	110	89
1 to 50 percent	138	144	159	143	96	87	97
51 to 100 percent	277	328	345	333	84	80	83
101 percent or more	58	229	130	164	25	45	35
Benefit as a percentage of maximum benefit							
low benefits (1 to 50 percent of max)	177	333	335	353	53	53	50
high benefits (51 to 99 percent of max)	239	283	227	211	84	105	113
maximum benefit	163	204	168	194	80	97	84

Subgroups defined based on "Trends in Supplemental Nutrition Assistance Program Participation rates: Fiscal Year 2010 to Fiscal Year 2016"

Source: Developed from eligibility estimates from the MATH CPS-Eligibility model, MATH SIPP+ model, TRIM3, and ATTIS combined with participation estimates based on SNAP QC data, as processed by Mathematica

Table A.6: Estimated State-Level SNAP Case Participation Rates in Mississippi in 2016
By Data Source, Model, and Whether Estimate Includes State Broad Based Categorical Eligibility (BBCE)
(Numbers in thousands)

sample size < 50

		Eligible			Participation Rate (Participants/Eligibles)		
		CPS		ACS	CPS		ACS
Case Characteristic	Participating	MATH	TRIM3	ATTIS	MATH	TRIM3	ATTIS
2016 (Federal Rules)							
All cases	259	330	367	390	78	71	66
Case composition							
Children (17 or younger)	123	120	126	127	103	98	97
Single-adult	84	59	65	81	142	129	103
Married-head	19	32	34	27	59	56	70
Other	20	29	27	18	69	75	109
Multiple-Adult	19	24	18	15	79	107	127
Child Only	1	5	9	3	20	11	29
No Children	137	210	241	264	65	57	52
Adults age 18 to 49 without disabilities in childless households	37	30	45	68	123	82	55
Case earned income status							
No Earned income	186	222	249	257	84	75	72
Earned income	73	108	118	134	68	62	55
Countable Income as a Percentage of Poverty Guidelines							
No Income	59	55	63	69	107	93	85
1 to 50 percent	43	38	53	55	113	80	78
51 to 100 percent	134	150	188	182	89	71	74
101 percent or more	23	87	63	84	26	37	27

Table A.6: Mississippi (continued)

Case Characteristic	Participating	Eligible			Participation Rate (Participants/Eligibles)		
		CPS		ACS	CPS		ACS
		MATH	TRIM3	ATTIS	MATH	TRIM3	ATTIS
2016 Including State Broad Based Categorical Eligibility (BBCE)							
All cases	268	372	378	397	72	71	68
Case composition							
Children (17 or younger)	126	132	129	128	95	98	99
Single-adult	86	63	67	82	137	128	105
Married-head	20	38	35	28	53	57	73
Other	20	30	27	18	67	74	108
Multiple-adult	19	25	18	15	76	107	127
Child only	1	5	9	3	20	11	29
No Children	142	240	250	269	59	57	53
Adults age 18 to 49 without disabilities in childless households	39	32	45	68	122	86	57
Case earned income status							
No Earned income	192	252	256	262	76	75	73
Earned income	75	120	122	135	63	61	56
Countable Income as a Percentage of Poverty Guidelines							
No Income	61	60	63	69	102	96	88
1 to 50 percent	44	45	59	57	98	75	78
51 to 100 percent	137	162	190	185	85	72	74
101 percent or more	25	104	66	86	24	38	29

Subgroups defined based on "Trends in Supplemental Nutrition Assistance Program Participation rates: Fiscal Year 2010 to Fiscal Year 2016"

Source: Developed from eligibility estimates from the MATH CPS-Eligibility model, MATH SIPP+ model, TRIM3, and ATTIS combined with participation estimates based on SNAP QC data, as processed by Mathematica

Table A.7: Estimated State-Level SNAP Individual Participation Rates for Tennessee in 2016
By Data Source, Model, and Whether Estimate Includes State Broad Based Categorical Eligibility (BBCE)
(Numbers in thousands)

sample size < 50

		Eligible			Participation Rate (Participants/Eligibles)		
		CPS		ACS	CPS		ACS
Individual Characteristic	Participating	MATH	TRIM3	ATTIS	MATH	TRIM3	ATTIS
2016 (Tennessee does not have BBCE so results reflect eligibility under federal rules)							
All Individuals	1,100	1,184	1,238	1,353	93	89	81
Age							
Children (17 or younger)	467	417	432	461	112	108	101
Nonelderly adults (18 to 59)	526	509	587	651	103	90	81
Elderly Individuals (60+)	107	257	219	241	42	49	44
Adults age 18 to 49 without disabilities in childless households	119	73	136	198	163	88	60
Case size							
1 person	294	261	399	422	113	74	70
2 or more people	806	923	840	932	87	96	87
Case earned income status							
No Earned income	691	652	699	695	106	99	99
Earned income	409	532	540	658	77	76	62
Countable Income as a Percentage of Poverty Guidelines							
No Income	257	165	205	199	156	125	129
1 to 50 percent	285	257	257	249	111	111	115
51 to 100 percent	444	434	535	583	102	83	76
101 percent or more	114	328	242	323	35	47	35
Benefit as a percentage of maximum benefit							
low benefits (1 to 50 percent of max)	291	439	532	617	66	55	47
high benefits (51 to 99 percent of max)	411	395	337	397	104	122	104
maximum benefit	399	350	370	339	114	108	118

Subgroups defined based on "Trends in Supplemental Nutrition Assistance Program Participation rates: Fiscal Year 2010 to Fiscal Year 2016"

Source: Developed from eligibility estimates from the MATH CPS-Eligibility model, MATH SIPP+ model, TRIM3, and ATTIS combined with participation estimates based on SNAP QC data, as processed by Mathematica

Table A.8: Estimated State-Level SNAP Case Participation Rates in Tennessee in 2016
By Data Source, Model, and Whether Estimate Includes State Broad Based Categorical Eligibility (BBCE)
(Numbers in thousands)

sample size < 50

		Eligible			Participation Rate (Participants/Eligibles)		
		CPS		ACS	CPS		ACS
Case Characteristic	Participating	MATH	TRIM3	ATTIS	MATH	TRIM3	ATTIS
2016 (Tennessee does not have BBCE so results reflect eligibility under federal rules)							
All cases	543	562	667	717	97	81	76
Case composition							
Children (17 or younger)	221	206	219	226	107	101	98
Single-adult	141	104	117	128	136	120	110
Married-head	40	55	51	53	73	78	75
Other	41	47	51	44	87	81	94
Multiple-adult	27	29	26	25	93	103	106
Child only	13	18	25	18	72	53	71
No Children	321	356	447	492	90	72	65
Adults age 18 to 49 without disabilities in childless households	111	53	115	156	209	96	71
Case earned income status							
No Earned income	399	375	454	455	106	88	88
Earned income	144	186	213	262	77	68	55
Countable Income as a Percentage of Poverty Guidelines							
No Income	159	86	125	131	185	127	122
1 to 50 percent	99	92	121	107	108	82	93
51 to 100 percent	227	223	293	305	102	78	74
101 percent or more	58	161	127	175	36	46	33

Subgroups defined based on "Trends in Supplemental Nutrition Assistance Program Participation rates: Fiscal Year 2010 to Fiscal Year 2016"

Source: Developed from eligibility estimates from the MATH CPS-Eligibility model, MATH SIPP+ model, TRIM3, and ATTIS combined with participation estimates based on SNAP QC data, as processed by Mathematica

Appendix B: CPS ASEC Interview Rate and Representation Analysis

List of Tables

Table B.1
Interview Status by Whether SNAP Case at Housing Unit Address, by State, 2016

		SNAP case at CPS address?	
	All CPS sampled housing units	Yes	No
Illinois			
N	1,900	200	1,700
Weighted (thousands)	5,108	600	4,508
Interview status			
Percentage distribution	100%	100%	100%
Interview	74%	82%	73%
Non interview: Type A	11%	12%	10%
Non interview: Type B/C	15%	6%	16%
Mississippi			
N	1,400	200	1,200
Weighted (thousands)	1,243	161	1,082
Interview status			
Percentage distribution	100%	100%	100%
Interview	67%	82%	65%
Non interview: Type A	12%	9%	12%
Non interview: Type B/C	21%	9%	23%
Tennessee			
N	1,400	250	1,100
Weighted (thousands)	2,780	459	2,321
Interview status			
Percentage distribution	100%	100%	100%
Interview	69%	75%	68%
Non interview: Type A	14%	19%	13%
Non interview: Type B/C	18%	6%	20%

Sources: Decision Demographics & Urban Institute tabulations of linked 2016 CPS ASEC and SNAP administrative data for Illinois, Mississippi, and Tennessee

Universe: Housing units in the basic March CPS sample (excluding Hispanic oversample)

DRB Delegated Authority Approval Number CBDRB-FY21-CES014-029 (Ns are rounded to meet disclosure avoidance requirements).

Table B.2
Interview Status and Whole Imputation by Whether SNAP Case at Household Address, by State, 2017

	CPS sampled households	SNAP case at CPS address?	
		Yes	No
N	2,200	350	1,900
Weighted (thousands)	3,338	519	2,818
Interview status			
Percentage distribution	100%	100%	100%
Interview, not whole impute	71%	79%	70%
Basic CPS interview, whole impute to ASEC	14%	7%	15%
Non-Interview: Type A	15%	14%	15%
		MISSISSIPPI	
N	1,100	150	950
Weighted (thousands)	985	136	850
Interview status			
Percentage distribution	100%	100%	100%
Interview, not whole impute	77%	86%	75%
Basic CPS interview, whole impute to ASEC	9%	6%	9%
Non-Interview: Type A	15%	8%	16%
		TENNESSEE	
N	1,200	200	950
Weighted (thousands)	2,352	383	1,969
Interview status			
Percentage distribution	100%	100%	100%
Interview, not whole impute	69%	77%	68%
Basic CPS interview, whole impute to ASEC	16%	7%	18%
Non-Interview: Type A	15%	16%	14%

Sources: Decision Demographics & Urban Institute tabulations of linked 2017 CPS ASEC and SNAP administrative data for Mississippi and Tennessee

Universe: Households in the basic March CPS sample (excluding Hispanic oversample). Excludes type B and type C non-interview housing units.

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(Ns are rounded to meet disclosure avoidance requirements).

Table B.3
Interview Status by SNAP Case Type, 2017[1]

	SNAP case type				
	Total[2]	At least one member 60+, without children	One adult with child(ren)	Multiple adults with child(ren)	One person case, age 18 to 59
N	450	70	100	70	150
Weighted (thousands)	668	95	187	103	245
Percentage distribution	100%	100%	100%	100%	100%
Interview, not whole impute	74%	75%	69%	83%	75%
Basic CPS Interview, whole impute to ASEC	8%	4%	11%	9%	4%
Non-interview: Type A	11%	16%	13%		10%
Non-interview: Type BC	7%	5%	6%		11%
Non-interview: Type ABC				9%	

Sources: Decision Demographics & Urban Institute tabulations of linked 2017 CPS ASEC and SNAP administrative data for Mississippi and Tennessee

Universe: Housing units in the basic March CPS sample (excluding Hispanic oversample) that match the address of a SNAP case. Addresses are matched by MAFID to preserve confidentiality.

[1]Bottom row combines cells to avoid disclosure.

[2]The total includes child only cases and cases with multiple adults without members younger than 18 or 60 or above, not shown separately.

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Table B.4
Share of SNAP Cases Represented in the Linked Data, by Case Type and Year

	Cases in SNAP administrative data (thousands)	Weighted SNAP cases in linked data (thousands)	Percentage of SNAP cases represented in linked data
2012			
Total	1,819	1,565	86%
At least one member 60+ without children	272	232	85%
Child only	62	44	71%
One adult with child(ren)	483	456	94%
Multiple adults with child(ren)	253	278	110%
One person case, age 18 to 59	663	501	76%
Multiple person case, all age 18 to 59	84	55	66%
2013			
Total	1,978	1,616	82%
At least one member 60+ without children	297	252	85%
Child only	68	54	79%
One adult with child(ren)	513	435	85%
Multiple adults with child(ren)	263	293	111%
One person case, age 18 to 59	747	504	68%
Multiple person case, all age 18 to 59	89	79	89%
2014			
Total	1,969	1,585	81%
At least one member 60+ without children	311	262	84%
Child only	67	46	69%
One adult with child(ren)	506	475	94%
Multiple adults with child(ren)	254	267	105%
One person case, age 18 to 59	743	474	64%
Multiple person case, all age 18 to 59	87	61	70%
2015			
Total	1,986	1,651	83%
At least one member 60+ without children	328	293	89%
Child only	69	53	77%
One adult with child(ren)	497	452	91%
Multiple adults with child(ren)	238	259	109%
One person case, age 18 to 59	770	527	68%
Multiple person case, all age 18 to 59	83	67	81%

Table B.4, continued

	Cases in SNAP administrative data (thousands)	Weighted SNAP cases in linked data (thousands)	Percentage of SNAP cases represented in linked data
2016			
Total	1,783	1,326	74%
At least one member 60+ without children	328	281	86%
Child only	63	40	64%
One adult with child(ren)	454	370	82%
Multiple adults with child(ren)	209	253	121%
One person case, age 18 to 59	661	322	49%
Multiple person case, all age 18 to 59	66	57	86%

Sources: Decision Demographics & Urban Institute tabulations of 2012–2016 linked CPS ASEC and SNAP administrative data for Illinois, Mississippi, and Tennessee

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Appendix C: Eligibility Analysis

List of Tables

Table C.1
ASEC Characteristics of SNAP Cases by TRIM3 Eligibility Status, by Year

	Eligible 1+ months	Ineligible in all months	Total
		2012	
N	600	200	800
Weighted total (in thousands)			1,564
TRIM3 unit and case match status			
Percentage distribution	100%	100%	100%
TRIM3 unit matches SNAP case	65%	23%	54%
Mismatch: at least one case member not in ASEC household	17%	22%	18%
Mismatch: all case members are in ASEC household	18%	55%	27%
Imputation			
No imputation	81%	60%	76%
Whole impute	7%	18%	10%
Not whole impute, any income item imputed	12%	22%	14%
		2013	
N	600	200	800
Weighted total (in thousands)			1,617
TRIM3 unit and case match status			
Percentage distribution	100%	100%	100%
TRIM3 unit matches SNAP case	67%	28%	58%
Mismatch: at least one case member not in ASEC household	14%	30%	18%
Mismatch: all case members are in ASEC household	19%	42%	24%
Imputation			
No imputation	77%	56%	72%
Whole impute	8%	15%	9%
Not whole impute, any income item imputed	15%	29%	18%

Table C.1, continued

	Eligible 1+ months	Ineligible in all months	Total
		2014	
N	600	200	800
Weighted total (in thousands)			1,586
TRIM3 unit and case match status			
Percentage distribution	100%	100%	100%
TRIM3 unit matches SNAP case	65%	28%	56%
Mismatch: at least one case member not in ASEC household	18%	31%	21%
Mismatch: all case members are in ASEC household	18%	41%	23%
Imputation			
No imputation	71%	44%	65%
Whole impute	8%	26%	12%
Not whole impute, any income item imputed	21%	30%	23%
		2015	
N	700	250	950
Weighted total (in thousands)			1,651
TRIM3 unit and case match status			
Percentage distribution	100%	100%	100%
TRIM3 unit matches SNAP case	65%	22%	53%
Mismatch: at least one case member not in ASEC household	17%	27%	20%
Mismatch: all case members are in ASEC household	17%	51%	27%
Imputation			
No imputation	66%	46%	61%
Whole impute	8%	28%	14%
Not whole impute, any income item imputed	25%	26%	26%

Table C.1, continued

	Eligible 1+ months	Ineligible in all months	Total
		2016	
N	600	200	800
Weighted total (in thousands)			1,326
TRIM3 unit and case match status			
Percentage distribution	100%	100%	100%
TRIM3 unit matches SNAP case	63%	31%	54%
Mismatch: at least one case member not in ASEC household	21%	28%	23%
Mismatch: all case members are in ASEC household	16%	41%	23%
Imputation			
No imputation	69%	33%	58%
Whole impute	9%	35%	17%
Not whole impute, any income item imputed	22%	32%	25%

Sources: Decision Demographics & Urban Institute tabulations of combined 2012–2016 linked CPS ASEC, TRIM3, and SNAP administrative data for Illinois, Mississippi, and Tennessee

Note: Cases identified as "No impute" correspond to a TRIM3 unit in which no member has imputation of the entire ASEC supplement ("Whole impute") or any income value ("Income item impute"). SNAP case status reflects the CPS ASEC survey month. TRIM3 simulated eligibility reflects eligibility in at least one month of the prior calendar year.

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Table C.2
ASEC Characteristics of SNAP Cases by TRIM3 Eligibility Status; Combined 2012 to 2016 data, by state

	Eligible 1+ months	Ineligible in all months	Total
		ILLINOIS	
N	1,300	450	1,700
Weighted total (in thousands)			3,665
Percentage distribution	100%	100%	100%
TRIM3 unit matches SNAP Case	61%	25%	51%
Mismatch: at least one case member not in ASEC household	17%	27%	20%
Mismatch: all case members are in ASEC household	22%	49%	29%
Imputation			
No imputation	69%	46%	63%
Whole impute	9%	25%	14%
Not whole impute, any income item imputed	21%	29%	24%
		MISSISSIPPI	
N	950	250	1,200
Weighted total (in thousands)			1,345
Percentage distribution	100%	100%	100%
TRIM3 unit matches SNAP Case	65%	25%	56%
Mismatch: at least one case member not in ASEC household	21%	25%	22%
Mismatch: all case members are in ASEC household	14%	50%	22%
Imputation			
No imputation	82%	62%	78%
Whole impute	3%	16%	6%
Not whole impute, any income item imputed	15%	22%	17%
		TENNESSEE	
N	850	300	1,200
Weighted total (in thousands)			2,732
Percentage distribution	100%	100%	100%
TRIM3 unit matches SNAP Case	71%	29%	60%
Mismatch: at least one case member not in ASEC household	15%	30%	19%
Mismatch: all case members are in ASEC household	14%	41%	21%
Imputation			
No imputation	73%	45%	66%
Whole impute	9%	27%	14%
Not whole impute, any income item imputed	18%	28%	20%

Sources: Decision Demographics & Urban Institute tabulations of combined 2012–2016 linked CPS ASEC, TRIM3, and SNAP administrative data for Illinois, Mississippi, and Tennessee

Note: Cases identified as “No impute” correspond to a TRIM3 unit in which no member has imputation of the entire ASEC supplement (“Whole impute”) or any income value (“Income item impute”). SNAP case status reflects the CPS ASEC survey month. TRIM3 simulated eligibility reflects eligibility in at least one month of the prior calendar year.

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Table C.3
Percentage of SNAP Case Members in State Ad Rec Data that appear to be Non-participating Based on State Codes

	Percentage of SNAP case members that are non-participating		
	Illinois	Mississippi	Tennessee
2012	0.0	1.5	*suppressed*
2013	0.0	3.3	0.6
2014	0.0	2.5	*suppressed*
2015	0.0	2.8	0.6
2016	0.0	3.2	*suppressed*
2017	na	3.3	0.9

Sources: Decision Demographics & Urban Institute tabulations of 2012–2017 State SNAP administrative data

Universe: SNAP administrative case persons in Illinois, Mississippi, and Tennessee

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