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Comparing National Household Food Acquisition and Purchase Survey (FoodAPS) Data With Other National Food Surveys' Data

Marie Clay, Michele Ver Ploeg, Alisha Coleman-Jensen, Howard Elitzak, Christian Gregory, David Levin, Constance Newman, and Matthew P. Rabbitt

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Abstract

The U.S. Department of Agriculture's (USDA) National Household Food Acquisition and Purchase Survey (FoodAPS) is the first nationally representative household survey to collect data on foods purchased or acquired during a survey week, producing results that are both nationally representative and representative of Supplemental Nutrition Assistance Program (SNAP) participants as well as of low-income non-SNAP households. In order to assess the quality of FoodAPS data, this report compares estimates from FoodAPS to estimates from other national-level food-related surveys, examining: (1) general demographic and socio-economic characteristics; (2) food expenditures; (3) food security; (4) SNAP participation and income; and (5) diet behavior and health. FoodAPS estimates of total, food-at-home (FAH) spending are greater than estimates from the Consumer Expenditure Survey (CE) but less than those from the National Health and Nutrition Examination Survey (NHANES). Compared to other national-level surveys, FoodAPS estimates a greater share of households with low or very low food security.

Keywords: National Household Food Acquisition and Purchase Survey, food expenditures, SNAP participation

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Contents

Summary iii

Motivation 1

Data and Methods 4

FoodAPS 4

Food Spending 4

Food Security 7

SNAP Participation and Household Income 7

Diet and Health 8

Current Population Survey Annual Social and Economic Supplement 8

Current Population Survey-Food Security Supplement 8

Consumer Expenditure Survey 9

IRI Consumer Network Panel 9

National Health and Nutrition Examination Survey 11

National Health Interview Survey 12

The Survey of Income and Program Participation 13

Results 14

General Demographic Population Characteristics 14

Food Spending 16

Food Security Status 23

SNAP Participation and Income Status and Characteristics of SNAP Participants 23

Diet and Health 27

Conclusions 31

References 32

Glossary 33

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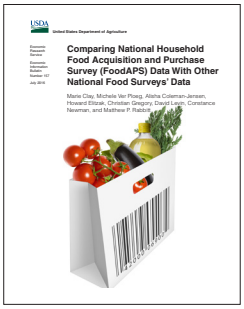

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What Is the Issue?

USDA's National Household Food Acquisition and Purchase Survey (FoodAPS) is the first nationally representative survey to collect detailed and comprehensive information about household food purchases and acquisitions for a full week for everyone in the surveyed household. The survey also collects information on household food security, income and employment, and diet- and health-related behaviors and status. Although several other national surveys separately collect information on these key variables, no other nationally representative survey contains all of this information. This report compares several key FoodAPS estimates to those from other national-level surveys, including: (1) food spending; (2) food security; (3) food assistance program participation and income; (4) dietary knowledge and preferences; and (5) body mass index and general health, as well as sociodemographic information.

What Did the Study Find?

Total food spending and food-at-home (FAH) spending estimates from FoodAPS exceed estimates from the Consumer Expenditure Survey (CE) by the Bureau of Labor Statistics that uses a similar diary-style recording method. But the FoodAPS estimates are below those based on respondents' recalling food spending in the past month, as in USDA's National Health and Nutrition Examination Survey (NHANES).

- FoodAPS estimate of total weekly food spending is $124.03 compared with $117.34 from the CE survey, or about a 5-percent difference. The CE is the primary national data set for consumer spending estimates and uses a similar 7-day purchase-recording method to measure food spending. This difference is mostly the result of greater FAH spending estimates from FoodAPS, which are 9 percent greater than CE estimates. The difference may reflect the explicit attempt by FoodAPS to obtain data on food spending from all sources and for all household members, using multiple reporting methods to collect purchase information. FAFH spending estimates are similar for the two surveys.

- Compared with estimates of FAH spending from the Information Resources Consumer Network Panel (IRI)—a proprietary data source that also uses a diary-style collection—FoodAPS captures about 26 percent more FAH spending.

ERS is a primary source of economic research and analysis from the U.S. Department of Agriculture, providing timely information on economic and policy issues related to agriculture, food, the environment, and rural America.

- FoodAPS estimates of total food spending are 23 percent lower than those reported by respondents of the NHANES. This difference may be partially due to larger household sizes in NHANES relative to FoodAPS and to different methods for obtaining data on food spending.

Almost 16 percent of FoodAPS households reported experiencing low or very low food security in the past 30 days compared with 11 percent reported in the National Health Interview Survey (NHIS) by the Centers for Disease Control and Prevention, and 8 percent in the Current Population Survey Food Security Supplement (CPS-FSS). One reason for these results may be that FoodAPS respondents have heightened attention to food hardship after participating in this food-centered survey for 1 week.

Estimates of Supplemental Nutrition Assistance Program (SNAP) participation in FoodAPS are similar to estimates from the Census Bureau's Survey of Income and Program Participation (SIPP). There are also some differences in the estimates of SNAP households' total income and income from specific sources in FoodAPS compared with SIPP, but these differences are partially explained by the definition of the household used in FoodAPS (all people in the household who live together and share food during the survey week) compared with SIPP (where household members that are within each SNAP unit are specifically identified).

Average self-reported weight and height measures from FoodAPS are similar to those from the NHANES, which are obtained by actual measurement of weight and height by trained medical professionals. FoodAPS respondents are more likely to be overweight than NHANES respondents (31 percent compared with 25 percent).

How Was the Study Conducted?

FoodAPS is a nationally representative survey of noninstitutionalized households in the contiguous United States, as well as four subpopulations: (1) SNAP participants; (2) nonparticipants with incomes less than the Federal poverty threshold (FPL), which varies by household size and family size; (3) nonparticipants with incomes between 100 and 185 percent of FPL, and (4) nonparticipants with incomes greater than or equal to 185 percent of FPL. FoodAPS contains data on FAH and FAFH purchases and foods acquired for free. It collects item expenditure and quantity data and includes rich data about the sampled households. A total of 4,826 households, comprising 14,317 individuals, participated. Data were collected from April 2012 to January 2013.

For this report, FoodAPS weekly food spending estimates are compared with estimates from the CE, NHANES, and IRI. Household food security estimates are compared with estimates from the CPS-FSS and from the NHIS using the 10-item U.S. Adult Food Security Survey Module to assess household food security status in the last 30 days. SNAP participation and income estimates are compared with estimates from the Survey of Income and Program Participation (SIPP). Data from NHANES are also used to compare dietary behavior and knowledge, body mass index, and general health measures. General demographic characteristics reported in the FoodAPS sample are compared with estimates from the Current Population Survey Annual Social and Economic Supplement (CPS-ASEC). Comparisons are made for continuous variables using weighted estimates of sample means and standard errors in t-tests. Categorical variables are also compared using χ^2 tests. Key sample and question design differences between estimates are highlighted as caveats to comparability.

Comparing National Household Food Acquisition and Purchase Survey (FoodAPS) Data With Other National Food Surveys' Data

Motivation

In 2012, the U.S. Department of Agriculture (USDA) conducted a survey to obtain detailed information on the food purchases and acquisitions of American households. This study, the National Household Food Acquisition and Purchase Survey (FoodAPS), was jointly sponsored by the Economic Research Service (ERS) and the Food and Nutrition Service (FNS) and conducted by Mathematica Policy Research, Inc. The study is in response to intense interest in the food purchase and acquisition patterns of participants of the Supplemental Nutrition Assistance Program (SNAP) and their low-income counterparts who do not participant in SNAP.

FoodAPS collected detailed information about household food acquisitions from all sources for both at-home and away-from-home food consumption by all household members over the course of 7 days. A total of 4,826 households completed the survey. The primary respondent (PR) for each household—the main food shopper or meal planner—provided information about the household and individuals in the household through two in-person interviews. These interviews collected demographic and other information about the household related to food purchases, economic well-being, and diet and health.

Research questions that the survey was designed to address include:

- How do economic factors (such as prices and income) and demographic characteristics impact household food purchase decisions and the nutritional quality of food acquisitions?
- What is the influence of nutrition knowledge on food purchases and household food security?
- How does participation in food and nutrition assistance programs influence food purchases and household food security?
- How do economic and demographic factors as well as food and nutrition assistance programs influence the ability of low-income households to consistently access sufficient food for active, healthy living?
- How do access and retail outlet choice and location influence food purchases and the resulting nutritional quality of food acquisitions?

FoodAPS has design and study features that were chosen to address these questions and, in doing so, fill gaps in data left by other national-level datasets. First, the survey is designed to be nationally representative of SNAP-participating households as well as nonparticipating households from three income groups—those households with income below the Federal poverty threshold, those with income at or above the poverty threshold but below 185 percent of poverty, and those with income

at or above 185 percent of poverty. Data on food spending and food shopping are available from the CE survey and from proprietary retail scanner data; however, neither of these sources is representative of SNAP participants or other low-income groups. FoodAPS also collected information on food acquired from nonretail sources such as schools, food pantries, friends, family, churches, home gardens, or through hunting and fishing. To measure how food spending and food demand may be related to key health and well-being outcomes, FoodAPS collected food security information for the household, as well as information on nutrition knowledge, diet-related shopping and consumption practices, height and weight of household members, and general health status information.

The purpose of this report is to compare estimates of interest from the FoodAPS to those from other national-level surveys. These comparisons are undertaken to better understand the quality of the FoodAPS data in relation to other data and vice versa, as FoodAPS contains many features that fill gaps in other datasets.

We focus on five general types of outcomes of interest:

- General demographic and socio-economic characteristics
- Food expenditures
- Food security
- SNAP participation and income
- Diet behavior and health

Since no national-level dataset covers all the outcomes of interest, multiple datasets are used to compare with FoodAPS. These survey comparisons are summarized in the box, "Key Differences in Measures and Collection Methods of Survey Estimates." We first compare the general demographic characteristics of the FoodAPS sample with estimates from the Current Population Survey Annual Social and Economic Supplement (CPS-ASEC), conducted by the U.S. Census Bureau. FoodAPS weekly food spending estimates are compared to estimates from the CE, National Health and Nutrition Examination Survey (NHANES), and IRI Consumer Network Panel (IRI). Estimates of household food security from FoodAPS are compared with estimates from the CPS Food Security Supplement (CPS-FSS) and to estimates from the National Health Interview Survey (NHIS). SNAP participation, income, and employment estimates from FoodAPS are compared with estimates from the Survey of Income and Program Participation (SIPP). Dietary behavior and knowledge, body mass index, and general health measures from the NHANES are used to compare with similar estimates from FoodAPS.

Key Differences in Measures and Collection Methods of Survey Estimates

Total Food Expenditures

National Household Food Acquisition and Purchase Survey (FoodAPS): 7-day recording of all foods purchased or acquired

Consumer Expenditure Survey (CE): 7-day diary recording of foods purchased; prompts given for categories of foods

Information Resources, Inc. (IRI): Subset of static panel of respondents with positive random-weight-item purchases using universal product code (UPC) scans and random-weight-food products purchased on shopping trip

National Health and Nutrition Examination Survey (NHANES): Set of seven questions on food spending based on past 30-day recall; prompts to capture spending at specific types of retailers and to exclude nonfood spending

Food Security

FoodAPS: Adult 30-day survey

Current Population Survey-Food Security Supplement (CPS-FSS): Adult 30-day survey, only asked of respondents who experienced some form of food insecurity during the last 12 months

National Health Interview Survey (NHIS): Adult 30-day survey

Income

FoodAPS: Primary respondent (PR) reports income from six different sources for all household members aged 16(+) years old

Survey of Income and Program Participation (SIPP): Current monthly income from six sources for all household members aged 15(+) years old (but only 16(+) years old used here for comparability)

Monthly Supplemental Nutrition Assistance Program (SNAP) Benefit Level

FoodAPS: PR reports for the household; participants matched to SNAP administrative records with consent from respondent

SIPP: Survey of Income and Program Participation, U.S. Census Bureau total aggregated household income received from SNAP and categorized by both definitions of SIPP households (SNAP unit and broad-based unit)

Employment Status of Individuals, age 16+ in SNAP-Participating Households

FoodAPS: Employment status of individuals reported by the PR for the past 7 days

SIPP: Weekly labor force data are collected at the individual level and compiled to determine monthly employment status

Health Status and Body Weight Measures

FoodAPS: Height, weight, and body mass index (BMI) were reported by the primary respondent for all household members aged 2(+) years old

NHANES: Height, weight, and BMI for sample persons aged 2(+) years old were measured by trained health technicians in a mobile examination center

Source: USDA, Economic Research Service.

Data and Methods

Detailed information about the methods used to collect key FoodAPS data is given here. Comparison datasets are briefly summarized here and in table 1. The reference periods used and variables reported were chosen to match as closely as possible to the FoodAPS variables. Important differences between each dataset and the FoodAPS survey and the methods used to make estimates more comparable also are given. Table 2 shows the source surveys for each variable used to compare with FoodAPS data.

FoodAPS

The FoodAPS survey used a multistage sample design with oversampling of SNAP and other low-income households. A stratified sample of 50 primary sampling units (PSUs), defined as counties or groups of contiguous counties, was selected using probability proportional to size (PPS) selection. Within each of the 50 sampled PSUs, 8 secondary sampling units (SSUs) comprised of a census block group or a group of contiguous block groups, were selected. Sampled addresses within these SSUs were then screened to determine if the household was eligible to participate. Data were collected from April 2012 to January 2013.

The household is the main unit of analysis in FoodAPS, where a household includes all persons who live together and share food and who were present for the week of the survey. This household definition differs somewhat from the definitions used in other surveys, as noted when each survey is described herein. Some FoodAPS data such as employment, height and weight, and diet-related information were also collected and reported for individuals within the household.

Food Spending

Numerous reminders and prompts were used in FoodAPS to capture all food purchases and acquisitions during the survey week. The PR was asked to complete two in-person interviews and to call the study's telephone center for three brief telephone interviews regarding food acquisition events over the course of 7 days. Each household member age 11 years old and older was asked to track and report all food acquisitions in specially prepared booklets. When filling out food books, participants were asked to distinguish between "food and drinks brought into the home" (FAH) and "meals, snacks, and drinks obtained outside the home" (FAFH). It may be ambiguous how some respondents classify items into these two categories. For example, "takeout" items purchased from restaurants and brought back home to eat may be classified as FAH items even though they were prepared at a restaurant. Or, a candy bar or soda purchased at a grocery store may be classified as FAFH if the respondent consumed it immediately. The PR and other adult food books included pages to report details for both FAH and FAFH acquisitions. Youths aged 11 to 17 years old were asked to report FAFH acquisitions. The PR was responsible for recording food acquisitions by members under 11 years old.

Acquisition event details include location, date, and payment types. Food item details were obtained by asking households to scan barcodes on packaged foods and save their receipts from stores and restaurants. For FAH items that could not be scanned, such as variable-weight items purchased by the unit or pound (e.g., a head of lettuce or individual apples), respondents were asked to scan barcodes from a specially designed food barcode book. If the food was not listed, respondents

Table 1

Summary of surveys selected for comparison

	FoodAPS	CPS-ASEC	CPS-FSS	CE	IRI Consumer Network Panel	NHIS	SIPP	NHANES
Sampled population	U.S. civilian noninstitutionalized population residing in the contiguous United States	U.S. civilian noninstitutionalized population residing in the contiguous United States	U.S. civilian noninstitutionalized population residing in the contiguous United States	U.S. civilian noninstitutionalized population at the national and regional levels	Households (HH) selected to demographically represent the most recent U.S. census	U.S. civilian noninstitutionalized population residing in the contiguous United States	U.S. civilian noninstitutionalized population residing in the contiguous United States	U.S. civilian noninstitutionalized population residing in the contiguous United States
Subsampled population	Oversamples SNAP recipients and other low-income HH	Oversamples small States and Hispanics (sometimes it oversamples Blacks)				Oversamples Blacks and Hispanics		Oversamples many groups[1]
Unit of observation	Household	Household	Household	Consumer unit	Household	Individual	Household	Individual
Sample size	4,826	72,720	43,942	7,500	28,000	108,131	21,000; now 42,000	5,000/year (released every 2 years together)
Dates data covers	4/2012-1/2013	Mar-12	Dec-12	2012	2012	2012	Apr-12	2009-2010, 2011-2012
Data structure	Cross-section	Cross-section	Cross-section	Cross-section	Panel	Repeated cross-section	Panel	Cross-section
Sample selection method	Multistage sample design	2-stage sample design	2-stage sample design	Multistage sample design	Sample recruitment	Multistage probability sample survey conducted annually	PSUs sampled without replacement; complex sampling design	Complex sampling design
Sample weights	HH weights	HH and person weights	HH and person weights	Consumer unit weights	Provides projection factor for HHs (to the total U.S. population)	HH, individual and mortality, and supplemental weights	Individual- and HH-level weights	Individual-level weights
Source agency	USDA FNS and ERS	Census Bureau supported by BLS	Census Bureau supported by BLS	BLS	Information Resources, Inc.	Census Bureau for NCHS	Census Bureau	USDA/DHHS
Year survey started	2012	1940	1940	1888	1995	1957	1983	1959

[1]NHANES oversamples: Blacks, Mexican Americans, low-income Whites (beginning in 2000), adolescents aged 12-19 years, persons aged 60+ years, other subgroups over the years.

FoodAPS = National Household Food Acquisition and Purchase Survey; CPS-ASEC = Current Population Survey-Annual Social and Economic Supplement; CPS-FSS = Current Population Survey-Food Security Supplement; CE = Consumer Expenditure Survey; HH = Household; IRI = Information Resources, Inc.; NHIS = National Health Interview Survey; SIPP = Survey of Income and Program Participation; NHANES = National Health and Nutrition Examination Survey; SNAP = Supplemental Nutrition Assistance Program; consumer unit = unit of observation for the Consumer Expenditure Survey; PSU = primary sampling unit. FNS = Food and Nutrition Service; BLS = Bureau of Labor Statistics; NCHS = National Center for Health Statistics; DHHS = Department of Health and Human Services.

Source: USDA, Economic Research Service.

Table 2

Data sources for outcome measure estimates

Outcome	FoodAPS	CPS-ASEC	CPS-FSS	CE	IRI Consumer Network Panel	NHIS	NHANES	SIPP
General demographic characteristics	✓	✓						
Total food expenditures:	✓			✓			✓	
Food at home	✓			✓	✓		✓	
Food away from home	✓			✓			✓	
Food security	✓		✓			✓		
Food sufficiency	✓		✓					
SNAP participation	✓							✓
Income	✓							✓
Monthly SNAP benefit level	✓							✓
Presence and number of children (<18)/elderly (60+) in SNAP households	✓							✓
Employment status of individuals, age 16+ in SNAP households	✓							✓
Diet and health behavior	✓						✓	
Food allergies and restrictions of individuals in samples	✓						✓	
Nutrition information knowledge and behavior (household reference person)	✓						✓	
Health status and body weight measures	✓						✓	

FoodAPS = National Household Food Acquisition and Purchase Survey; CPS-ASEC = Current Population Survey-Annual Social and Economic Supplement; CPS-FSS = Current Population Survey-Food Security Supplement; CE = Consumer Expenditure Survey; IRI = Information Resources, Inc.; NHIS = National Health Interview Survey; NHANES = National Health and Nutrition Examination Survey; SIPP = Survey of Income and Program Participation; SNAP = Supplemental Nutrition Assistance Program.

Source: USDA, Economic Research Service.

were asked to record item details. For FAFH, respondents were asked to save receipts and record details. Details about each FAFH event were reported during the three survey-week phone calls. Possible inconsistencies in the shopping event and item-level information provided through multiple collection instruments (scanners, phone calls, survey books, and receipts) were resolved by those conducting the study. Item-level expenditure and quantity information were collected directly from the receipt for FAH events and from the phone calls and food books for FAFH. When the receipt was unreadable, or not provided, item expenditure was imputed when sufficient information about the item was available.

Food Security

FoodAPS included USDA's standard 10-item, U.S. Adult Food Security Survey Module to assess household food security status in the last 30 days.[1] These questions were asked at the final in-person interview at the end of the survey week. The questions referred to conditions and behaviors that characterize households having difficulty meeting basic food needs in the past 30 days and specified that difficulties were due to lack of money and other resources to obtain food. Responses of "yes," "often," or "sometimes" were coded as affirmative, and affirmative responses were summed. Households with no affirmative responses were classified as having high food security; those with one or two affirmative responses were classified as marginal food security; those with three to five affirmative responses were categorized as low food security; and those with six or more affirmative responses were classified as very low food security. In most USDA reports, the categories high food security and marginal food security are grouped and described as food secure (e.g., Coleman-Jensen et al., 2014). The food-insecure category includes households with low food security and very low food security. Food-insecure households were, at times, unable to acquire adequate food for one or more household members because they had insufficient money or other resources for food. Households with very low food security were food insecure to the extent that eating patterns of one or more household members were disrupted and their food intake reduced, at least sometime during the year, because they could not afford enough food. The survey also asked a household-level question about food sufficiency in the last 30 days.[2]

SNAP Participation and Household Income

One of the strengths of FoodAPS is that SNAP participation and level of benefits for participating households were matched to administrative records. All but 122 households consented to have their records matched. Respondents were asked whether they or anyone in their household received benefits from SNAP. To confirm respondents' reports of SNAP participation, records of consenting households were matched against two sets of SNAP administrative data: State-level enrollment files for March through November 2012, which were provided by 22 States and 1 county covering 85 percent of FoodAPS households, and transaction records from the program's anti-fraud locator using electronic-benefit-transfer (EBT) retailer transactions (ALERT) system database, which were provided by all 27 States containing survey respondents. We use measures of SNAP participation and monthly benefit amounts that incorporate these administrative records. For nonconsenting households and households without a match, we used the self-reported SNAP participation status and self-reported SNAP monthly benefit amount.[3] These linkages give us high confidence in our measure of SNAP participation, which is often underreported in national surveys (Meyer et al., 2009).

Income information for each individual in the residential unit was reported by the PR. Monthly total household income is the sum of reported income for individual members from six income sources: (1) earnings; (2) unemployment insurance; (3) retirement and disability; (4) welfare, child support, and alimony; (5) investments; and (6) other income sources. This measure of total household income

[1]The module is found at: http://www.ers.usda.gov/datafiles/Food_Security_in_the_United_States/Food_Security_Survey_Modules/ad2012.pdf

[2]The food sufficiency question asks respondents whether they had enough of the kinds of foods their family wants to eat in the last 30 days. This question is separate from the household food security scale, which is based on a series of questions.

[3]The absence of a match does not necessarily mean the household is not participating in SNAP, since these matches were based on probabilistic matching, which links data records across datasets for several preselected variables using statistical probabilities. First and last name, phone number, and street address were used to match to SNAP records.

is compared to the 2012 Federal poverty thresholds for household size and age to classify households into one of three groups: (1) income at or below poverty; (2) income above 100 percent of poverty but at or below 185 percent of poverty; and (3) income above 185 percent of poverty. We also report information on employment status of individuals age 16 and older in SNAP-participating households.

Diet and Health

FoodAPS collected information about general health and dietary health and knowledge. Height and weight information was reported by the PR for all household members age 2 years old or over. This information was used to calculate body mass index (BMI) and to classify individuals as normal weight, overweight, or obese.[4] The PR also reported the general health status of individual members of the household (excellent, very good, good, fair, or poor), whether each household member smoked or chewed tobacco, was currently on a diet, or was lactose intolerant. These health and health behavior measures are compared with similar estimates from the NHANES. FoodAPS also asked the PR about use and knowledge of nutrition information. Responses to these questions were compared with responses to similar questions from NHANES.

Current Population Survey Annual Social and Economic Supplement

The CPS-ASEC is administered every March by the U.S. Census Bureau and supported by the Bureau of Labor Statistics (BLS) (BLS, 2015a). The purpose of the survey is to provide national estimates of labor force status and demographics and to produce comprehensive and timely estimates of economic well-being. The survey oversamples small States and Hispanics and often oversamples Blacks. Sample weights for the household and the individual are provided and are used to make comparisons to FoodAPS. The reference period used in this study is the 2012 calendar year, and the sample size is 99,000 households.

CPS-ASEC estimates are used to compare general individual and household-level demographic characteristics with FoodAPS estimates. Individual-level characteristics include age, sex, race, and Hispanic ethnicity for all individuals, education for individuals age 16 and older, and marital status for individuals age 15 or older. Household variables include household composition, tenure status, and region. In order to make comparisons of race shares from the two surveys, the "other" and "multiple races" categories from FoodAPS were collapsed together.

Current Population Survey-Food Security Supplement

The CPS-FSS is conducted by the U.S. Census Bureau and sponsored by USDA/ERS to provide information about the prevalence and severity of food insecurity in U.S. households. It is the basis of the USDA's annual report on food security in the United States (Coleman-Jensen et al., 2014). It is a supplement to the CPS and is nationally representative of the U.S. civilian noninstitutionalized population. The food security supplement has been conducted annually since it began in 1995 and has been fielded in December since 2001. The U.S. Adult Food Security Survey Module with a 30-day reference-period scale was used in FoodAPS. The CPS-FSS food security estimates shown here are calculated from the adult food security measure and reference the 30-day period from mid-November to mid-December 2012. CPS-FSS respondents are only asked about food insecurity experienced in the 30 days prior to the survey if they have indicated food-insecure conditions some-

[4]BMI-for-age was used to classify the overweight and obese status for children between ages 2 to 19 years old.

time in the prior 12 months. This differs from FoodAPS, which asked about food insecurity in the 30 days prior to the survey for every household from April 2012 to January 2013, not just those with food-insecure conditions in the prior 12 months. The 2012 CPS-FSS survey, which is used in this report, covered 43,942 households comprising a representative sample of the U.S. civilian population of 122 million households (Coleman-Jensen et al., 2013). The CPS-FSS asked one adult respondent in each household a series of questions about experiences and behaviors of household members that indicate food insecurity. The food security status of the household was assigned based on the number of food-insecure conditions as described above for FoodAPS. Food security estimates from CPS-FSS are compared with estimates from FoodAPS and NHIS.

Consumer Expenditure Survey

The CE survey began in 1888 and was administered close to every 10 years until 1980, when it became a quarterly survey. The survey is collected by the U.S. Census Bureau and sponsored by the BLS. The CE is the only Federal survey to provide information on the complete range of consumers' expenditures and income as well as the characteristics of those consumers. The samples are drawn from U.S. civilian noninstitutionalized population at the national and regional levels. The unit of analysis is the "consumer unit," which is defined by the BLS based on biological, legal, or financial relationships of household members. A consumer unit is defined as (1) all members of a particular household related by blood, marriage, adoption, or other legal arrangements; (2) a person living alone or sharing a household with others or living as a roomer in a private home or lodging house or in permanent living quarters in a hotel or motel, but who is financially independent; or (3) two or more persons living together who use their income to make joint expenditure decisions. Financial independence is determined by the three major expense categories: housing, food, and other living expenses. To be considered financially independent, at least two of the three major expense categories have to be provided entirely, or in part, by the respondent.

Diary survey data are collected from a quarterly repeated cross-sectional survey. Respondents keep daily diaries for two consecutive 1-week periods on goods and services such as regularly purchased items. The purchases are separated into FAH, FAFH, clothing, shoes, jewelry and accessories, and all other products and services, including gifts and donations (BLS, 2015b). In recording food purchases, respondents are given examples of FAH (e.g., eggs, milk, cereal, etc.) and separately FAFH (e.g., Chinese takeout, pretzels at a ballgame, soda from vending machine, etc.) on the diary sheet. The CE is used to make comparisons of total weekly FAH and FAFH spending. The CE was designed for the purpose of providing weights for the various Consumer Price Index (CPI) categories. The CE estimates provided in this report are relevant for the year 2012, which differs slightly from the FoodAPS reference period of April 2012 to January 2013.

IRI Consumer Network Panel

The National Consumer Panel (NCP) is a joint venture between Information Resources, Incorporated (IRI), and The Nielsen Company (Nielsen) to utilize a common set of households to support both the Nielsen HomeScan and IRI Consumer Network panels (IRI, 2015). Households are selected for participation in the Consumer Network panel using quota sampling. The IRI Consumer Network panel consists of over 100,000 active panelist households and over 60,000 static panelists. The static panel, which is a subset of the active panel, includes households that have both reported a food purchase, at least once every 4 weeks for 11 of the 13 four-week periods, and have reported an average weekly expenditure of at least $25 for a one-person household, $35 for a two-person house-

hold, or $45 for a three-person or larger household. As a result, households that only occasionally report their FAH purchases are excluded from the static panel.

Households report their food purchases by using a handheld scanner provided by IRI to record the universal product code (UPC) of each product purchased, which is then organized into weekly reporting periods. A subset of the static panel, approximately 28,000 households, also reports their purchases of products that are sold without a UPC (e.g., products sold by weight or count), known as random-weight products. Participating households scan a barcode on a reference card that maps to random-weight meat, bakery, fruits, vegetables, cheese, cold cuts and lunch meat, prepared foods, random-weight coffee, and candy/nuts/seeds. These random-weight products are assigned an IRI-created UPC that corresponds to items in the product dictionary. This allows the products to be analyzed the same way as those sold with UPCs. However, currently, IRI collects only data on expenditures for random-weight products, and not quantities.

For retailers where IRI has point-of-sale transaction data, the consumer-panel data are clustered into market areas and the point-of-sale data from within that market area are used for the purpose of assigning prices to the household's food-product purchases. The price assigned to a specific product is generally either a chain-store average price or an outlet average price, with the outlet price being used when the chain-store price is unavailable. When IRI does not have point-of-sale transaction data for a retailer, or when IRI has point-of-sale transaction data for a retailer but neither the chain-store average price nor the outlet average price is available, the price input by the panelist is used.

When panelists enter a price, they also indicate on their handheld scanner whether they received a discount deal on an item (store sale, coupon, etc.). When the panelists indicate that they received a deal, they are prompted to specify whether the deal was a store sale, such as a special pricing display or temporary price reduction; a store coupon that is valid only when used at a specific store; a manufacturer coupon that is valid for use at any store; or an "other sale" such as a senior citizen or employee discount or damaged or open-box goods. If the panelists used a store or manufacturer coupon, they are asked to enter the price paid before the coupon and then enter the face value of the coupon (or if multiple coupons were used on an item, the combined value of all coupons used). In other words, they are asked to input the price paid and the value of the coupon even if they shopped at a retailer where they would normally not be asked to input the price paid. IRI uses a proprietary iterative proportional fitting-weighting methodology to allow the static panel to correspond to the overall profile of the U.S. household population based on Census population data. The demographic characteristics used in the weighting process are household size, household income, age of the head of household, race, ethnicity, and presence of children, while county size is used as a proxy for geographic distribution.

Because the IRI Consumer Network data to which ERS has access include only edible food-at-home products, it was not possible to calculate food-away-from-home spending estimates using the IRI data. Additional modifications to the Consumer Network data were necessary to align the spending estimates with those from FoodAPS. Because only 28,000 of the households in the static panel are asked to report their random-weight purchases, using the entire static panel of 62,517 households to calculate the spending estimates would almost certainly result in underestimates of the true means. In order to mitigate that potential problem, only the 28,000 panelists who report their random-weight purchases were used in the calculation of all of the spending estimates. Households in the static panel sometimes do not report any shopping trips for food products in a given week. For the purpose of this analysis, it was assumed that in this scenario, the panelist made no food purchases in the

given week, and a zero was inserted as the panelist's expenditure for that week. As a result, the mean estimates serve as a lower bound on the true means.

IRI data are presented by household size, collapsing households with five to nine members together to make them comparable to estimates of FAH from the other surveys in this study. The Consumer Network data do not include information on SNAP participation status. Therefore, we are unable to estimate SNAP participant spending using Consumer Network data. Instead, we compare estimates of food spending by income categories for IRI (using the three income-to-poverty threshold ranges for SNAP nonparticipant households described earlier) to classify households and do not provide separate estimates for SNAP participants and nonparticipants. The Consumer Network data include information about whether or not children are present in a household, but not the specific number of children, so weighted average-income thresholds at each household size (from one to nine people) were used to calculate the 100-percent threshold. The 185-percent threshold was then calculated using the weighted average-income threshold. The 12 income ranges used in the Consumer Network data to categorize each household's income were redefined to a specific dollar value of income by assigning to each household the midpoint of the income range in which it was originally categorized by IRI. For example, a household in IRI's $60,000 to $69,999 income range would be recoded to have an income of $64,999.50. The second step consisted of comparing the recoded household income(s) against the three income-to-poverty threshold ranges used for comparisons with the other surveys. The IRI Consumer Network estimates provided in this report cover 2012, which differs slightly from the FoodAPS reference period of April 2012 to January 2013.

National Health and Nutrition Examination Survey

The NHANES is a nationally representative survey conducted by the National Center for Health Statistics of the Centers for Disease Control and Prevention (CDC), Department of Health and Human Services, designed to assess the health and nutritional status of adults and children (CDC, 2015a). This survey includes interview and physical examination components. It began in 1959 and became an annual survey in 1999, although data are released in 2-year intervals to allow national estimates. NHANES samples about 5,000 individuals annually (or about 10,000 individuals in a 2-year data release), and oversamples Blacks, Mexican Americans, low-income Whites (beginning in 2000), adolescents aged 12 -19 years old, and persons aged 60 years and older, as well as other subgroups over the years. The unit of analysis is the individual.

In this report, we use the 2011-12 NHANES survey data to compare estimates of total weekly food-at-home and food-away-from-home spending; school lunch participation for school-aged children; body mass index (BMI) and overweight and obese status; diet and general health status; and smoking, dieting, food-allergy, and lactose-intolerance status with similar estimates from the FoodAPS survey.[5] Data on nutritional knowledge and use of nutrition facts panels on food products are also compared with FoodAPS.

There are some important distinctions between these NHANES measures and the similar measures in FoodAPS. First, with respect to food spending, NHANES, unlike the other three surveys used to measure food spending, does not ask respondents to record their food purchases using a diary-like method. Rather, they are asked to recall the amount spent on food in the past 30 days based on a set

[5]Since NHANES SNAP participation data for 2011-12 are not yet available, we use 2009-10 NHANES data when comparing food spending estimates across SNAP participation status and income.

of seven questions asked of the sample respondent to the household interview questions about the family's spending on food. The questions are designed to separate nonfood expenditures. Further, questions are designed to separately consider spending at supermarkets and other food retailers (FAH) and spending at restaurants or take-out places (FAFH). This method of separating FAH and FAFH spending based on retailer type differs slightly from FoodAPS' method, which uses the "in home" and "outside of home" distinctions. This may result in some differences across surveys in how similar purchased foods are classified into the FAH and FAFH categories, but any differences are expected to be small. To obtain weekly food spending estimates from these NHANES 30-day estimates, we divided by 4.3.

Another important distinction is that NHANES measures height and weight during the medical examination component of the survey. These are used to calculate BMI, overweight, and obesity status. In FoodAPS, the PR self-reports the height and weight of all members of the household based on recall. Thus, the FoodAPS estimates of these variables are likely to be measured with greater error than the NHANES measures and may be subject to reporting biases.

The diet status measure in NHANES refers to the diet for the sampled individual within the household and is reported by the household survey respondent. In FoodAPS, the PR answers this question in reference to his or her own diet. General health status, lactose intolerance, food allergies, and current dieting status are in reference to the sampled member in the NHANES (reported by the household respondent). In FoodAPS, these are asked in reference to all household members and reported by the PR. Nutritional knowledge and use of nutrition-facts panels are asked of the sample respondent in NHANES and of the PR in FoodAPS. NHANES asks sample persons over age 19 of their current smoking status, while FoodAPS asks the PR if anyone in the household smokes or uses chewing tobacco and, if so, asks the PR to report the smoking status of all household members. To match NHANES, FoodAPS estimates of smoking behavior are based on individuals 19 years and older. Finally, participation in free or reduced-price school lunch is asked of all school-age sample members (age 4 to 19 years old) in the NHANES and of all school-age household members (age 4 to 19 years old) in the FoodAPS.

National Health Interview Survey

The National Health Interview Survey (NHIS) of the National Center for Health Statistics began in 1957 and is an annual survey that collects a broad set of health measures for a nationally representative sample of 60,000 households (CDC, 2015b). The purpose of the survey is to monitor health status and health care access in the United States. NHIS has a complex sampling design and samples from the U.S. noninstitutionalized civilian population. Blacks and Hispanics are oversampled. In this report, we compare 2012 NHIS 30-day adult food security estimates to the comparable estimates from FoodAPS. Similar to FoodAPS, the 10 adult food security items are asked of all households in the NHIS (not just those who showed signs of food insecurity in the past 12 months as the CPS-FSS did) and in reference to the prior 30 days. NHIS does not have a question on food sufficiency as FoodAPS and CPS-FSS do.

The Survey of Income and Program Participation

SIPP is conducted by the U.S. Census Bureau to measure economic well-being, family dynamics, labor force participation, assets, health insurance, childcare, food security, and demographics in order to assess the effectiveness of Government programs (U.S. Census Bureau, 2015). The survey uses a complex, multistage, stratified design and is nationally representative of the civilian, noninstitutionalized population. SIPP collects information on income and participation in Government programs from a panel of households for up to 4 years. Monthly longitudinal data are collected for households in 4-month waves. SIPP's complex sample design includes an oversampling of lower income households. Sample weights are included to make nationally representative estimates.

This report uses data from April 2012, which were collected in wave 12 of the 2008 SIPP panel. We use the SIPP data to examine FoodAPS estimates of SNAP participation; household income relative to Federal poverty thresholds; and characteristics of SNAP households such as the number and presence of children and elderly, monthly household income amounts from six sources (earnings from work, unemployment insurance, welfare and child support, disability income, investment income, and other sources), and employment status of individual household members over the age of 15.

There are some minor differences in concepts and measures between the SIPP and FoodAPS. First, as noted previously, the FoodAPS household unit includes all persons who live together and share food and who were present for the week of the survey. The SIPP household includes all usual residents of the unit, defining a usual resident as one who sleeps there the majority of the time (U.S. Census Bureau, 2015). SIPP also collects information on which members of the household participate in SNAP, which allows the survey to better distinguish households that may contain mixed or multiple SNAP units (e.g., some household members may not be covered by SNAP and some households may have two distinct SNAP units). This report uses two definitions of SIPP households. One is based on the broad survey definition of "broad SIPP" and one that defines households based on the SNAP unit "SNAP SIPP," which may be a subunit of the broad SIPP household. The FoodAPS household definition probably matches more closely to the broad SIPP definition.

Measurement of household income and employment status also varies in these two surveys. FoodAPS collects current monthly income based on the PR's report of income from six different sources (the same sources SIPP collects) for each member of the household at least 16 years of age. The income of people living in the household who are unrelated to the householder is not considered when determining total income in FoodAPS. SIPP estimates use current monthly income from all six sources for all individuals in the household at least 15 years of age, aggregated for the household. FoodAPS employment status is measured for all individuals age 16 and older and divided into (1) works at a job or business; (2) has a job or business but is not working (e.g., on vacation, laid off, or not working because of a health issue); (3) is looking for work; and (4) not working at a job or business. In order to make sure that SIPP estimates were compatible with FoodAPS, work-status estimates were calculated at the individual level for respondents in SIPP who were at least 16 years of age. The SIPP monthly employment status variable was recoded based on the definition of labor force participation from the FoodAPS work status variable.

Results

We turn now to comparing estimates from FoodAPS to other national-level surveys. Arithmetic weighted averages and weighted shares with standard errors were calculated from FoodAPS accounting for the survey's complex sample design. These estimates were compared across national surveys that collected similar information. Statistical comparison of the point estimate means and shares were conducted using Studentized t-statistics with unpooled variances for difference of means (or shares) tests for FoodAPS estimates compared pairwise to their respective estimates from the other surveys. Rao-Scott corrected chi-squared analysis was performed on categorical variables from FoodAPS and the respective surveys. Results of these tests are indicated in the tables.

General Demographic Population Characteristics

The comparison of estimates of demographic variables from CPS-ASEC and FoodAPS are provided in table 3a (at the individual level) and table 3b (at the household level). Overall, these estimates are close, as expected. However, a few differences are worth noting. First, the FoodAPS sample has a slightly larger share of children (under age 18)—25 percent compared with 24 percent from CPS-ASEC. Marital status of household heads in both surveys is similar except that CPS-ASEC has a slightly greater share of married individuals than FoodAPS (51 percent compared with 48 percent), the share of divorced individuals in CPS-ASEC is smaller than in FoodAPS (10 percent compared with 14 percent) and the share of those never married in CPS-ASEC is slightly greater than in FoodAPS (30 percent compared with 29 percent).

The racial distributions across the two surveys are statistically different. Race categories with smaller shares of the population are dissimilar, as FoodAPS has a smaller share of Asians than CPS-ASEC (4 percent versus 5.1 percent) but a greater share of individuals categorized as Other and Multiple races (8.6 percent versus 2.3 percent). The share of Hispanic individuals is similar in both surveys at about 17 percent.

There are some differences in household composition categories (see table 3b). About one-third of households in both surveys are comprised of single adults living alone, but in FoodAPS, a smaller share are elderly adults living alone compared with CPS-ASEC (11.6 percent compared with 17.3 percent in CPS-ASEC). So while both surveys show a similar share of elderly individuals (table 3a), in FoodAPS, these individuals are more likely to reside with other household members than they are in CPS-ASEC. FoodAPS also has a greater share of married adult households without children than CPS-ASEC (23.8 percent compared with 21.9 percent). However, both surveys show that almost a third of all households have children.

The distribution of housing tenure is different between FoodAPS and CPS-ASEC, with FoodAPS showing about 3 percentage points fewer homeowners than CPS-ASEC. The distribution across regions of the United States is also different between the two surveys. FoodAPS has a greater share of households from the Midwest relative to CPS-ASEC.

Table 3a

General individual-level demographic and socioeconomic characteristics of FoodAPS and Current Population Survey Annual Social and Economic Supplement participants

	FoodAPS mean/share (s.e.) N=14,317	CPS-ASEC mean/share (s.e.) N=196,604
Sex (share male)	47.97 (0.48)	48.96*,[1] (0.20)
Age (shares)		
Under 18 years old	24.94 (0.18)	23.84*** (0.23)
18-65 years old	61.92 (0.43)	62.24 (0.18)
65 years and older	13.14 (0.39)	13.91 (0.29)
Race (shares)		
White	73.42 (1.20)	78.20***,[1] (0.13)
Black	13.11 (0.57)	12.99 (0.28)
American Indian or Alaska Native	0.58 (0.15)	1.10* (0.26)
Asian	4.00 (0.43)	5.13** (0.28)
Native Hawaiian or other Pacific Islander	0.31 (0.10)	0.30 (0.29)
"Other" race and "multiple" race	8.57 (1.06)	2.28*** (0.29)
Hispanic, any race (share)	17.03 (0.77)	17.16 (0.25)
Marital status of individuals age > 15 years old (shares)	N=10,349	N=147,861
Married	48.25 (0.95)	51.27***,1 (0.22)
Widowed	6.23 (0.30)	5.84 (0.34)
Divorced	14.16 (0.86)	10.34*** (0.32)
Separated	2.52 (0.25)	2.28 (0.33)
Never Married	28.84 (0.68)	30.28** (0.28)

Continued—

Table 3a
General individual-level demographic and socioeconomic characteristics of FoodAPS and Current Population Survey Annual Social and Economic Supplement participants—continued

	FoodAPS mean/share (s.e.) N=14,317	CPS-ASEC mean/share (s.e.) N=196,604
Educational Attainment (age > 15 years old) (shares):	N=10,309	N=147,861
Less than high school	14.43 (0.70)	15.65 (0.29)
High school diploma or GED	26.83 (1.12)	28.52 (0.28)
Some college (no 4-year degree)	29.26 (1.24)	27.95 (0.28)
Bachelor's degree or higher	29.48 (1.65)	27.88 (0.28)

[1]Difference between groups for categorical outcomes using χ^2 test is statistically significant for at least the 0.10 level. Jackknife replicate weights were used to calculate the standard errors shown in parentheses. The standard errors used in the χ^2 tests were calculated by Taylor Series approximation and are not shown in this report.
*Compares mean (share) estimate from FoodAPS with same estimate from CPS-ASEC using an unpooled standard error estimate, * p<0.10; ** p<0.05; *** p<0.01.

Source: USDA, Economic Research Service estimates using data from the National Household Food Acquisition and Purchase Survey collected April 2012-January 2013. Current Population Survey-Annual Social and Economic Supplement (CPS-ASEC) estimates from 2012.

Food Spending

Tables 4a-4c show estimates of weekly food spending for FoodAPS compared with other national-level surveys. Table 4a shows total weekly food spending; 4b shows total weekly FAH spending, and 4c shows total weekly FAFH spending. Each table is estimated for the entire sample and then for subgroups based on household size, household composition, and SNAP participation status. The non-SNAP households are further divided into three bins: (1) by poverty income ratio (PIR) at or below the Federal poverty threshold (FPL); (2) between 100 percent and 185 percent of the FPL; and (3) greater than 185 percent of the FPL. These classes, along with the category of SNAP participants, comprise the set of four target groups used to draw the FoodAPS sample.

In table 4a, total weekly food spending is displayed for FoodAPS, NHANES, and CE. FoodAPS estimates that the average household spent just over $124 on food in the survey week. This is in comparison to an estimated average of $159 from NHANES (about 23 percent greater) and $117 from CE (about 5 percent less), each of which is a statistically significant difference. This pattern, where CE estimates of total food spending are generally less than the FoodAPS estimates while NHANES estimates are generally greater, holds for almost all the subcategories for which the estimates are made.

For all three surveys, total food spending increases as household size increases, but generally at a decreasing rate. Figure 1 shows total food spending, separated by FAH and FAFH, for all three surveys by household size. FoodAPS estimates are greater than estimates from CE for all household sizes, although only significantly so for households with three or fewer persons. NHANES estimates by household size, however, are not statistically different than estimates from FoodAPS. Upon further inspection, households in NHANES tend to be larger than those in FoodAPS. In NHANES, 45 percent of households are comprised of four or more people while in FoodAPS, only 22 percent

Table 3b

General household-level demographic and socioeconomic characteristics of FoodAPS and Current Population Survey Annual Social and Economic Supplement

	FoodAPS mean/share (s.e.) N=4,826	CPS-ASEC mean/share (s.e.) N=72,720
Household composition (shares)		
1 adult, age 65+ years old	11.61 (0.67)	17.30***,[1] (0.46)
1 adult, nonelderly	21.72 (0.73)	17.56*** (0.46)
2 adults, married, no children	23.76 (0.77)	21.90** (0.44)
2 adults, cohabitating, no children	4.05 (0.50)	3.38 (0.49)
2 adults, not married or cohabitating, no children	6.72 (0.45)	7.98** (0.47)
1 adult, with children	4.50 (0.43)	5.33 (0.42)
2 adults, married, with children	21.08 (0.61)	21.57 (0.37)
2 adults, cohabitating, with children	3.10 (0.30)	2.26* (0.42)
2 adults, not married or cohabitating, with children	3.45 (0.40)	2.71 (0.42)
Tenure (shares)		
Owner	61.65 (1.82)	64.90*,[1] (0.28)
Renter	35.72 (1.68)	33.73 (0.38)
Other, do not pay for housing	2.63 (0.61)	1.37* (0.47)
Region (shares)		
Northeast	15.43 (2.44)	18.19[1] (0.41)
Midwest	31.33 (3.04)	22.25*** (0.40)
South	35.52 (3.57)	37.74 (0.39)
West	17.72 (2.47)	21.82* (0.40)

[1]Difference between groups for categorical outcomes using χ^2 test is statistically significant for at least the 0.10 level. Jackknife replicate weights were used to calculate the standard errors shown in parentheses. The standard errors used in the χ^2 tests were calculated by Taylor Series approximation and are not shown in this report. * p<0.10; ** p<0.05; *** p<0.01.

Source: USDA, Economic Research Service estimates using data from the National Household Food Acquisition and Purchase Survey (FoodAPS) collected April 2012-January 2013. Current Population Survey-Annual Social and Economic Supplement (CPS-ASEC) estimates from 2012.

Table 4a

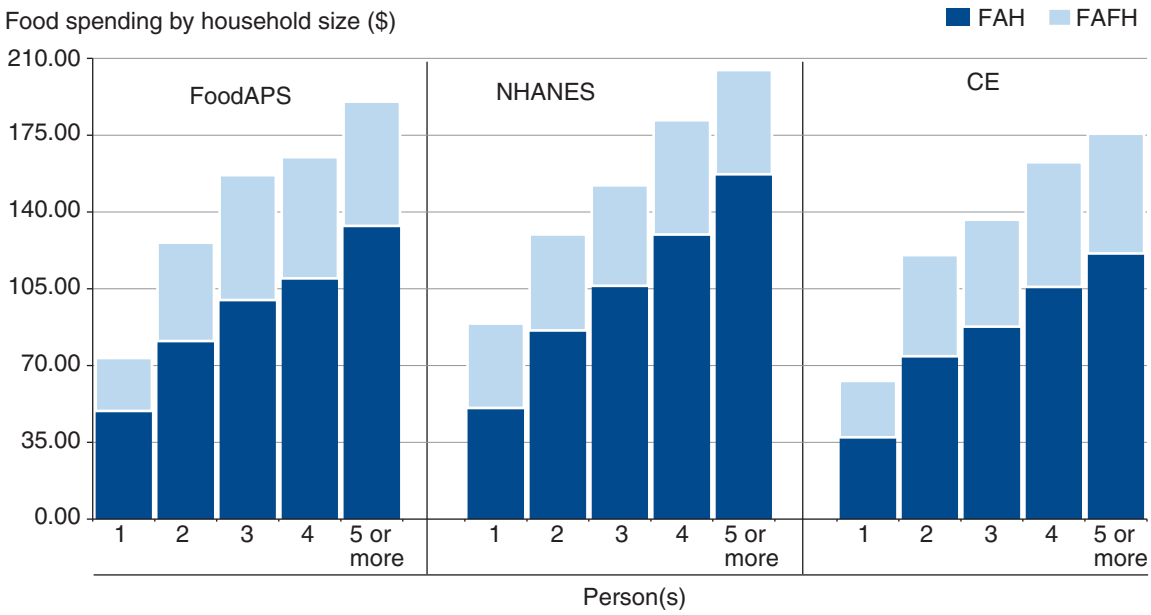
Mean total weekly food spending estimates from FoodAPS, the NHANES, and CE

	FoodAPS N=4,826	NHANES N=9,307	CE N=13,761
Total weekly food spending[1]:	124.03 (2.61)	158.69*** (3.64)	117.34** (1.61)
… by household size[2]			
1 person	73.41 (3.05)	89.10* (8.03)	63.05*** (1.58)
2 persons	126.05 (3.13)	129.91 (5.56)	120.33 (2.45)
3 persons	156.77 (6.80)	151.35 (7.36)	136.51*** (3.06)
4 persons	164.98 (8.51)	182.32 (7.74)	162.68 (4.26)
5 or more persons	190.30 (11.36)	205.36 (9.80)	175.68 (5.96)
… by household composition			
1 adult living alone	73.00 (3.12)	n/a	63.05*** (1.58)
2 or more adults, no children	140.65 (3.56)	n/a	135.74 (2.97)
1 adult, 1 or more children	100.06 (8.34)	n/a	106.45 (4.58)
2 or more adults, 1 or more children	168.72 (4.80)	n/a	169.35 (2.74)
… by SNAP participation status and income groups			
SNAP participant	100.19 (3.83)	123.08*** (3.11)	97.46 (3.88)
Non-SNAP, income < 100 percent of FPL	77.61 (6.77)	122.93*** (4.27)	82.42 (2.60)
Non-SNAP, 100 percent < income < 185 percent of FPL	83.73 (3.04)	123.53*** (3.97)	97.35*** (3.90)
Non-SNAP, income > 185 percent of FPL	139.46 (3.60)	161.18*** (4.38)	146.34* (2.05)

Jackknife replicate weights were used to calculate the standard errors shown in parentheses.
*Compares mean spending estimates from NHANES or CE with same estimate from FoodAPS using an unpooled standard error estimate, * p<0.10; ** p<0.05; *** p<0.01.
[1]TOTITEMEXP was used to create the food spending estimates which excludes nonfood items. Imputedexp was used to impute this variable when values were missing. [2]The variable HHSIZE used to calculate the food spending by household size excluded guests.
FoodAPS = National Household Food Acquisition and Purchase Survey; NHANES = National Health and Nutrition Examination Survey; CE = Consumer Expenditures; FPL = Federal Poverty threshold for family size; SNAP = Supplemental Nutrition Assistance Program.

Source: USDA, Economic Research Service estimates using data from FoodAPS collected April 2012-January 2013. NHANES estimates are from 2011-12 except for those by SNAP participation and income status, which are only available for 2009-10. CE survey estimates are from 2012. Two households in FoodAPS with missing information on SNAP status are excluded from the table.

Figure 1
Mean weekly food-at-home and food-away-from-home estimates by household size



NHANES = National Health and Nutrition Examination Survey, Centers for Disease Control and Prevention; CE = Consumer Expenditure Survey, Bureau of Labor Statistics; FoodAPS = National Household Food Acquisition and Purchase Survey, USDA.
Source: USDA, Economic Research Service.

of households have that many people. This may partially explain why NHANES estimates of food spending are so large relative to FoodAPS estimates.

FoodAPS estimates of spending among households without children (either single- or multiple-adult households) are greater than those estimates from CE (NHANES estimates by household composition are not available). However, estimates of weekly food spending for households with children, either with single or multiple adults, are not different across these two surveys.

For SNAP participants, NHANES estimates of total food spending are consistently greater than those from FoodAPS. For SNAP participants, NHANES estimates are 23 percent greater ($123.08 compared with $100.19), and for poor nonparticipants, NHANES estimates are 58 percent greater ($122.93 compared with $77.61). Estimates of mean weekly food spending for SNAP participants in these three surveys are higher than those of low-income nonparticipants, but lower than the highest income nonparticipants. CE estimates of weekly food spending among SNAP participants are lower than estimates for SNAP participants in FoodAPS. However, estimates for all non-participants are higher in CE than in FoodAPS, although only significantly higher for nonparticipants with incomes between 100 and 185 percent of poverty thresholds.

Table 4b shows the FAH spending category. The table includes estimates from IRI in addition to the NHANES, CE, and FoodAPS. Like total food spending, FoodAPS estimates of total weekly FAH spending are fairly close but about 9 percent higher than CE estimates ($81.79 compared with $74.43). Mean total weekly FAH spending estimates from NHANES are 38 percent greater than FoodAPS estimates. On the other extreme, IRI estimates are much lower than the estimates from the three other surveys at $60.36, or 26 percent lower than the FoodAPS estimated mean. Each of these

Table 4b

Mean weekly food-at-home spending estimates from FoodAPS, NHANES, CE, and IRI

	FoodAPS N=4,826	NHANES N=9,475	CE N=13,761	IRI N=28,000
Total food-at-home weekly spending[1]:	81.79 (2.03)	112.52*** (2.90)	74.43*** (1.00)	60.36*** (0.49)
… by household size[2]				
1 person	49.30 (2.34)	50.66 (1.86)	37.31*** (0.90)	38.77*** (0.72)
2 persons	81.15 (2.53)	86.00 (2.95)	74.24** (1.92)	62.65*** (0.66)
3 persons	99.84 (5.10)	106.32 (3.61)	87.77** (2.06)	67.19*** (1.24)
4 persons	109.71 (5.96)	129.72** (5.94)	105.86 (2.49)	70.32*** (1.4)
5 or more persons	133.66 (10.96)	157.19* (6.75)	121.10 (4.00)	77.23*** (2.16)
… by household composition				
1 adult living alone	48.96 (2.42)	n/a	37.31*** (0.90)	41.76*** (0.61)
2 or more adults, no children	90.37 (2.87)	n/a	85.3 (1.99)	67.7*** (0.66)
1 adult, 1 or more children	65.62 (7.22)	n/a	70.13 (3.60)	58.69 (2.87)
2 or more adults, 1 or more children	113.30 (4.03)	n/a	109.16 (1.89)	69.07*** (1.12)
… by SNAP participation status and income groups				
SNAP participant	77.83 (3.68)	106.67*** (4.04)	75.96 (3.24)	n/a
Non-SNAP, income < 100 percent of FPL	54.73 (5.47)	95.73*** (4.34)	54.27 (1.67)	53.63 (1.93)
Non-SNAP, 100 percent < income < 185 percent of FPL	57.63 (2.30)	96.34*** (3.38)	67.37*** (2.72)	55.79 (1.25)
Non-SNAP, income > 185 percent of FPL	88.94 (2.87)	112.74*** (3.22)	87.22 (1.33)	61.33*** (0.49)

Jackknife replicate weights were used to calculate the standard errors shown in parentheses.

* Compares mean spending estimates from NHANES, CE, and IRI with same estimates from FoodAPS using an unpooled standard error estimate, * p<0.10; ** p<0.05; *** p<0.01.

[1]TOTITEMEXP was used to create the food spending estimates which excludes nonfood items. Imputedexp was used to impute this variable when values were missing. [2]The variable HHSIZE used to calculate the food spending by household size excluded guests.

FoodAPS = National Household Food Acquisition and Purchase Survey; NHANES = National Health and Nutrition Examination Survey; CE = Consumer Expenditures; IRI = Information Resources Consumer Network Panel; FPL = Federal Poverty threshold for family size; SNAP = Supplemental Nutrition Assistance Program.

Source: USDA, Economic Research Service estimates using data from FoodAPS collected April 2012-January 2013. NHANES estimates are from 2011-12 except for those by SNAP participation and income status, which are only available for 2009-10. CE estimates are from 2012. IRI data are from April 2012-January 2013. Two households in FoodAPS with missing information on SNAP status are excluded from the table.

differences from FoodAPS estimates is statistically significant. Previous studies of a similar scanner panel survey from Nielsen found that food spending estimates were underreported relative to estimates from the CE (Zhen et al., 2009; Boonsaeng and Carpio, 2014). Zhen et al. (2009) explained that the Nielsen Homescan data panels from 2002-05 have different demographic compositions than their CE counterparts, such as household size and share of female-headed households.

All four surveys show that FAH spending increases as household size increases, but at decreasing rates. IRI estimates are significantly lower than FoodAPS estimates for all household sizes and show much less of an increase as household size increases. As household size increases, the difference between FoodAPS and IRI estimates increases as well, such that for households with at least 5 members, IRI FAH spending estimates are almost half as big as FoodAPS estimates. For smaller households (with three or fewer members), NHANES spending estimates are within 10 percent of FoodAPS estimates and are not significantly different. CE estimates for households with three or fewer people, on the other hand, are significantly lower than FoodAPS estimates, but are similar to FoodAPS for households with four or more people.

For the subgroup of one adult living alone, FoodAPS FAH spending estimates are greater than estimates from CE and IRI, at $48.96 for FoodAPS compared with $37.31 for CE and $41.76 for IRI. For other household composition groups, CE estimates are within 10 percent of FoodAPS estimates and the differences are statistically significant for only households with two or more adults and no children. IRI estimates are significantly less for all subgroups except households with a single adult with children. Generally, FoodAPS FAH spending estimates are greater than CE and IRI estimates but less than NHANES estimates (where NHANES subcategory variables were available).

Estimates of FAH spending are also made across SNAP participation and income groups for non-SNAP households (with the exception of the SNAP group with IRI data, for which estimates of SNAP participation are not observable). First, the CE estimates are within 5 percent of those from FoodAPS across all income groups except for nonparticipants of SNAP with incomes between 100 percent and 185 percent of the FPL, a difference that is statistically significant. The NHANES estimates, however, are 27 percent to 75 percent greater than estimates from FoodAPS. IRI estimates are similar to FoodAPS estimates for all but the highest income nonparticipants, for which IRI estimates are 31 percent less than FoodAPS estimates.

Table 4c compares total weekly FAFH spending estimates for FoodAPS, NHANES, and the CE. There are no differences in estimates of mean total weekly FAFH spending for the three surveys. Patterns in mean weekly FAFH spending by household size are similar across the three survey estimates. Mean FAFH spending estimates for households with two people, with three people, and with at least five people are significantly larger in FoodAPS compared with NHANES ($56.93 compared with $45.85 for a three-person household; $56.64 compared with $47.48 for households with five people or more). However, for one-person households, FoodAPS estimates are lower than those from NHANES ($24.12 compared with $38.49). FoodAPS estimates are significantly greater than CE estimates for three-person households. Interestingly, all three surveys show that FAFH spending levels off or even decreases as household size approaches five members. Estimates of FAFH spending by household composition are statistically similar for FoodAPS and CE, except for households with two or more adults and one or more children. Here, FoodAPS estimates are about 9 percent greater than estimates from the CE.

FoodAPS shows that the average SNAP participant spent $22.36 on FAFH, compared with $18.58 from NHANES. Estimates for SNAP participants from CE are not different than FoodAPS estimates. Estimates from each survey show that SNAP participants spend less or almost equal amounts

Table 4c

Mean total weekly food away from home spending estimates from FoodAPS, NHANES, and CE

	FoodAPS N=4,826	NHANES N=9,452	CE N=13,761
Total weekly food spending[1]:	42.24 (1.09)	46.27 (2.64)	42.91 (0.82)
… by household size[2]			
1 person	24.12 (1.54)	38.49* (7.41)	25.74 (0.99)
2 persons	44.90 (1.66)	43.74 (3.17)	46.09 (1.20)
3 persons	56.93 (3.03)	45.85* (5.30)	48.74** (1.85)
4 persons	55.28 (3.38)	52.07 (4.54)	56.82 (2.43)
5 or more persons	56.64 (3.27)	47.48* (4.18)	54.58 (3.31)
… by household composition			
1 adult living alone	24.04 (1.58)	n/a	25.74 (0.99)
2 or more adults, no children	50.28 (1.96)	n/a	50.44 (1.56)
1 adult, 1 or more children	34.44 (3.86)	n/a	36.32 (2.23)
2 or more adults, 1 or more children	55.43 (2.19)	n/a	60.20* (1.42)
… by SNAP participation status and income groups			
SNAP participant	22.36 (1.17)	18.58*** (1.36)	21.50 (1.52)
Non-SNAP, income < 100 percent of FPL	22.88 (4.73)	27.25 (1.49)	28.15 (1.38)
Non-SNAP, 100 percent < income < 185 percent of FPL	26.10 (1.96)	27.53 (2.17)	29.98 (1.70)
Non-SNAP, income > 185 percent of FPL	50.52 (1.50)	49.08 (1.74)	59.12*** (1.19)

Jackknife replicate weights were used to calculate the standard errors shown in parentheses.
* Compares mean spending estimates from NHANES and CE with same estimates from FoodAPS using an unpooled standard error estimate, * p<0.10; ** p<0.05; *** p<0.01.
[1]TOTITEMEXP was used to create the food spending estimates which excludes nonfood items. Imputedexp was used to impute this variable when values were missing. [2]The variable HHSIZE used to calculate the food spending by household size excluded guests.
FoodAPS = National Household Food Acquisition and Purchase Survey; NHANES = National Health and Nutrition Examination Survey; CE = Consumer Expenditures; IRI = Information Resources Consumer Network Panel; FPL = Federal Poverty threshold for family size; SNAP = Supplemental Nutrition Assistance Program.

Source: USDA, Economic Research Service estimates using data from FoodAPS collected April 2012-January 2013. NHANES estimates are from 2011-12 except for those by SNAP participation and income status, which are only available for 2009-10. CE estimates are from 2012. Two households in FoodAPS with missing information on SNAP status are excluded from the table.

on FAFH than the poorest nonparticipants, although this is much less pronounced for estimates from FoodAPS.

Food Security Status

Table 5 shows that the CPS-FSS estimates a greater share of households who are food sufficient—that is, they have enough of the kinds of food that they wish to eat—than FoodAPS, with a statistically significant difference of 17 percent. Correspondingly, FoodAPS shows a greater share of households with enough to eat but not always the kinds of food that they would like to eat (31 percent compared with 20 percent in CPS-FSS).

FoodAPS households are much more likely to experience low or very low food security than CPS-FSS or NHIS households. About 9 percent of FoodAPS households have low food security compared with almost 5 percent of CPS-FSS households and 6 percent of NHIS households. FoodAPS also estimates a greater share with very low food security (almost 7 percent compared with 3 percent from CPS-FSS and 5 percent from NHIS). Figure 2 shows that combined, the estimates of the shares of those with low or very low food security from FoodAPS are greater than those based on the CPS-FSS (16 percent in FoodAPS compared with 8 percent from the CPS-FSS) and those based on the NHIS (12 percent). FoodAPS even shows a much larger share of households with marginal food security than the other two surveys—15 percent compared with 5 percent and 8 percent for CPS-FSS and NHIS, respectively.

One hypothesis for these differences is that FoodAPS respondents may have heightened awareness of their food security after participating in the survey for a week. Another potential source of differences in estimates is that CPS-FSS food security estimates come from a single time period of about 1 month in 2012, whereas the FoodAPS estimates come from a 10-month period.

SNAP Participation and Income Status and Characteristics of SNAP Participants

Table 6 shows estimates of SNAP participation based on SIPP and FoodAPS, including both the broad SIPP and SNAP SIPP household definitions. Both SIPP estimates of the share of SNAP participants match closely to those of FoodAPS, with all three showing that between 13.4 and 13.6 percent of households participated in SNAP. These estimates do not differ statistically across the surveys. The SIPP estimates of SNAP participation appear to be quite reliable given that they almost match FoodAPS estimates, which include information from SNAP administrative data. SIPP has been found to have much less underreporting of SNAP participation than other national surveys (Czajka and Denmead, 2008; Meyer et al., 2009).

For nonparticipants, estimates from FoodAPS show a smaller share of households in poverty compared with SIPP (about 5 percent for FoodAPS compared with 8 percent for SIPP, which is a statistically significant difference). FoodAPS also shows a smaller share for households with incomes between 100 and 185 percent of poverty compared with the SIPP broad household unit definition. Mean SNAP benefit levels for FoodAPS are smaller compared with the means from SIPP estimates ($250.66 per month compared with $280.97 for SNAP SIPP households, $299.31 for broad SIPP households, and $274 according to administrative data from fiscal year 2012 (Gray and Eslami, 2014)). These measures are not adjusted for household size, as FoodAPS SNAP households are larger than SNAP SIPP households (2.9 persons compared with 2.5 persons) but slightly smaller

Table 5
Household food sufficiency and food security status (30-day) for FoodAPS, CPS-FSS, and NHIS surveys

	FoodAPS N=4,826	CPS-FSS N=43,915†	NHIS N=43,307
Food sufficiency status (shares)			
Enough of the kinds of food we want to eat	63.95 (1.09)	74.96***,[1] (0.24)	n/a
Enough, but not always the kind of food we want to eat	30.70 (1.13)	19.97*** (0.22)	n/a
Sometimes not enough to eat	3.99 (0.37)	3.97 (0.11)	n/a
Often not enough to eat	1.36 (0.18)	1.10 (0.06)	n/a
Food security status (shares)			
High food security	69.22 (0.89)	86.36***,[1] (0.19)	80.62***,[1] (0.27)
Marginal food security	14.83 (0.76)	5.40*** (0.13)	7.62*** (0.16)
Low food security	9.41 (0.48)	4.90*** (0.12)	6.44*** (0.14)
Very low food security	6.54 (0.29)	3.34*** (0.10)	5.33*** (0.14)

Jackknife replicate weights were used to calculate the standard errors shown in parentheses. The standard errors used in the χ^2 tests were calculated by Taylor Series approximation and are not shown in this report.
†The sample size for CPS-FSS food security is 43,790 households.
[1]Difference between groups for categorical outcomes using χ^2 test is statistically significant for at least the 0.10 level.
*Compares mean spending estimates from CPS-FSS and NHIS with same estimates from FoodAPS using an unpooled standard error estimate, * p<0.10; ** p<0.05; *** p<0.01.
FoodAPS = National Household Food Acquisition and Purchase Survey; CPS-FSS = Current Population Survey-Food Security Supplement; NHIS = National Health Interview Survey; SNAP = Supplemental Nutrition Assistance Program.

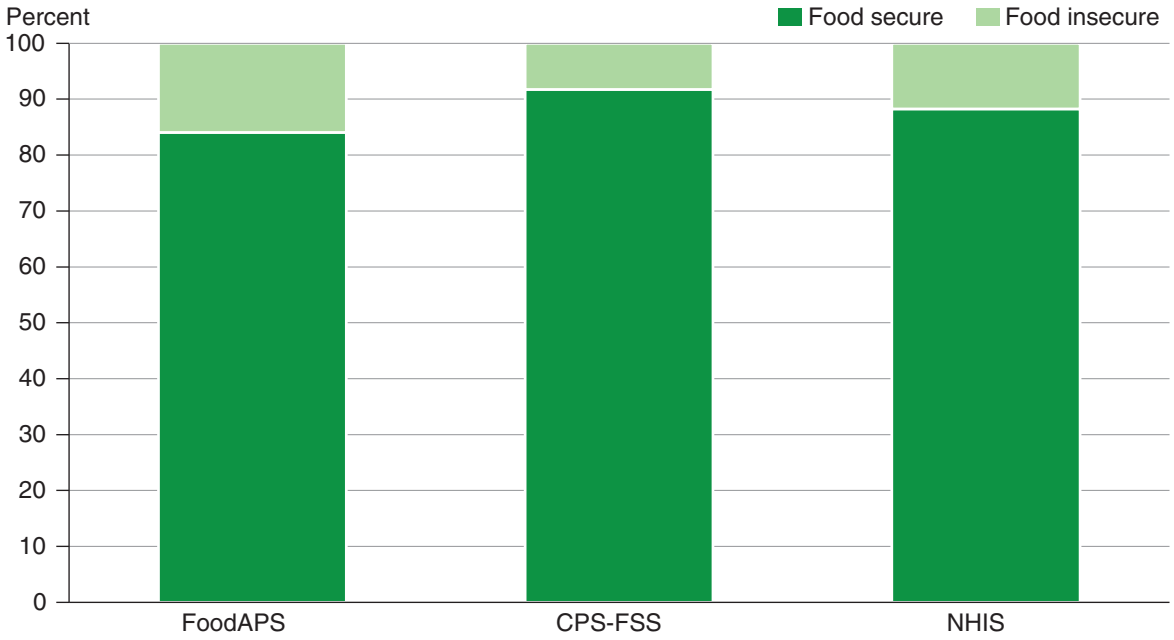
Source: USDA, Economic Research Service estimates using data from FoodAPS collected April 2012-January 2013. CPS-FSS estimates are from mid-November to mid-December, 2012. NHIS estimates are from 2012. All three measures are based on the 30-day adult food security scale. Two households in FoodAPS with missing information on SNAP status are excluded from the table.

than broad SIPP households (3.1 persons). So the differences in SNAP benefit amounts across surveys do not seem to be due to household size differences.

The estimates of income for SNAP households in SIPP vary by the definition of the household. FoodAPS estimates of total monthly income and income from different sources tend to be in between the two estimates from SIPP. Estimated total income from FoodAPS is 16 percent greater than the estimate from the SNAP SIPP unit ($1,469.55 per month for SIPP compared with $2051.57 for FoodAPS), but similar to the estimate for the broad SIPP unit ($2,122.32). Large differences in earnings and income from all other sources are the major sources of these differences. FoodAPS households have earnings averaging $1,253.43 per month compared with $846.48 for SIPP using the SNAP household unit and $1,320.69 using the broad SIPP household unit. FoodAPS households had much less income from other sources than SIPP households of both types (about $40 per month compared with $423 to $575 per month for the two SIPP estimates).

These results suggest that FoodAPS estimates of income are greater than what they may be in SNAP administrative systems because FoodAPS cannot precisely measure the SNAP unit(s) within households and, therefore, overestimates income for each SNAP household (e.g., when the household

Figure 2
Food security and food insecurity share estimates from FoodAPS, CPS-FSS, and NHIS



FoodAPS = National Household Food Acquisition and Purchase Survey, USDA; CPS-FSS = Current Population Survey-Food Security Supplement, U.S. Census Bureau; NHIS = National Health Interview Survey, Centers for Disease Control and Prevention.
Source: USDA, Economic Research Service.

actually contains two SNAP units and FoodAPS attributes all the income to a single unit). It also suggests that SIPP protocols for income data collection may be more explicit in the "other" income sources for which they request information, and thus respondents may report more.

Just under half (49 percent) of SNAP households contained children in FoodAPS, while 45 to 49 percent of households in SIPP contained children (the difference between the FoodAPS estimate and the broad SIPP estimate is statistically significant). SNAP administrative data show that 45 percent of households had children in 2012 (USDA, 2014). About 28 percent of SNAP households contained one elderly adult (age 60 or older) in FoodAPS compared with 21 to 23 percent in SIPP—the FoodAPS estimate differs statistically from both SIPP estimates. The monthly average from 2012 SNAP administrative data showed that 17 percent of SNAP households contained elderly adults (USDA, 2014).

The bottom of table 6 shows SNAP employment status for individuals age 16 and older in SNAP households from both surveys. For each employment status, FoodAPS estimates are different from those in SIPP. For example, 36 percent of working-age individuals in FoodAPS were employed compared with 32 percent in SIPP. A greater share of FoodAPS households was looking for work than in SIPP (15 percent compared with 11 percent). On the other hand, SIPP shows a much larger share of working-age individuals out of work or not looking for work (54 percent compared with 47 percent from FoodAPS).

Table 6

Estimates of SNAP participation and characteristics of SNAP, FoodAPS, and SIPP participants

	FoodAPS N=4,824	SIPP (SNAP household unit) N=32,116	SIPP (broad household unit) N=30,637
SNAP participation (percent)			
SNAP-participating households	13.64 (0.00)	13.60[1] (0.22)	13.36[1] (0.22)
Non-SNAP households			
Income < 100 percent of FPL	4.85 (0.39)	8.65*** (0.18)	8.12*** (0.18)
100 percent < income < 185 percent of FPL	12.69 (0.69)	13.49 (0.21)	14.02* (0.22)
Income > 185 percent of FPL	68.82 (0.60)	64.27*** (0.32)	64.51*** (0.31)
Characteristics of SNAP-participating households			
	N=1,581	N=4,563	N=4,270
Ratio of income-to-poverty threshold	1.28 (0.06)	1.04*** (0.03)	1.25 (0.03)
Mean household size[2]	2.90 (0.06)	2.47*** (0.03)	3.10*** (0.03)
Total monthly household income	2,051.57 (102.83)	1,469.55*** (42.05)	2,122.32 (55.29)
Earnings income	1,253.43 (89.15)	846.48*** (38.74)	1,320.69 (45.51)
Unemployment insurance income	66.68 (11.21)	45.04* (4.62)	58.43 (4.74)
Welfare, child support, alimony income	91.45 (11.32)	67.62** (3.29)	76.87 (3.62)
Retirement and disability income	589.30 (43.68)	454.16*** (17.20)	572.73 (31.11)
Investment income	10.56 (3.65)	6.07 (1.92)	9.27 (2.16)
Income from all other sources	40.16 (7.03)	423.21*** (17.45)	574.67*** (31.87)
Monthly SNAP benefit level	250.66 (8.10)	280.97*** (3.75)	299.31*** (3.96)
Share of households with children	48.78 (1.95)	48.79 (0.88)	45.00* (0.88)
Mean number of children in households with children	2.13 (0.05)	2.10 (0.03)	2.10 (0.03)
Share of households with elderly adults (age 60+)	27.74 (2.01)	21.39***,[1] (0.67)	23.00**,[1] (0.69)
Mean number of elderly adults (age 60+) in households with elderly	1.19 (0.02)	1.15* (0.01)	1.18 (0.01)

Continued—

Table 6
Estimates of SNAP participation and characteristics of SNAP, FoodAPS, and SIPP participants—continued

	FoodAPS individuals N=3,525	SIPP individuals N=7,331
Employment status of individuals, age 16+ years old in SNAP-participating households		
Works at a job or business	35.90 (1.48)	31.71***,[1] (0.66)
Is with a job or business but is not at work	1.68 (0.45)	2.80** (0.23)
Looking for work	14.95 (1.28)	11.12*** (0.45)
Not working at a job or business	47.47 (1.23)	54.38*** (0.71)

Jackknife replicate weights were used to calculate the standard errors shown in parentheses. The standard errors used in the χ^2 tests were calculated by Taylor Series approximation and are not shown in this report.
[1]Difference between groups for categorical outcomes using χ^2 test is statistically significant for at least the 0.10 level.
*Compares mean spending estimates from SIPP with same estimates from FoodAPS using an unpooled standard error estimate, * p<0.10; ** p<0.05; *** p<0.01.
[2]The variable HHSIZE used to calculate FoodAPS mean household size excluded guests.
FoodAPS = National Household Food Acquisition and Purchase Survey; SIPP = Survey of Income and Program Participation; FPL = Federal Poverty threshold for family size; SNAP = Supplemental Nutrition Assistance Program.

Source: USDA, Economic Research Service estimates using data from FoodAPS collected April 2012-January 2013. SIPP estimates calculated consider the SNAP unit and a broad household resident unit. The SNAP unit more closely matches SNAP eligibility guidelines. The broad household unit matches the FoodAPS household unit.

Diet and Health

Table 7 presents estimates of dietary behavior and health outcomes for FoodAPS and NHANES. The sample sizes for NHANES and FoodAPS vary across variables because the ages and population reference groups to whom the questions are addressed vary. The number of observations used is shown in separate columns adjacent to each survey's estimates.

Self-reported dietary health of the reference person in the FoodAPS and NHANES samples are similar, although FoodAPS estimates show a greater share with very good diets (28 percent compared with 23 percent) and NHANES shows a greater share with good diets (43 percent compared with 37 percent). The χ^2 test for self-reported dietary health was statistically significant for at least the 0.10 level. FoodAPS estimates show a greater share of individuals who were dieting at the time of the survey compared with NHANES (16 percent compared with 12 percent). FoodAPS estimates a much lower share of school-age children receiving free or reduced-price school lunches than NHANES (65 percent compared with 82 percent). Both estimates are greater than estimates of the share of schoolchildren receiving free and reduced-price lunches based on administrative data and the Current Population Survey. Administrative data estimates show that 40 percent of children age 5 to 17 years old in the United States and U.S. territories of Guam, Puerto Rico, and the Virgin

Table 7
Diet and nutrition knowledge and behavior and health-outcome estimates from FoodAPS and NHANES

	FoodAPS	Number of observations	NHANES	Number of observations
Diet and health behavior				
Reported diet healthfulness of primary respondent/sample person (shares)		4,826		6,168
Excellent	9.38 (0.92)		9.61[1] (0.67)	
Very good	28.10 (0.93)		22.72*** (0.97)	
Good	36.87 (1.03)		42.87*** (0.88)	
Fair	20.52 (0.91)		20.09 (0.95)	
Poor	5.13 (0.45)		4.70 (0.44)	
Individual is currently on a diet (share)	16.94 (0.01)	14,317	11.80***,[1] (0.60)	8,618
School-age child receives school lunch (share)	65.16 (1.60)	3,823	81.59***,[1] (1.66)	2,416
Individual smokes or chews tobacco, age 20+ years old (share)	21.34 (0.93)	9,472	45.32***,[1] (2.22)	2,369
Food allergies and restrictions of individuals in samples				
Any food allergies (share with allergies)	7.32 (0.38)	14,304	8.59**,[1] (0.37)	10,088
Lactose intolerant (share)	8.41 (0.33)	14,293	2.28***,[1] (0.24)	10,537
Nutrition information knowledge and behavior (household reference person)				
Heard of MyPyramid? (share)	53.63 (2.01)	4,824	57.91 (1.92)	6,174
Frequency of searching the nutrition facts panel on foods (shares)		4,824		5,189
Always	16.72 (1.13)		13.01***,[1] (0.52)	
Most of the time	24.68 (1.15)		30.64*** (0.62)	
Sometimes	29.74 (1.03)		35.49*** (0.81)	
Rarely	11.27 (0.79)		13.98*** (0.52)	
Never	16.92 (0.86)		6.74*** (0.45)	
Never seen	0.66 (0.14)		0.14*** (0.04)	

Continued—

Table 7
Diet and nutrition knowledge and behavior and health-outcome estimates from FoodAPS and NHANES—continued

	FoodAPS	Number of observations	NHANES	Number of observations
Health status and body weight measures				
General health status (shares)		14,305		5,892
Excellent	19.42 (0.92)		12.65***,[1] (0.85)	
Very good	31.59 (1.09)		34.12 (1.22)	
Good	34.70 (1.13)		38.05** (1.24)	
Fair	11.82 (0.49)		13.08 (0.78)	
Poor	2.46 (0.17)		2.11 (0.31)	
Weight, age 2+ years old (mean in pounds)	156.57 (0.99)	13,404	156.84 (1.06)	9,243
Height, age 2+ years old (mean in inches)	64.18 (0.15)	13,464	63.78* (0.15)	8,615
Body mass index, age 2+ years old (mean)	26.09 (0.13)	13,108	26.66*** (0.17)	9,412
Overweight, 25 < BMI < 30, age 2+ years old (share)[2]	30.17 (0.65)	13,108	25.40***,[1] (1.17)	8,602
Obese, BMI > 30, age 2+ years old (share)	28.09 (0.93)	13,108	26.32 (0.92)	8,602

Jackknife replicate weights were used to calculate the standard errors shown in parentheses. The standard errors used in the χ^2 tests were calculated by Taylor Series approximation and are not shown in this report.
[1]Difference between groups for categorical outcomes using χ^2 test is statistically significant for at least the 0.10 level.
[2]BMI<25 not shown. BMI-for-age was used to classify the overweight and obese status for children between ages 2 to 19 years old.
*Compares mean spending estimates from SIPP with same estimates from FoodAPS using an unpooled standard error estimate, * p<0.10; ** p<0.05; *** p<0.01.
BMI = body mass index; FoodAPS = National Household Food Acquisition and Purchase Survey; NHANES = National Health and Nutrition Examination Survey; SIPP = Survey of Income and Program Participation.

Sources: USDA, Economic Research Service estimates using data from FoodAPS collected April 2012-January 2013. NHANES estimates are from 2011-12 except for the nutrition facts, food allergy, and lactose intolerance variables that use NHANES estimates from 2009-10.

Islands received free or reduced-price lunch in October 2012.[6] FoodAPS has a smaller share of tobacco users than NHANES by nearly one-third—21 percent compared with 45 percent. Both surveys find qualitatively similar estimates of the shares with food allergies (between 7 to 9 percent of the sample), but this difference is statistically significant. FoodAPS estimates show a much greater share with lactose intolerance than the NHANES—9 percent compared with 2 percent. The t-test for each of these binary-share estimates was statistically significant at the 0.01 level.

Estimates of shares reporting knowledge of MyPyramid are similar in both surveys as represented by insignificant t-statistics. The overall distributions of frequency of use of nutrition-facts panels

[6]Data on school-lunch receipt are from: http://www.fns.usda.gov/pd/child-nutrition-tables/ and estimates of the number of children age 5 to 17 years old are from the Current Population Survey. These estimates are not quite comparable to those from FoodAPS or NHANES—the FNS data include children from Alaska, Hawaii, and the three U.S. territories named above, although they only include children age 5 to 17 years old, while our FoodAPS and NHANES estimates include children age 4 to 19 years old but not children in Alaska, Hawaii, or the three territories.

were significantly different for FoodAPS compared with NHANES. NHANES provided source examples and detailed descriptions of nutrition-facts panels on food items before asking about frequency of use of such panels. However, FoodAPS did not provide such detailed information before its nutrition-facts panel question. This could explain the differences between the estimates for the two surveys on this question.

FoodAPS respondents are more likely to report they are in excellent health relative to NHANES respondents (19 percent compared with 13 percent). But NHANES respondents were slightly more likely to report that they were in very good health than FoodAPS respondents (34 percent compared with 32 percent). The distribution of responses to the health status question was different across the two surveys and was statistically significant as measured by the χ^2 test.

It is interesting to note that the body measures for NHANES and FoodAPS are almost identical with, at most, a 2-percent difference for height, weight, and BMI, although the average BMI estimate for FoodAPS is slightly smaller than that for NHANES (26.12 compared with 26.65). The PR-reported body measures from FoodAPS match relatively well to the benchmark of measured height and weight from the NHANES. Estimates of the shares of overweight are, however, different, with FoodAPS estimating almost 31 percent overweight and NHANES estimating just over 25 percent overweight. FoodAPS also estimates a larger share who are obese than NHANES; however, this difference is not statistically significant. We note that NHANES estimates are from 2011-12, so changes in the overall populations' weight status between 2011 and 2012 are not reflected in the NHANES estimates but presumably are in FoodAPS. Also, the NHANES estimates were collected by trained medical technicians, whereas the FoodAPS estimates were collected by the primary respondent for the household. This could account for differences between NHANES and FoodAPS estimates, even after controlling for differences in survey collection years.

Conclusions

Descriptive estimates of food spending, food security, SNAP participation, and diet and health behaviors from FoodAPS included in this report are within plausible bounds of estimates from other surveys. This gives us confidence that FoodAPS provides researchers quality data on these key measures for future research. However, we were not able to compare all the major variables of interest, and some remaining differences in survey questions or techniques could not be resolved.

Some FoodAPS questions were worded so specifically that there were no counterparts on other surveys. Particular examples were questions regarding dietary behavior such as attendance of classes on nutrition education, consumption of the correct amount of fruits and vegetables, and knowledge of MyPlate.

The techniques used to compare estimates across surveys could also affect comparability. For example, we assumed that IRI-surveyed individuals with no recorded purchases that week actually did not spend money on FAH that week. Whereas in FoodAPS, we are more confident that if a respondent did not report spending, then they truly spent zero on FAH. Alternatively, we could have dropped households with zero FAH spending from IRI estimates. This treatment would have to be the same across surveys for the resulting estimates to be useful in comparisons.

In some instances, FoodAPS was able to borrow from the instruments of established surveys, so some similarities would be expected. However, when combined with other FoodAPS questions, the focus of FoodAPS on food purchases and acquisitions, different interview modes, and survey field training and operations, it would be unrealistic to expect no differences in estimates from FoodAPS and the other surveys examined here. For example, it is possible that the intense focus on food in FoodAPS, along with the diaries given to respondents to record FAH and FAFH purchases, elicits greater recall of food spending than the CE survey and the IRI panels for FAH. Because IRI is a panel data collection where households provide information over longer periods of time, panelists may feel more burden from the survey and underreport spending, especially for smaller food shopping trips or for shopping trips that mixed food purchases with purchases of other goods. This is another example of differences in estimates between FoodAPS and other surveys that could not be overcome by survey concordance techniques.

For some variables, the wording is not identical in each survey, and thus respondents could have interpreted and responded to each question differently. Further, FoodAPS is more explicit in attempts to capture food spending by all household members than the IRI panel, and estimates may reflect this. Future work could examine differences in food spending across broad categories of food.

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Glossary

Acronym	Definition
ALERT	Anti-fraud locator using electronic-benefit-transfer (EBT) retailer transactions
BLS	Bureau of Labor Statistics
BMI	Body mass index
CDC	Centers for Disease Control and Prevention
CE	Consumer Expenditure Survey
CPI	Consumer Price Index
CPS-ASEC	Current Population Survey-Annual Social and Economic Supplement
CPS-FSS	Current Population Survey-Food Security Supplement
ERS	Economic Research Service
FAFH	Food away from home
FAH	Food at home
FNS	Food and Nutrition Service
FoodAPS	National Household Food Acquisition and Purchase Survey
FPL	Federal Poverty threshold for family size
NHANES	National Health and Nutrition Examination Survey
NHIS	National Health Interview Survey
PIR	Poverty-to-income ratio
PSU	Primary sampling unit
PPS	Probability proportional to size
PR	Primary respondent
SIPP	Survey of Income and Program Participation
SNAP	Supplemental Nutrition Assistance Program
UPC	Universal product code