Economic Research Service
U.S. DEPARTMENT OF AGRICULTURE

# Understanding Data About the Supplemental Nutrition Assistance Program (SNAP) in the Circana Consumer Network Panel

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**Recommended citation format for this publication:**

Gregory, C. A. (2025). *Understanding data about the Supplemental Nutrition Assistance Program (SNAP) in the Circana Consumer Network Panel* (Report No. TB-1969). U.S. Department of Agriculture, Economic Research Service.



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# Understanding Data About the Supplemental Nutrition Assistance Program (SNAP) in the Circana Consumer Network Panel

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## Abstract

The Circana (formerly IRI) Consumer Network Panel contains a wealth of information on consumer food-at-home choices, store channels, store locations, and prices paid, as well as demographics of the respondent households. This report investigates the quality of two variables related to the Supplemental Nutrition Assistance Program (SNAP) participation: a participation indicator and a utilization indicator. Both indicators are self-reported, and both could be used to examine the food-at-home purchase behavior of SNAP households. The report finds that the utilization and participation indicators sometimes contradict each other and that monthly patterns of participation implied by the utilization indicator are significantly different from survey and administrative records. However, as a stand-in for annual SNAP participation, the utilization indicator yields estimates like other Federal survey data collections. The report also finds that the SNAP sample in Circana has higher income than the SNAP population, that differences in spending contradict what is known from other research, and that SNAP households' food-at-home spending declines over the SNAP month.

**Keywords:** Scanner data, Circana, SNAP, Supplemental Nutrition Assistance Program

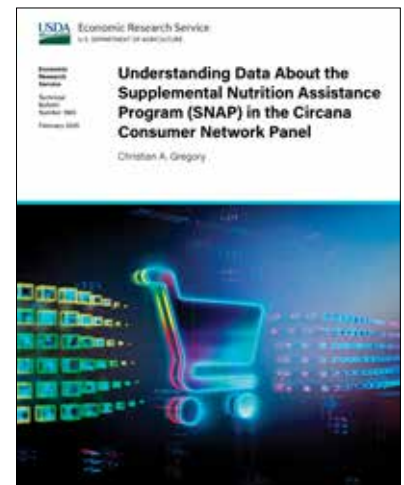## Acknowledgments

## About the Author

Christian Gregory is a research economist in the Food Assistance Branch of the USDA, Economic Research Service. His work focuses on SNAP, health, and food security.

# Contents

# Understanding Data About the Supplemental Nutrition Assistance Program (SNAP) in the Circana Consumer Network Panel

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## What Is the Issue?

The Circana (formerly, IRI) Consumer Network panel is a proprietary dataset that can be used to understand food prices, food demand, the food environment, consumer shopping behavior, and the relationships among them. This dataset is particularly relevant for food, nutrition, and health research. Circana's advantages over other sources of data on food purchases and health include its unevenly spaced panel data, detail of purchase information, short data production schedule, and the duration of collection. One notable feature is the inclusion of two indicators of household SNAP participation: one captures point-in-time participation; the other captures utilization. This report examines the quality of those indicators for the years 2018–20 and assesses the prospects of using the indicators in diet, health, and nutrition research.

## What Did the Study Find?

- Almost half of respondent households in the static panel do not indicate whether they participated in SNAP in June.

- The SNAP participation indicator collected in June and the SNAP utilization indicator collected continuously throughout the year sometimes do not agree with each other.

- When benchmarking monthly SNAP utilization in Circana against Federal surveys and administrative totals, this report finds that Circana substantially underreports the number of SNAP participants during the year; additionally, the annual profile of month-by-month SNAP usage constructed by using the utilization indicator also indicates substantial underreports.

- However, using the utilization measure of SNAP as a proxy for annual participation leads to estimates of participation that are comparable to Federal surveys.

- Using the utilization measure of SNAP participation leads to estimates of monthly participation that are between 25 and 40 percent below those of administrative totals.

- The Circana SNAP sample has higher incomes than the SNAP population, as represented by the SNAP characteristics report based on quality control data.

- Comparisons of SNAP and non-SNAP households in Circana (even unconditional on income)[1] show little difference in levels of food spending.

- Monthly patterns of spending for SNAP households in Circana show decreased levels of spending at the end of the SNAP month, which is consistent with studies using other data sources.

- Circana consumer network panel data, compared to that in the Consumer Expenditure Survey, underestimate monthly food-at-home expenditures for SNAP participants by more than 30 percent.

## How Was the Study Conducted?

This study uses the 2018–20 Circana Consumer Network panel data to tabulate summary measures of participation in and utilization of SNAP. The report compares the declared monthly utilization of SNAP with administrative totals available from the U.S. Department of Commerce, Bureau of the Census (Census Bureau) and the USDA, Food and Nutrition Service (FNS). Additionally, the report examines differences in SNAP yearly participation with that recorded in the Federal surveys—particularly the Current Population Survey Food Security Supplement, the Survey of Income and Program Participation, and the Medical Expenditure Panel Survey—as well as administrative microdata. The report examines the agreement between two indicators of SNAP participation in the data, SNAP participation rates by year and by month, demographic characteristics of SNAP participant households compared to administrative data, measures of monthly food-at-home expenditure in SNAP and non-SNAP households and expenditure patterns among SNAP households across the benefit month.

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[1] This report focuses primarily on measurement errors in the SNAP indicators, rather than the sampling error that is indicated by the descriptions of shopping behavior and demographics.

# Understanding Data About the Supplemental Nutrition Assistance Program (SNAP) in the Circana Consumer Network Panel

## Introduction

The Circana (formerly, IRI) Consumer Network panel is an important proprietary dataset that supports research on food prices, food demand, the food environment, consumer shopping behavior, and the relationships between them. The USDA, Economic Research Service (ERS) has been a steward of these data since 2012.[2] USDA, ERS has produced documentation for the data, procedures for linking the data to USDA nutrition databases, a description of the data's statistical properties, and comparisons of food expenditures to Government data collections (Carlson et al., 2019; Levin et al., 2018; Muth et al., 2016; Sweitzer et al., 2017).

The underlying data presented and managed by Circana is collected by the National Consumer Panel (NCP), which is jointly owned by the private companies Circana and Neilsen. Households are recruited into participating in the sample by online advertising in a range of media. Those that register do so through NCP's internet site and provide detailed demographic information on the site. For the duration of their participation in the panel, households are provided incentives to record all the Universal Product Codes (UPC) for goods purchased.[3]

Since 2017, an indicator of SNAP participation has been collected once a year in June. The indicator records respondent answers to an email query about Federal assistance programs that members of the household take part in (SNAP-June).[4] A second potential indicator of SNAP utilization records the method of payment at the item-level, as reported by the survey respondent (SNAP-Pay).

There are potential limitations to the participation (SNAP-June) and utilization (SNAP-Pay) indicators. For example, between 2018 and 2020, almost half of the households in the Circana static panel did not respond to the question about participation.[5] And even though the utilization indicator is assigned in the data on the item level, it is not applied to each item in practice. Instead, respondents choose a single method of payment for an entire shopping trip; even if SNAP is among the methods of payment for a trip, only one method will be recorded. This leads to underreports of SNAP utilization. As a result of these limitations, there are non-trivial challenges to identifying SNAP participation in the Circana consumer network panel data.

Understanding the quality of SNAP indicators in Circana is important because these data maintain several structural advantages over Federal data collections that address aspects of the food choices. For example, the National Health and Nutrition Examination Survey (NHANES) collects food spending data once per

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[2] USDA, Economic Research Service has access to data that date from 2008 but received the 2008–12 data all at once in 2013.

[3] Details about the sample recruitment and general information about Circana can be found in Muth et al. (2016).

[4] The SNAP indicator was also collected biannually, in January and June, from 2014–16.

[5] The static panel is the set of households that consistently give their purchase information to Circana. One criterion for inclusion is that static panel households will report their expenditures at least once every 4 weeks for 80 percent of the time periods in a calendar year or at least once for 11 of 13 4-week periods in a year; there are some spending thresholds for inclusion as well. See Muth et al. (2016). In 2020, of 124,000 total households, roughly 61,500 were counted as being in the static panel.

**1**

*Understanding Data About the Supplemental Nutrition Assistance Program (SNAP) in the Circana Consumer Network Panel*, TB-1969
USDA, Economic Research Service

biennial collection cycle and only provides aggregate spending, rather than detailed spending on food items. NHANES has been used to study food spending, food consumption, and food label use, among other topics. The complex and multifaceted nature of this data collection, which is its strength, also affects timeliness in collection and data publication (Taylor et al., 2023). USDA, ERS's National Household Food Acquisition and Purchase Survey (FoodAPS), fielded in 2012, includes a week's worth of food purchase and acquisition data. These data provide a rich set of demographic and background variables and a match to administrative SNAP records for a representative sample of U.S. households and for low-income and SNAP participating populations. Among the advantages of Circana, relative to these data collections, are timeliness and duration of collection. The Circana consumer network panel is available on a relatively short (18–24 months) turn-around. Households in the Circana static panel give product level information for every shopping trip and are followed for at least 1 calendar year, whereas FoodAPS covers a period covering 7 days and NHANES acquires spending data once. The U.S. Department of Labor, Bureau of Labor Statistics' Consumer Expenditure Survey is also highly regarded by researchers and Federal statistical agencies for food expenditures; but the survey does not provide UPC-level expenditure for households as the Circana CN panel does and does not provide household information over time.

The potential value of Circana data also been highlighted by challenges faced by Federal data collections. In general terms, the household survey, considered by social science researchers as the bedrock of much of what is known in social science, is experiencing a period of declining item- and survey-response rates (Meyer et al., 2015). Two major sources of data on food and health have their own particular challenges. For NHANES, these challenges stem from difficulties in collection during the Coronavirus (COVID-19) pandemic that inhibited field operations and data collection. NHANES' recent redesign of its intricate survey may also explain some of its challenges (Taylor et al., 2023).[6] USDA, Economic Research Service's Food APS-2, will go back into the field in 2027.

At the same time, there are several characteristics of the Circana consumer network panel that suggest caution. First, as opposed to NHANES and FoodAPS, the panel is a self-selected, nonprobability sample of households. Second, the annual profiles of monthly participants are indicative of underreporting and, hence, misclassification. These qualities suggest caution on the part of the researcher.

This study examined the quality of the SNAP participation and utilization indicators in the Circana Consumer Network panel. This report shows:

- How estimates of SNAP participation (based on the method-of-payment indicator) differ from estimates using population level administrative records data for years 2018 through 2020;

- The characteristics of the SNAP sample in Circana compared to what is known using SNAP quality control data; and,

- SNAP spending and shopping behavior in the Circana data.

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[6] NHANES will resume data collection in January 2025, having used 2024 to execute its redesign.

# SNAP Reporting

In the years 2018–20, the Circana consumer network panel data have two indicators relevant to SNAP participation. One is collected in June, as the response to an email query sent to consumer network panel households. The text of the item is in the box "Yearly Circana SNAP Participation Email Inquiry."

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**Yearly Circana SNAP Participation Email Inquiry**

Do you or anyone in your household participate in any of the following government programs? Please select all that apply.

WIC (Special Supplemental Nutrition Program for Women, Infants, and Children)

Food Stamps/SNAP (Supplemental Nutrition Assistance Program)

Social Security Benefits

Medicare Part D

Medicaid

Unemployment

None of these

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Circana told USDA, ERS in an email that the SNAP-June indicator should be understood to be a point-in-time indicator, meaning that it only reflects responses to participation in June, not the other months.

The mode of payment for each item in the shopping trip is also collected and indicates whether SNAP was used as the payment method (SNAP-Pay) for any purchase over the year.[7] In practice, the method of payment variable never collects mixed methods of payments: shopping trips that have more than one method of payment are not usually coded as a SNAP purchase even if the trips include items paid for with SNAP benefits.

These two methods of characterizing households are sometimes not in agreement. Table 1 shows a cross-tabulation of households in the static panel of the consumer network panel data that affirm each of the SNAP indicators for each year. The cells are unweighted counts of respondents; rows show the participation indicator collected in June (SNAP-June); columns show utilization (SNAP-Pay) for any purchase over the year.

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[7] Although the method of payment is assigned at the item level, it is collected at the time of the shopping trip; everything in each shopping trip is assigned a single method of payment.

Table 1
**Unweighted counts of SNAP indicators in Circana, 2018–20**

| 2018 | | |
|---|---|---|
| | SNAP Pay = 0 | SNAP Pay = 1 |
| SNAP June = 0 | 32,011 | 719 |
| SNAP June = 1 | 1,399 | 1,241 |
| SNAP June = . | 28,327 | 1,241 |
| **2019** | | |
| | SNAP Pay = 0 | SNAP Pay = 1 |
| SNAP June = 0 | 30,334 | 852 |
| SNAP June = 1 | 1,291 | 1,409 |
| SNAP June = . | 29,679 | 1,687 |
| **2020** | | |
| | SNAP Pay = 0 | SNAP Pay = 1 |
| SNAP June = 0 | 30,008 | 1,591 |
| SNAP June = 1 | 1,180 | 2,305 |
| SNAP June = . | 26,192 | 2,923 |

SNAP = Supplemental Nutrition Assistance Program, "." = missing.

Note: Sample includes only persons with positive projection factors. SNAP June indicates affirmation of the question that was distributed by Circana about SNAP participation. SNAP Pay indicates that the respondent claimed at least one purchase paid for with SNAP during the year.

Source: USDA, Economic Research Service calculation using Circana Consumer Network Panel Data.

The disagreement of these two SNAP indicators is not entirely surprising. Research using administrative data has shown that, although a sizeable fraction of SNAP participants remains on the program for more than 1 year, the median spell in normal times can be between 7 and 8 months (Edwards et al., 2016; Gray, 2019). In that sense, an indicator meant only to indicate participation in June would not be expected to entirely agree with a method of payments indicator for every month. What is surprising is that, among those who asserted that they participated in June, between one-third and one-half claimed to have no payments with SNAP in June or any other month (table 1). In the month of June, among those who affirmed the SNAP-June item, relatively few claimed SNAP purchases in that month (table 2).

Table 2
**Fraction with no SNAP purchase for those affirming SNAP, June 2018–20**

| | 2018 | 2019 | 2020 |
|---|---|---|---|
| No SNAP purchase in June | 0.74 | 0.75 | 0.62 |
| Standard error | 0.045 | 0.041 | 0.036 |
| N | 2,640 | 2,700 | 3,485 |

SNAP = Supplemental Nutrition Assistance Program, N = number of unweighted observations.

Note: Data include persons with positive projection factors and for whom the SNAP June indicator indicates program participation. Estimates are the proportion of those indicating SNAP participation in June that do not indicate that SNAP was used for payment during that month.

Source: USDA, Economic Research Service calculation using Circana Consumer Network Panel Data.

Additionally, nearly half of all respondents provided no information about the SNAP-June inquiry (44, 45, and 40 percent in 2018, 2019, and 2020, respectively) (table 1). Missing data alone need not pose a problem for research; however, determining the appropriate estimation method for statistics derived from this measure

*Understanding Data About the Supplemental Nutrition Assistance Program (SNAP) in the Circana Consumer Network Panel,* TB-1969
USDA, Economic Research Service

requires one to make untestable assumptions about the relationship between whether a variable is missing and its value, among other things. In this case, even robust estimation methods are likely to be biased (Newman, 2014; Rotnitzky & Vansteelandt, 2015; Kenward & Molenberghs, 2015).

In the context of this finding and the limitation of the single month (SNAP-June) measure of self-reported participation, it would seem better from a research point of view, to use the method of payment indicator for SNAP participation. If taken as indicating SNAP participation, this measure would be correct if only one purchase during the month were attributed to SNAP. However, the measure would still be subject to under-reports because it will miss purchases made with mixed payment methods or when the household respondent makes errors or just doesn't respond. To examine how well these data approximate the prevalence of SNAP participation, table 3 shows the population prevalences for SNAP participation from administrative totals available from the Food and Nutrition Service (FNS Key Data), as well as weighted estimates using the Circana consumer network panel.

Table 3
**Monthly SNAP prevalence: Circana versus administrative totals, 2018–20**

|  | FNS/Census | Circana estimate | Lower bound | Upper bound |
|---|---|---|---|---|
| **2018** | | | | |
| Jan | 0.114 | 0.055 | 0.053 | 0.058 |
| Feb | 0.114 | 0.052 | 0.050 | 0.055 |
| Mar | 0.115 | 0.056 | 0.053 | 0.058 |
| Apr | 0.126 | 0.057 | 0.054 | 0.059 |
| May | 0.131 | 0.059 | 0.057 | 0.062 |
| Jun | 0.132 | 0.064 | 0.062 | 0.067 |
| Jul | 0.132 | 0.065 | 0.063 | 0.068 |
| Aug | 0.131 | 0.064 | 0.061 | 0.067 |
| Sep | 0.132 | 0.062 | 0.059 | 0.064 |
| Oct | 0.123 | 0.064 | 0.061 | 0.067 |
| Nov | 0.121 | 0.061 | 0.059 | 0.064 |
| Dec | 0.120 | 0.060 | 0.057 | 0.063 |
| **2019** | | | | |
| Jan | 0.126 | 0.064 | 0.061 | 0.067 |
| Feb | 0.023 | 0.058 | 0.056 | 0.061 |
| Mar | 0.117 | 0.063 | 0.060 | 0.066 |
| Apr | 0.116 | 0.065 | 0.062 | 0.068 |
| May | 0.116 | 0.071 | 0.068 | 0.074 |
| Jun | 0.116 | 0.076 | 0.073 | 0.079 |
| Jul | 0.116 | 0.077 | 0.075 | 0.081 |
| Aug | 0.117 | 0.075 | 0.072 | 0.078 |
| Sep | 0.116 | 0.074 | 0.071 | 0.077 |
| Oct | 0.116 | 0.077 | 0.073 | 0.079 |
| Nov | 0.116 | 0.073 | 0.070 | 0.076 |
| Dec | 0.115 | 0.073 | 0.070 | 0.076 |

| | FNS/Census | Circana estimate | Lower bound | Upper bound |
|---|---|---|---|---|
| **2020** | | | | |
| Jan | 0.114 | 0.069 | 0.066 | 0.072 |
| Feb | 0.114 | 0.069 | 0.064 | 0.070 |
| Mar | 0.115 | 0.070 | 0.067 | 0.073 |
| Apr | 0.126 | 0.077 | 0.074 | 0.080 |
| May | 0.131 | 0.083 | 0.080 | 0.087 |
| Jun | 0.132 | 0.091 | 0.088 | 0.095 |
| Jul | 0.132 | 0.093 | 0.090 | 0.097 |
| Aug | 0.131 | 0.092 | 0.089 | 0.095 |
| Sep | 0.132 | 0.089 | 0.086 | 0.093 |
| Oct | 0.129 | 0.091 | 0.088 | 0.095 |
| Nov | 0.128 | 0.090 | 0.087 | 0.094 |
| Dec | 0.127 | 0.089 | 0.086 | 0.093 |

SNAP = Supplemental Nutrition Assistance Program, FNS = Food and Nutrition Service.

Note: In Circana, households are counted as participating in SNAP in each month if the households reported a purchase made with SNAP that month. Monthly estimates of SNAP prevalence are calculated from FNS totals divided by monthly population estimates. FNS data are from SNAP Data Tables from the Food and Nutrition Service. Monthly population estimates come from the U.S. Department of Commerce, Bureau of the Census National Population Totals, 2010–2019, 2020–2022.

Source: USDA, Economic Research Service calculation based on Circana consumer network panel data.

Although the method-of-payment indicator might be preferred to the SNAP-June indicator because of missing values and frequency in the latter, there are limits to the usefulness of the assumption that the utilization indicator is measuring participation. For each year, the estimates from Circana are a fraction of the participation calculated using administrative totals from FNS KeyData and Census population totals (table 3). For each year, the study counts only the method-of-payment indicators. In general, these statistics indicate that SNAP benefit use in Circana under reports SNAP participation in general. However, the degree to which that assumption is true is unknown, unlike some Federal data collections, about which more is known about under-reporting rates (Meyer et al., 2009, 2022)

The estimates from February 2019 demonstrate another limitation of the assumption that SNAP payment and contemporary participation in the program are measuring the same thing. During this month, a shutdown of the Federal Government reduced the SNAP participation rolls to roughly 2 percent of the population. However, more than 5 percent of Circana households indicated payment with SNAP benefits. This latter finding would have been possible because, nationwide, those February SNAP benefits were distributed by January 20 in that year but can be used at any time. However, in theory, the finding points to the possibility that those claiming to use SNAP benefits might not be concurrently enrolled in the program but using benefits that remain on their Electronic Benefit Cards from a previous month. In this case, the Circana SNAP method of payment indicator over-reports SNAP participation.

As all Federal surveys that collect information on SNAP participation have SNAP reporting problems, it is reasonable to wonder whether reporting problems in the Circana consumer network panel are all that different than Federal surveys. To gauge the extent to which this is true, table 4 shows a weighted tabulation of the number of months receiving SNAP for each calendar year (2018, 2019, and 2020) for participants in the Medical Expenditure Panel Survey (MEPS), the Current Population Survey December Food Security Supplement (CPS-FSS), and the Survey of Income and Program Participation (SIPP). The Medical Expenditure Panel Survey (MEPS) is a nationally representative Federal survey that collects data on health conditions, utilization, and expenditure; the Current Population Survey (CPS) is the official source of

employment and poverty statistics in the United States; and the Survey of Income and Program Participation (SIPP) is a source of statistics on income and program participation for the United States. Information from these sources is compared with data on the number of months that SNAP was utilized as a payment method for the same calendar years for the Circana consumer network panel data. The left three panels of the table show the fraction of respondents that say they participated in SNAP for the given number of months in MEPS, CPS, and SIPP—while the right panel pertains to the Circana consumer network panel data based on the SNAP-Pay measure. In all the tabulations, the implied participation in SNAP for each year can be ascertained by taking 1 minus the fraction of respondents who report not utilizing SNAP during the year. These results show that, used as a proxy for annual participation, the payment indicator (any SNAP payment during the year) leads to estimates of SNAP participation like those in Federal surveys.

Table 4
**Number of months (percent of total population) in SNAP in three Federal surveys and Circana, 2018–20**

| Months on SNAP | MEPS | | | CPS FSS | | | SIPP | | | Circana | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2018 | 2019 | 2020 | 2018 | 2019 | 2020 | 2018 | 2019 | 2020 | 2018 | 2019 | 2020 |
| 0 | 89.11 | 90.13 | 87.83 | 92.24 | 92.56 | 91.59 | 95.05 | 95.38 | 94.83 | 93.48 | 92.30 | 86.91 |
| 1 | 0.27 | 0.18 | 0.80 | 0.47 | 0.37 | 0.70 | 0.05 | 0.08 | 0.08 | 0.97 | 1.34 | 2.47 |
| 2 | 0.27 | 0.15 | 0.43 | 0.20 | 0.20 | 0.37 | 0.07 | 0.10 | 0.11 | 0.65 | 0.65 | 1.57 |
| 3 | 0.29 | 0.36 | 0.44 | 0.29 | 0.32 | 0.35 | 0.08 | 0.07 | 0.11 | 0.55 | 0.58 | 1.00 |
| 4 | 0.26 | 0.25 | 0.44 | 0.19 | 0.21 | 0.24 | 0.06 | 0.08 | 0.09 | 0.48 | 0.40 | 0.87 |
| 5 | 0.18 | 0.31 | 0.35 | 0.17 | 0.16 | 0.23 | 0.05 | 0.05 | 0.07 | 0.38 | 0.52 | 0.58 |
| 6 | 0.72 | 0.60 | 0.59 | 0.25 | 0.27 | 0.26 | 0.04 | 0.09 | 0.06 | 0.42 | 0.45 | 0.63 |
| 7 | 0.17 | 0.10 | 0.32 | 0.14 | 0.20 | 0.22 | 0.06 | 0.07 | 0.07 | 0.44 | 0.46 | 0.62 |
| 8 | 0.25 | 0.12 | 0.29 | 0.14 | 0.11 | 0.18 | 0.06 | 0.04 | 0.06 | 0.41 | 0.39 | 0.75 |
| 9 | 0.12 | 0.15 | 0.25 | 0.15 | 0.17 | 0.28 | 0.06 | 0.05 | 0.14 | 0.39 | 0.56 | 0.82 |
| 10 | 0.18 | 0.13 | 0.26 | 0.19 | 0.13 | 0.34 | 0.06 | 0.05 | 0.10 | 0.44 | 0.55 | 0.92 |
| 11 | 0.13 | 0.11 | 0.21 | 0.44 | 0.37 | 0.31 | 0.06 | 0.04 | 0.09 | 0.51 | 0.68 | 0.95 |
| 12 | 7.97 | 7.34 | 7.64 | 5.11 | 4.95 | 4.93 | 4.31 | 3.91 | 4.19 | 0.91 | 1.12 | 1.91 |
| Annual participation | 11.89 | 9.87 | 12.17 | 7.76 | 7.44 | 8.41 | 4.95 | 4.62 | 5.17 | 6.52 | 7.70 | 12.09 |
| N | 30,461 | 28,512 | 27,805 | 37,300 | 34,334 | 34,300 | 50,120 | 52,509 | 56,745 | 64,938 | 65,252 | 64,199 |

CPS-FSS = Current Population Survey-Food Security Supplement, MEPS = Medical Expenditure Panel Survey, N = unweighted observations, SIPP = Survey of Income and Program Participation, SNAP = Supplemental Nutrition Assistance Program.

Note: In Circana, any household that reports a purchase made with SNAP in a given month is counted as a SNAP participating household in that month. Estimates are weighted for all months. Sample sizes are unweighted. Annual participation is defined as participation in at least 1 month in the year.

Source: USDA, Economic Research Service calculations using data from the Medical Expenditure Panel Survey, Current Population Survey December Food Security Supplement, Survey of Income and Program Participation, and Circana Consumer Network Panel 2018–20.

Table 5

**Number and duration of SNAP spells in Circana Customer Network panel, 2018–20**

|  | 2018 | 2019 | 2020 |
|---|---|---|---|
| Mean number of spells | 1.62 | 1.71 | 1.5 |
| Standard error | 0.0199 | 0.019 | 0.01296 |
| Spell length | 2 | 2 | 2 |
| **Total number of spells** | **5,125** | **6,699** | **10,162** |

SNAP = Supplemental Nutrition Assistance Program, projection61k = Circana weight variable.

Note: Count of spells and spells lengths is calculated using the SNAP-Pay indictor. Estimate of the number of spells is weighted by projection61k. Spell length is measured in months.

Source: USDA, Economic Research Service calculations using Circana customer network panel data, 2018–20.

One characteristic worth noting about all the Federal data collections is that a plurality of persons who say they have participated in SNAP in the last year say they have participated for 12 months. In the Circana data, a plurality of households claims to use SNAP for purchases in only 1 month of the year. This finding results in a sample for which the number of spells—or periods of time—on SNAP is between one and two per year and the median spell is 2 months (table 5). To the degree that a researcher might use the method-of-payments indicator as an indicator of participation (receipt of benefits) monthly, this result emphasizes that the method of payments indicator underreports SNAP participation: the shortest recertification period for SNAP is 3 months, meaning that for any SNAP household, the minimum number of months of benefit receipt is usually 3 months. While it is possible to participate in SNAP for 1 or 2 months, it requires the household to decertify itself; while this result does occasionally happen, this is not something that describes the median experience on SNAP.

Table 6 shows a tabulation of the number of months on SNAP as well as the median spell length for any spell in each year 2018–20 in Arizona. The left panel shows the proportions of the SNAP sample in the consumer network panel that report a total time and median spell length on SNAP, while the right panel shows these distributions for the true population of SNAP households in Arizona (table 6). For the consumer network panel, a substantial fraction of households report utilization for 1 month in all 3 years. In 2018, the plurality of consumer network panel households report being on SNAP for 10 months, while in 2019 and 2020, the plurality report only 1 month on SNAP for the year. This pattern of reporting in the consumer network panel data could reflect misreporting of the number of trips, or the underreporting of SNAP payments conditional on reporting a trip. In the administrative records, for all 3 years, the large plurality of households is on SNAP for all 12 months. The median spell length in each data source reflects these differences: for the consumer network panel, the median spell is 2 months in all 3 years; for the administrative records the median spells for 2017, 2018, and 2019, respectively, are 8, 8, and 11 months. In both cases, the total number of months and the duration of spells on SNAP, the consumer network panel substantially underrepresent SNAP participation for all 3 years.

Table 6

**Number of months on SNAP and median spell length in Arizona: Circana and administrative records, 2018–20**

| Months on SNAP | Circana customer network data (percent) | | | SNAP administrative records (percent) | | |
|---|---|---|---|---|---|---|
| | 2018 | 2019 | 2020 | 2018 | 2019 | 2020 |
| 1 | 14.7 | 15.7 | 15.7 | 5 | 4.6 | 4.7 |
| 2 | 10.1 | 13.2 | 13.6 | 5.1 | 5 | 4.5 |
| 3 | 13.9 | 2.9 | 8.2 | 5.2 | 5.3 | 3.2 |
| 4 | 9.6 | 2 | 7.4 | 5.8 | 6.1 | 2.7 |
| 5 | 6.7 | 16.8 | 4.4 | 5.9 | 5.8 | 3 |
| 6 | 6.1 | 17.8 | 3.5 | 9.7 | 9.7 | 5.3 |
| 7 | 1.2 | 8.1 | 10 | 4.2 | 4.3 | 2.6 |
| 8 | 6.9 | 5.2 | 11.4 | 4.4 | 4.5 | 5.9 |
| 9 | 1.3 | 3.5 | 11.5 | 4.6 | 4.8 | 7.5 |
| 10 | 17.8 | 10.3 | 4.5 | 5 | 5.1 | 7 |
| 11 | 5.2 | 2.9 | 4.4 | 6.2 | 6.2 | 5.8 |
| 12 | 6.5 | 1.7 | 4.1 | 39.1 | 38.7 | 47.7 |
| Median spell length (months) | 2 | 1 | 2 | 8 | 8 | 11 |

SNAP = Supplemental Nutrition Assistance Program.

Note: For the Circana data, any household that reports a SNAP purchase in a month is counted as participating in SNAP for that month. The Department of Commerce, Bureau of the Census has ensured appropriate access and use of confidential data and has reviewed these results for disclosure avoidance protection (Project 7532295: CBDRB-FY24-CES005-004).

Source: USDA, Economic Research Service calculations using Circana consumer network panel data, 2018–20 and SNAP administrative records from Arizona are available through the U.S. Department of Commerce, Bureau of the Census through the Census-Food and Nutrition Service-Economic Research Service Joint Project.

# Characteristics of SNAP Households in Circana

Previous research has shown that the Circana consumer network panel data underrepresent low-income households (Lusk & Brooks, 2011; Muth et al., 2016). Therefore, it stands to reason that SNAP households would be underrepresented in the sample. However, we might also wonder about the characteristics of the SNAP sample itself. A characteristic of SNAP households in the Circana data is compared with what has been reported in the SNAP quality control data, a nationally representative sample of State SNAP administrative records in figures 1–5.[8] For the purposes of this comparison, any household that claims SNAP as the method of payment at any time during the year is counted as a SNAP household in the Circana consumer network panel.[9]

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[8] The SNAP quality control data are available online (*SNAP Quality Control Data*).

[9] The author chose the payment indicator (rather than the SNAP-June indicator) because more than one-half of observations per year were missing information on the SNAP-June indicator.

**9**

*Understanding Data About the Supplemental Nutrition Assistance Program (SNAP) in the Circana Consumer Network Panel,* TB-1969
USDA, Economic Research Service

Figure 1
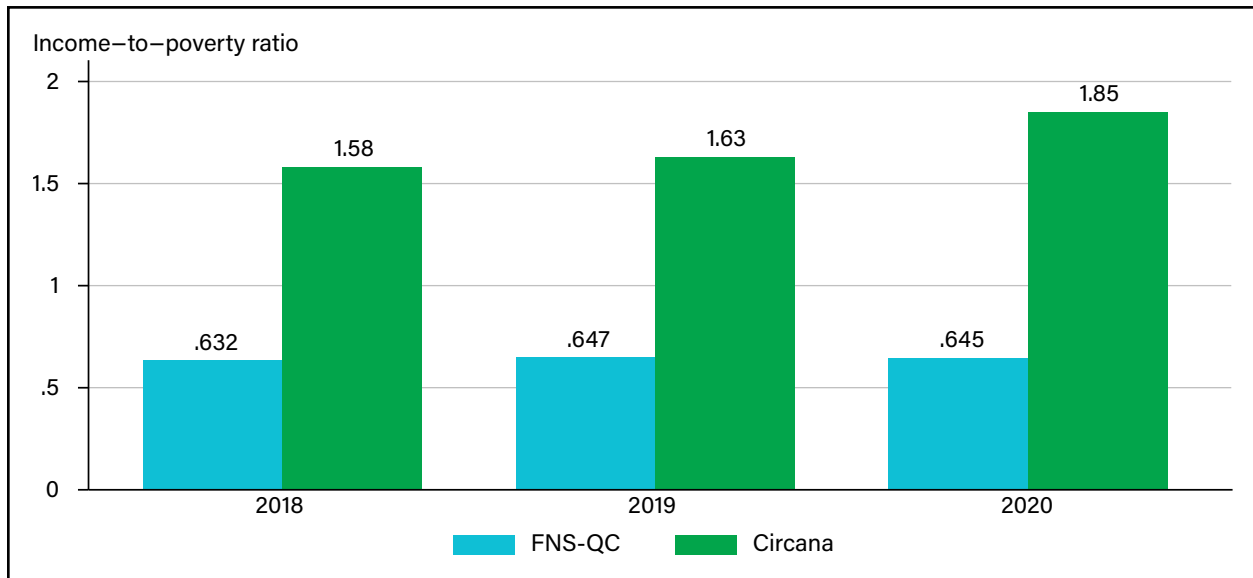**Fraction of SNAP households in poverty, SNAP quality control data and Circana, 2018–20**
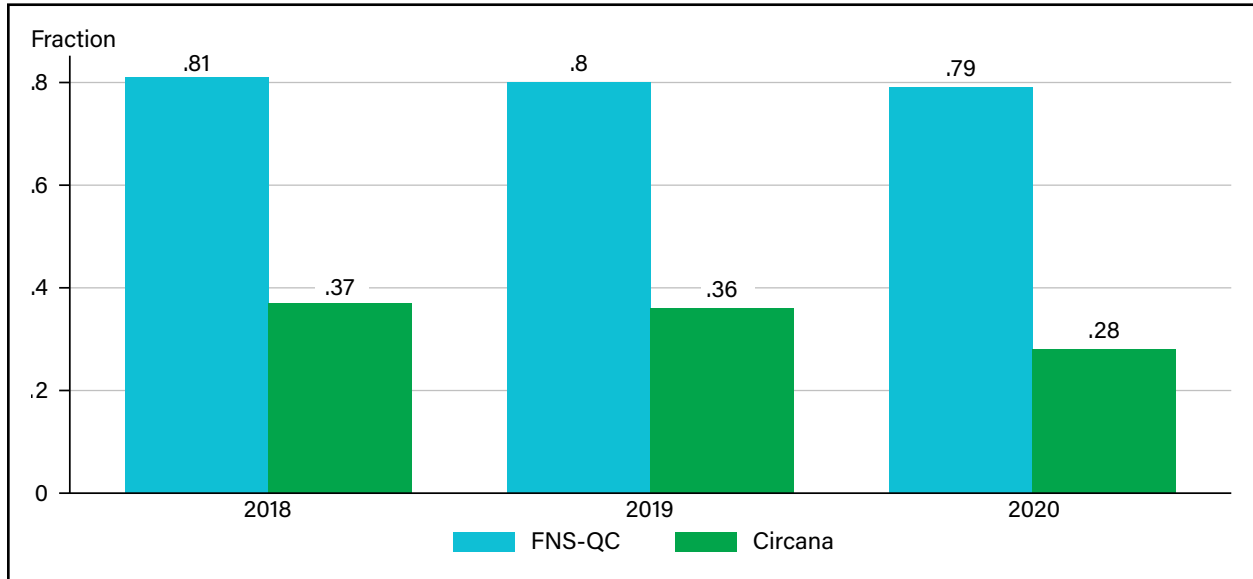


SNAP = Supplemental Nutrition Assistance Program, FNS = Food and Nutrition Service, projection61k = Circana weight variable, QC = quality control. Estimates are weighted by projection61k.

Note: In Circana, any household that reports a SNAP purchase in given year is counted as a SNAP household for that year. FNS estimates are taken from U.S. Department of Agriculture, *Characteristics of Supplemental Nutrition Assistance Programs*, fiscal years 2018, 2019, and 2020. For 2020, the Characteristics report divides the fiscal year into prepandemic and waiver months. For this figure, waiver months are used, but the intuition conveyed by the figure is not changed when the prepandemic estimates are used.

Source: USDA, Economic Research Service calculation based on Circana consumer network panel data, 2018–20.

Figure 2
**Gross income of SNAP households as a fraction of the Federal poverty thresholds: SNAP quality control data and Circana, 2018–20**



SNAP = Supplemental Nutrition Assistance Program, FNS=Food and Nutrition Service, projection61k = Circana weight variable, QC = quality control. Estimates are weighted by projection61k.

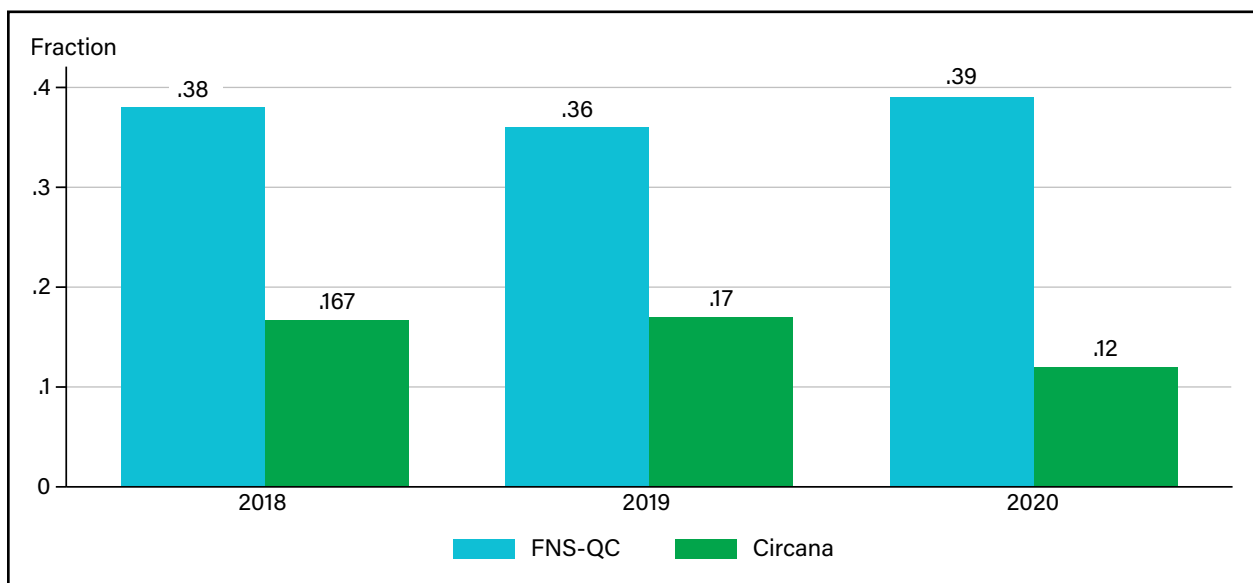Note: In Circana, any household that reports a SNAP purchase in given year is counted as a SNAP household for that year. FNS administrative estimates come from the U.S. Department of Agriculture, *Characteristics of Supplemental Nutrition Assistance Programs*, fiscal year 2020, table 3.7.

Source: USDA, Economic Research Service calculations using Circana Consumer Network data 2018, 2019, and 2020.

SNAP households in Circana are much less likely to have incomes below the poverty line than SNAP quality control households (figure 1). Circana SNAP households were about one-half as likely as the SNAP population to have income below the poverty line for years 2018–20. As might be expected, household income expressed as a fraction of the poverty line is much higher in Circana than in SNAP quality control data (figure 2). The average income-to-poverty threshold for SNAP households is well less than 1—about .65. At the same time, the ratio for Circana consumer network panel households are more than double that—averaging 1.58, 1.63, and 1.85 for 2018, 2019, and 2020, respectively. SNAP households in Circana are also much less likely to have incomes below half of the poverty line than SNAP quality control panel households (figure 3). Circana SNAP households are more likely to have children than SNAP quality control panel households (figure 4); Circana SNAP households are also much less likely to have older adults present in the household (figure 5). Finally, SNAP households in Circana are much less likely to be single adults than the SNAP population at large (figure 6).

Figure 3
**Fraction of SNAP households with income less than 50 percent of poverty, SNAP quality control data and Circana, 2018–20**



SNAP = Supplemental Nutrition Assistance Program, FNS = Food and Nutrition Service, projection61k = Circana weight variable, QC = quality control. Estimates are weighted by projection61k.

Note: In Circana, any household that reports a SNAP purchase in given year is counted as a SNAP household for that year. FNS estimates are taken from U.S. Department of Agriculture, *Characteristics of Supplemental Nutrition Assistance Programs*, fiscal years 2018, 2019, and 2020. For 2020, the Characteristics report divides the fiscal year into prepandemic and waiver months. For this figure, the waiver months were used, but the intuition conveyed by the figure is not changed when the prepandemic estimates are used.

Source: USDA, Economic Research Service calculation based on Circana consumer network panel data, 2018–20.

Figure 4
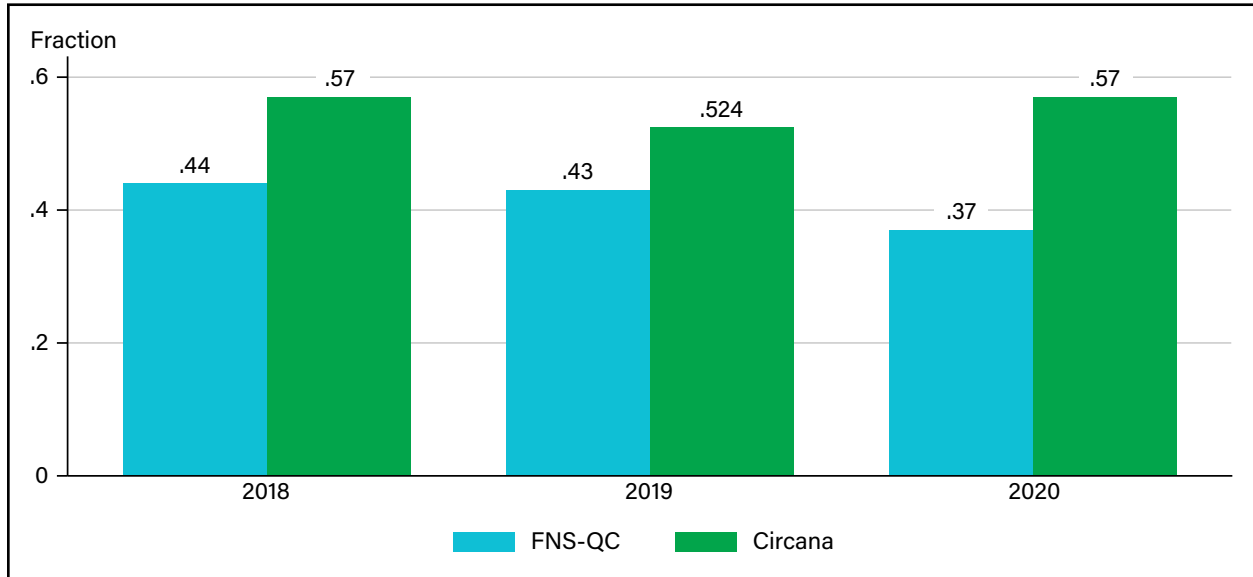**Fraction of SNAP households with children, SNAP quality control data and Circana, 2018–20**



SNAP = Supplemental Nutrition Assistance Program, FNS = Food and Nutrition Service, projection61k = Circana weight variable QC = quality control. Estimates are weighted by projection61k.

Note: In Circana, any household that reports a SNAP purchase in given year is counted as a SNAP household for that year. FNS estimates are taken from U.S. Department of Agriculture, *Characteristics of Supplemental Nutrition Assistance Programs*, *Fiscal Year 2020*. For 2020, the Characteristics report divides the fiscal year into prepandemic and waiver months. For this figure, the waiver months are used, but the intuition conveyed by the figure is not changed when the prepandemic estimates are used.

Source: USDA, Economic Research Service calculation based on Circana consumer network panel data, 2018–20.

Figure 5
**Fraction of SNAP households with elderly present, SNAP quality control data and Circana, 2018–20**
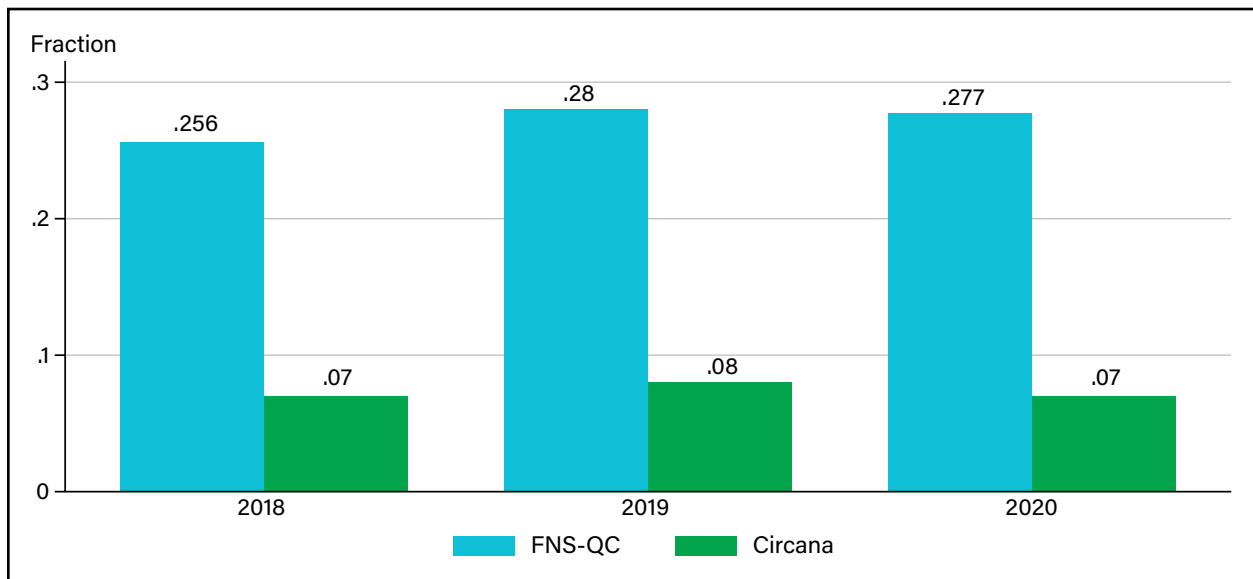


SNAP = Supplemental Nutrition Assistance Program, FNS = Food and Nutrition Service, projection61k = Circana weight variable, QC = quality control. Estimates are weighted by projection61k.

Note: In Circana, any household that reports a SNAP purchase in given year is counted as a SNAP household for that year. FNS estimates are taken from U.S. Department of Agriculture, *Characteristics of Supplemental Nutrition Assistance Programs*, fiscal years 2018, 2019, and 2020. For 2020, the Characteristics report divides the fiscal year into prepandemic and waiver months. For this figure, the waiver months are used, but the intuition conveyed by the figure is not changed when the prepandemic estimates are used. For Circana and FNS, an elderly person is any person at least 60 years old.

Source: USDA, Economic Research Service calculation based on Circana consumer network panel data, 2018–20.

Figure 6
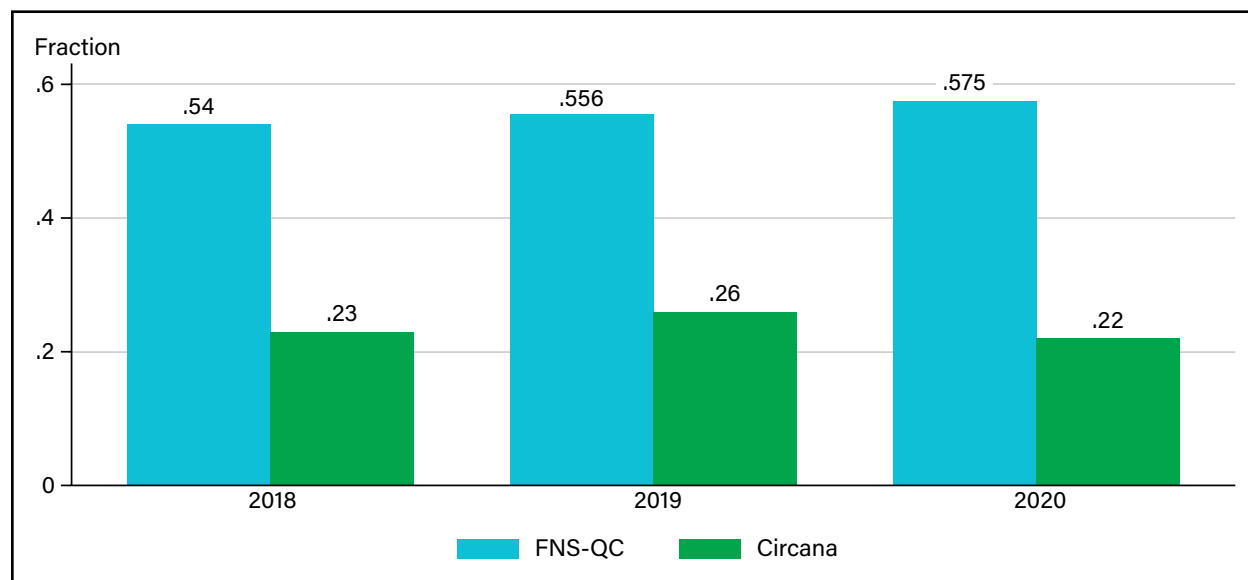**Fraction of SNAP households composed of a single adult, SNAP QC data and Circana, 2018–20**



SNAP = Supplemental Nutrition Assistance Program, FNS = Food and Nutrition Service, projection61k = Circana weight variable, QC = quality control.

Note: In Circana, any household that reports a SNAP purchase in given year is counted as a SNAP household for that year. Estimates are weighted by projection61k. FNS estimates are taken from U.S. Department of Agriculture, *Characteristics of Supplemental Nutrition Assistance Programs*, *Fiscal Year 2020*. For 2020, the Characteristics report divides the fiscal year into prepandemic and waiver months. For this figure, the waiver months were used, but the intuition conveyed by the figure is not changed when the prepandemic estimates are used.

Source: USDA, Economic Research Service calculation based on Circana consumer network panel data, 2018–20.

Table 7 shows the ethnic/racial background of SNAP householders in Circana and in quality control (administrative) records. The data in the quality control panel report on race and ethnicity come from applications for benefits; information on race is missing for a sizeable fraction of households. Nonetheless, the fractions of households/survey respondents that identify as African American Non-Hispanic, Asian Non-Hispanic, and Hispanic are comparable in the Circana and SNAP Characteristics reports.

Table 7
**Race/ethnic composition of SNAP households, administrative and Circana data, 2018–20**

|  | 2018 | | 2019 | | 2020 | |
|---|---|---|---|---|---|---|
|  | **FNS** | **Circana** | **FNS** | **Circana** | **FNS** | **Circana** |
| Non-Hispanic, White | 0.357 | 0.62 | 0.365 | 0.63 | 0.379 | 0.63 |
| African American, Non-Hispanic | 0.251 | 0.25 | 0.258 | 0.25 | 0.255 | 0.23 |
| Hispanic | 0.167 | 0.175 | 0.16 | 0.173 | 0.151 | 0.19 |
| Asian, Non-Hispanic | 0.03 | 0.026 | 0.033 | 0.02 | 0.032 | 0.03 |
| Native American/Other | 0.015 | 0.09 | 0.015 | 0.09 | 0.013 | 0.1 |
| Multiple races | 0.008 | . | 0.8 | . | 0.008 | . |
| Unknown | 0.174 | . | 0.161 | . | 0.162 | . |

SNAP = Supplemental Nutrition Assistance Program, FNS = Food and Nutrition Service, "." = data missing.

Note: Circana estimates are weighted by the variable projection61k.

Source: USDA, Economic Research Service calculations using 2018, 2019, 2020 Circana data. FNS figures from U.S. Department of Agriculture, Characteristics of Supplemental Nutrition Assistance Programs, fiscal year 2020, table 3.7.

# Food at Home Spending and Behavior

It is well-known that Circana consumer network panel data underestimate food-at-home expenditures by as much as 50 percent. (Sweitzer et al., 2017; Zhen et al., 2019). Comparison of estimates of total yearly food-at-home expenditures from a standard source, the USDA, ERS Food Expenditure series,[10] and the Circana consumer network panel data show that the Circana estimates are less than half of those from the ERS Food Expenditure Series report. This finding provides context for estimates of monthly expenditures for SNAP and non-SNAP households.[11] According to the estimates in the top panel of table 8, SNAP and non-SNAP households spent about $250 per month on food at home (FAH) in 2018 and 2019; in 2020, both SNAP and non-SNAP households spend a little more than $300 per month on FAH. Compared to estimates in the lower panel produced using the Consumer Expenditure Survey, these estimates underestimate monthly FAH by 36, 38, and 34 percent in 2018, 2019, and 2020, respectively. Moreover, these results suggest not only that the misclassification of SNAP households may bias our understanding of the differences in FAH spending between SNAP and non-SNAP households, but also that total expenditure levels in Circana are biased downwards.

Table 8
**Monthly food-at-home expenditures, 2018–20**

| Non-SNAP | | | SNAP | | |
|---|---|---|---|---|---|
| 2018 | 2019 | 2020 | 2018 | 2019 | 2020 |
| Circana | | | | | |
| $253.57 | $255.05 | $301.93 | $255.59 | $257.81 | $301.98 |
| (0.39) | (0.43) | (0.51) | (1.69) | (2.44) | (1.69) |
| Consumer Expenditure Survey | | | | | |
| $473.94 | $484.54 | $529.12 | $396.53 | $411.94 | $454.97 |
| (5.63) | (23.33) | (21.99) | (18.96) | (4.39) | (5.82) |

SNAP = Supplemental Nutrition Assistance Program, projection61k = Circana weight variable.

Note: Households claiming any transaction with SNAP as the payment method in any month are counted as SNAP households for that year. Calculations for the consumer expenditure survey come from survey responses for spending in the previous 3 months and do not account for months-in-scope in the survey, so each yearly estimate may include spending from October of the previous year to March of the following year. All Circana estimates are weighted using by projection factor projection61k.

Source: USDA, Economic Research Service calculations using 2018, 2019, 2020 Circana data and 2018, 2019, 2020 Consumer Expenditure Survey.

The underreport of SNAP purchases, and the difference that the way one measures SNAP participation can affect the measurement of outcomes (figure 7, table 8). To show this, figure 7 displays a profile of monthly FAH expenditure for SNAP and non-SNAP households for 2018, 2019, and 2020. For the purposes of this calculation, any household that claims SNAP as the method of payment during a given month is counted as a SNAP household. Any household that does not claim SNAP as a method of payment, regardless of income, is counted as a non-SNAP household. The graph shows that over time, although there are some differences between monthly spending levels for SNAP and non-SNAP households, monthly spending is a little higher generally for SNAP households than non-SNAP households.[12] This figure, compared with the result shown in the top panel of table 8, suggests the degree that the way one measures SNAP participation affects the

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[10] USDA, ERS - Food Expenditure Series (FES) comparison that would be most pertinent is between nominal monthly food-at-home sales for all purchaser and the consumer network panel data. ERS figures include taxes and tips. For sources and methods of the FES data, see Okrent et al. (2018). A month-by-month comparison is available on request.

[11] Households that claimed SNAP as a method of payment for a given month are counted as SNAP households for that month.

[12] Non-SNAP households are identified as those without any claim to use SNAP for any purchase during a given month.

outcome of a comparison between spending levels. The top panel of table 8 is based on Circana consumer network panel data and indicates any SNAP payment over the year counts as evidence of SNAP participation for the entire year. For this measure, expenditures for SNAP households are roughly equal with non-SNAP households. Average monthly food expenditures for SNAP households are about 12–15 percent lower than total food expenditures for non-SNAP households, reflecting the higher spending of higher income non-SNAP households, as shown in the bottom panel of table 8. The underreporting of SNAP payments for figure 7 masks this difference because when SNAP households fail to indicate a purchase, their spending is counted as being that of a non-SNAP household, bringing the average monthly spending of that group down.

Figure 7
**Monthly spending for SNAP and non-SNAP households in Circana, 2018–20**
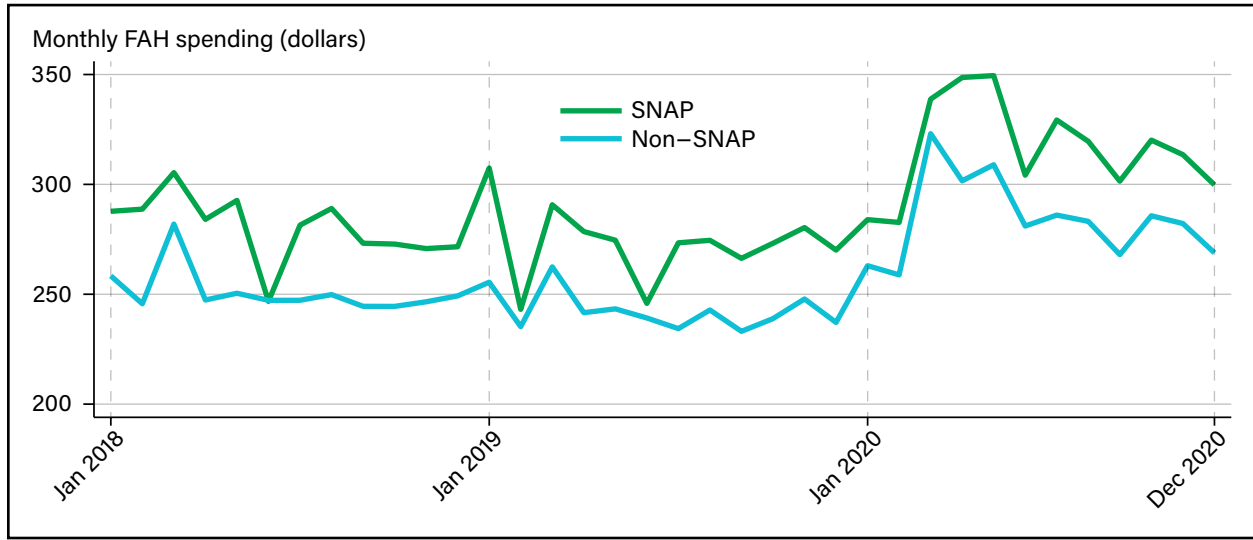


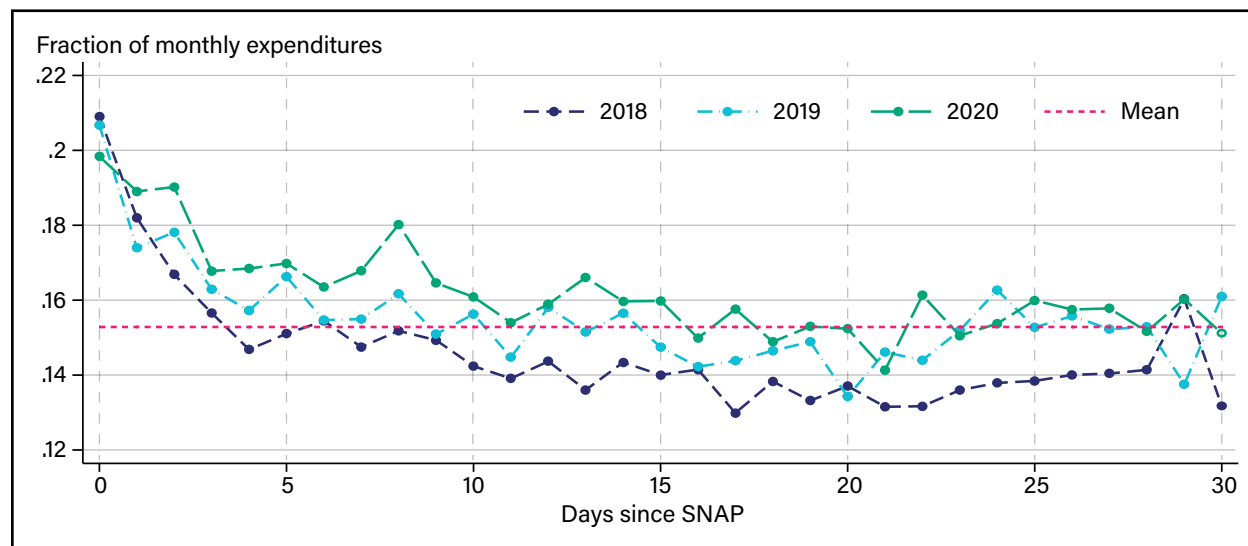SNAP = Supplemental Nutrition Assistance Program, FAH = Food at home. Estimates are weighted by projection61k.

Note: All estimates are weighted using by projection factor projection61k. Households claiming any transaction with SNAP as the payment method during a given month are counted as SNAP households.

Source: USDA, Economic Research Service calculations using Circana Consumer Network data.

Figure 8

**Daily fraction of monthly spending as a function of the number of days since SNAP benefit receipt: SNAP household in Circana consumer network panel data for six U.S. States**



SNAP = Supplemental Nutrition Assistance Program, projection61k = Circana weight variable.

Note: Data are for New Hampshire, Nevada, Idaho, North Dakota, Rhode Island, and South Dakota. SNAP households were identified as those that made at least one payment in the month from SNAP.

Source: USDA, Economic Research Service calculations using Circana consumer network panel data.

One of the most important empirical regularities of shopping behavior for SNAP households is that SNAP households' food consumption behavior changes in predictable ways, depending on the time since they received SNAP benefits. U.S. States distribute benefits for each SNAP household on the same calendar day each month—depending on a statewide schedule—based on the SNAP case number, name, or birthdate. Since 1996, the schedule changed for many States, mostly expanding the number of days when benefits are distributed (USDA, Economic Research Service, 2022). Research has established that SNAP participants eat fewer calories, have lower Healthy Eating Index scores, spend less, and respond to the food security questionnaire differently, depending on where the participants are in the SNAP month (Castellari et al., 2018; Gregory & Smith, 2018; Gregory & Todd, 2021; Stephens, 2008; Todd, 2015). This cyclicality in spending is shown using data from six States for which the SNAP distribution date is known with certainty—New Hampshire, Nevada, Idaho, North Dakota, Rhode Island, and South Dakota (figure 8). The total fraction of monthly expenditures is plotted as a function of the number of days since SNAP receipt (distribution) and shows a clear monthly pattern. SNAP households do not smooth consumption over the month, as is predicted by economic theory, but spend a higher proportion of their monthly food expenditures on the first few days of the SNAP month. The figure also shows that the cyclical pattern is a little more pronounced in 2018 than 2020, perhaps due to the increases in SNAP benefits due to the COVID-19 pandemic in 2020.

# Conclusion

The Circana consumer data panel provides a rich set of food-at-home acquisition indicators, as well as demographic variables suitable for research about food-at-home purchases. As some Federal data collections that provide similar information have lags in collection due to redesigns or logistical complications, the Circana panel remains particularly relevant for this research. The panel also maintains some advantages over Federal data collections with comparable content: in particular, the asynchronous panel structure, item-level detail

on spending, and the shorter data production schedule are significant to policy relevant research. The data collection includes two variables related to SNAP participation: one records a response to an email survey about SNAP participation in June; the other is a self-reported utilization indicator that records the method of payment for all store trips.

This report finds that the indicators of participation and utilization are frequently not in agreement; using either or both measures of SNAP participation leads to estimates of monthly participation that are between 25 and 40 percent below those of administratively verified sources, depending on the month and year. By benchmarking SNAP participation in Circana against other Federal surveys and administrative records, we observe that the Circana sample substantially underreports the number of SNAP participants during the year. Also, SNAP 12-month profiles constructed by using the method-of-payment indicator are indicative of substantial underreporting. However, using the SNAP payment indicator as an index of yearly participation results in measured levels of participation comparable to those in other Federal surveys.

Additionally, characteristics of SNAP households in Circana and in the population show that the Circana sample is significantly better off in terms of income than administrative records on the SNAP population. In that sense, it isn't clear that the prevalence of SNAP participation in the consumer network data panel should reflect that in the population. Estimates of average monthly food-at-home spending by SNAP households in Circana consumer network data, compared to a benchmark dataset like the Consumer Expenditure Survey, show that the Circana SNAP sample under-estimates food-at-home spending by between 30 and 50 percent.

Finally, the Circana SNAP sample shows shopping patterns over the benefit month that are consistent with what is known from a large body of research, although comparisons of spending levels between SNAP and non-SNAP households run contrary to expectations, with SNAP households spending similar amounts or even more on food-at-home on a monthly level.

It should be noted that the Circana consumer network panel households are comprised of a self-selected, non-probability sample. This kind of unstructured data collection has recently become more widely used for statistical inference in food and health as response rates to Federal surveys have declined and improvements to processing, understanding, and using "Big Data" have become more widespread in economics (Athey & Imbens, 2019; Mullainathan & Spiess, 2017; Oster, 2018; Storm et al., 2020). At the same time, methods particular to working with non-probability samples generally require auxiliary data (usually from a bench-mark Federal data collection) and strong assumptions in the model about the data generating process to make valid statistical inferences (Cornesse et al., 2020; Elliott & Valliant, 2017; Rafei et al., 2022). In this context, future research might examine ways that non-probability samples like the Circana SNAP sample can be used to develop research designs to answer questions relevant to food and health research.

Even in the context of probability-based sampling, the likely mismeasurement of SNAP participation introduces challenges to any analysis using the Circana data. While statistics produced in the absence of misclassification can be regarded as consistent with the true values of those quantities—misclassification in this context results in means, regression coefficients, causal parameters, and other quantities of interest that can be understood as partially identified. In general, partial identification is an approach to statistics and econometrics that does not treat parameter identification as an all-or-nothing proposition. Rather, the limitations of data call for use of external information—from economic theory, statistics, auxiliary data, or institutional knowledge—to estimate the statistics in question (Buonaccorsi, 2010; Gustafson, 2004, 2015; Manski, 1995, 2003, 2005; Tamer, 2010; Yi, 2017). For example, one might use prior knowledge about the rates of misreporting derived from studies of Federal surveys to help identify the difference in outcomes of interest, such as food spending or the quality of food purchases, for SNAP and non-SNAP households. The degree that estimates produced under these conditions will be useful will depend upon the application, model, and context.

The Circana consumer network panel data remain an asset for producing insights about food-at-home shopping, spending, consumer behavior and health. As demonstrated above, the data require caution about the ways that the data are applied to questions about consumers participating in the SNAP program.

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**21**

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