

REPORT

DRAFT REPORT

Lessons Learned from the Design and Implementation of the National Household Food Acquisition and Purchase Survey (FoodAPS)

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EXECUTIVE SUMMARY

The National Household Food Acquisition and Purchase Survey (FoodAPS) was designed and conducted by Mathematica Policy Research in response to a request by the United States Department of Agriculture (USDA) Economic Research Service (ERS) for “timely and complete information on the food acquisition behaviors of American households.”

The goals for FoodAPS were ambitious. FoodAPS is the first nationally representative survey to collect information from U.S. households about food obtained from all sources—including foods purchased and foods obtained at no cost—during a one-week period. Collected data include information about where, when, by whom, and at what price food was acquired; how much was acquired; the nutrient content of acquisitions; and the nature of food access.

Summary of accomplishments and limitations

FoodAPS screened more than 20,000 sampled addresses; successfully engaged 4,826 households for a 7-day data collection; deployed barcode scanners to collect data about foods brought into the home; obtained store receipts to extract item prices; and provided the first concrete picture of the substantial percentage of food away from home (FAFH) that is obtained at no cost from family, friends, school, and work. FoodAPS data were obtained through a multi-mode data collection that included paper Food Books, barcode scanners, telephone interviews, and tightly integrated information systems.

The limitations of FoodAPS must be viewed in the context of the time period in which the study was designed and the requirement from ERS that a paper-and-pencil survey be the primary mode of data collection. The data collection procedures were designed in 2009, just two years after the iPhone was introduced and one year before the iPad. Households were screened “on the doorstep” with a paper screener. Food data were not reported electronically, with the exception of barcode scanning for foods brought into the home.

Data collection in future rounds of FoodAPS will almost certainly use mobile devices when screening on the doorstep, a more sophisticated scanner to alert respondents to barcodes that are not recognized¹, and computer or mobile applications for collecting other food acquisition data. These more sophisticated data collection approaches will minimize many of the challenges discussed in this report.

Challenges and lessons learned

The primary challenge in the design of FoodAPS was to develop data collection procedures that produced high-quality data but were easy for interviewers to administer and for respondents to complete. In many ways, FoodAPS met this challenge. Inevitably, however, any study that attempts to collect data that have not been collected before will experience unexpected challenges. For FoodAPS, this situation was magnified by the volume and complexity of the

¹ Mathematica proposed to use a sophisticated scanner for FoodAPS, like those used for Nielsen HomeScan, but ERS rejected that proposal due to cost considerations.

data collected. This report describes challenges encountered during each phase of the study and the ‘lessons learned’ that can be applied to future FoodAPS data collections.

Field test. FoodAPS included a field test to determine the most effective Food Book protocol and incentive level. The contract did not include resources for fully processing the food data collected during the field test, so FoodAPS could not identify data-related challenges and redesign instruments and procedures prior to the full-scale study. If the survey is significantly redesigned for FoodAPS-2, we recommend a field test that mimics the full-scale study through all data processing.

Sample design. FoodAPS needed to (1) manage sample against survey targets for low-income households, and (2) attain an adequate screener response rate. Managing the sample was complicated because respondents tended to underreport income on the screener. One or more of the following modifications could be used to address this challenge: (1) relax the survey targets, (2) conduct a field test to develop a more accurate screener, and (3) test ways to adjust the intake criteria to account for differences between income reported on the screener and on the final interview.

Field staff recruitment and training. FoodAPS is a complex data collection and highly skilled field staff are needed to manage many tasks (e.g. screening, training households, and interviewing). Skills requirements could be reduced by adopting the following changes: (1) use an electronic screener to eliminate the need for field staff to navigate a complex paper-and-pencil instrument; (2) replace the household training video with an interactive e-learning video to reduce the number of questions respondents have for interviewers; and (3) have some staff specialize in screening households.²

Telephone staff recruitment and training. Telephone interviewers collected FAFH data from respondents using loosely scripted interviews, and they entered data in the Food Reporting System (FRS) on screens that resembled the Food Book pages. Data entry screens included drop-down lists for selecting places and food items, but interviewers had difficulty identifying items in the lists and coding data upon entry. This challenge could be addressed through additional interviewer training to familiarize interviewers with common restaurant foods, and further development of the FRS to display the full menu for popular fast food restaurants so that interviewers may more easily code food items.

Food-at-home (FAH) acquisitions. FoodAPS revealed some challenges related to missing and inconsistent data reported in Food Books. To resolve these issues, we recommend entering all information from receipts into a database (including prices of nonfood items, bottle deposits, the taxable subtotal and payment subtotals, and an indicator to identify taxable items). For acquisitions without receipts, we suggest that missing or incomplete store addresses be resolved by interviewers during the Final Visit by asking respondents to identify the store on a map.

We also found that a surprisingly large number of foods were not reported by scanning a barcode. We suggest that respondents scan all items, including nonfoods, to reduce the likelihood

² Midway through the field period, FoodAPS supplemented the field staff with screener-only interviewers.

of missed items. ERS may also consider eliminating item reporting on the Blue Page and use a more sophisticated scanner to provide feedback on unrecognized barcodes and prompts for entering product information.

A final challenge for FAH is that USDA databases do not contain information for all reported foods in their “as purchased” form. Expansion of USDA databases to include “as purchased” food equivalents and refuse factors assigned to individual food codes would greatly facilitate the coding process for future rounds of FoodAPS.

Food-away-from-home (FAFH) acquisitions. The challenges for collecting and processing FAFH data are due primarily to: (1) respondents relying on recall to report these data, (2) the variety of places where FAFH is acquired, (3) the variety of foods acquired, (4) the low rate of saved receipts, and (5) the fact that FAFH meals are not packaged and labeled with information on their size and contents.

The Food Book (Red Page) could be redesigned to promote better quality data from respondents. Rather than asking for the “name of place,” checkboxes could be used to indicate the type of place (and name would be collected only for restaurants, stores, and “other,” where no listed category is appropriate). The Red Page could also include a question “Did anyone in the household pay for the food?” so that respondents are directed to skip the section of the Red Page that collects payment information. The section for reporting individual food items could be redesigned with two lines per item, so that the name of the menu item and price are reported on one line and a description of the item on the second line.

Household interviews and self-administered forms. There were two primary challenges for collecting and processing the household interviews: (1) a single respondent was asked to provide a large amount of information for other household members by proxy, and (2) many respondents were unable to precisely identify the address of the store where they do most of their food shopping. The quality of proxy reports may be improved with additional edit checks during administration of the household interviews. Information about food stores may be improved by developing a method to have respondents to identify stores on a map. For self-administered forms, response might be improved by making the optional Income Worksheet mandatory, and by administering the Feedback Form electronically.

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I. INTRODUCTION

The National Household Food Acquisition and Purchase Survey (FoodAPS) was designed and conducted by Mathematica Policy Research under contract with the U.S. Department of Agriculture (USDA) Economic Research Service (ERS), with funding from ERS and the USDA Food and Nutrition Service (FNS).

FoodAPS was designed to provide detailed information about all food acquired by households during a one-week period, including information about where, when, by whom, and at what price the food was acquired; how much was acquired; the nutrient content of acquisitions; and the nature of food access.³ Inevitably, any study that attempts to collect data that have not been collected before will experience unexpected challenges.

This report describes challenges that were encountered during each phase of FoodAPS and the ‘lessons learned’ that can be applied to future FoodAPS data collections. ERS identified nine topic areas to explore. Mathematica developed discussion questions and held a series of brainstorming meetings to discuss challenges, lessons learned, and potential solutions.

The topic areas are:

1. Field test
2. Sample design and selection
3. Field interviewer recruitment and training
4. Telephone interviewer recruitment and training
5. Instrumentation
6. Field data collection and management
7. Processing of food-at-home (FAH) data
8. Processing of food-away-from-home (FAFH) data
9. Processing of household interviews and self-administered forms

Discussion questions for each meeting were provided to ERS for review and comment in February and March 2016. To ensure that all of the relevant issues were given due consideration, nine separate meetings were held over a five week period from May 27, 2016 to July 1, 2016, with each meeting lasting two hours. Different staff attended each meeting according to their involvement with that topic area, with the number of attendees ranging from three to seven. Questions were provided to meeting attendees one week in advance of each meeting and ERS was briefed on major findings from each meeting.

³ Other national surveys provide information about food consumed by individuals over a 24-hour period (National Health and Nutrition Examination Survey [NHANES]) or monthly household food expenditures (Consumer Expenditure Survey).

This report summarizes the findings from these meetings. Chapter II provides a brief overview of the FoodAPS survey, followed by seven chapters each corresponding to a topic area. Because there was substantial overlap in discussion across topic areas, topics 5 (instrumentation) and 6 (field data collection and management) are not discussed in separate chapters. Instrumentation is discussed under topics 7 through 9 because many challenges for data processing were related to instrumentation; field data collection and management is discussed under topics 2 through 4.

II. SURVEY OVERVIEW

FoodAPS data were collected between April 2012 and January 2013. More than 20,000 sample addresses were screened for eligibility, with a screener response rate of 70.9 percent. The percentage of eligible households initially agreeing to participate was 78.1 percent; 77.4 percent of those who agreed completed the initial interview; and 77.4 percent of those that completed the initial interview also completed the final interview (4,826 total). FoodAPS achieved an overall response rate (screener rate \times agreement rate \times completion rate) of 41.5 percent.

For each participating household, the survey provides data on household demographics, participation in nutrition assistance programs, food security, income, major categories of non-food expenditure, general health status, attitudes about healthy food, consumer behavior related to food shopping, and special dietary needs. This information was collected via two in-person interviews conducted at the beginning (Initial Interview) and end (Final Interview) of the study week.

For reported food acquisitions, the study provides data about: (1) the acquisition event (type of place, location, distance from home, total amount paid, and methods of payment) and (2) the foods acquired (item name, barcode (if scanned), item price, food category, and nutrient content). Participating households reported food acquisitions during a 7-day period, including information about (1) foods acquired for home preparation and consumption (food-at-home [FAH]), and (2) foods acquired and consumed away from home (food-away-from-home [FAFH]).

FoodAPS collected information about all members of participating households. A primary respondent (PR) was identified in each participating household (generally the primary food shopper) to respond to interviews and be trained on data collection procedures. The PR then trained other household members so that they could also report their food acquisitions during the study week.

A. Household Data Collection

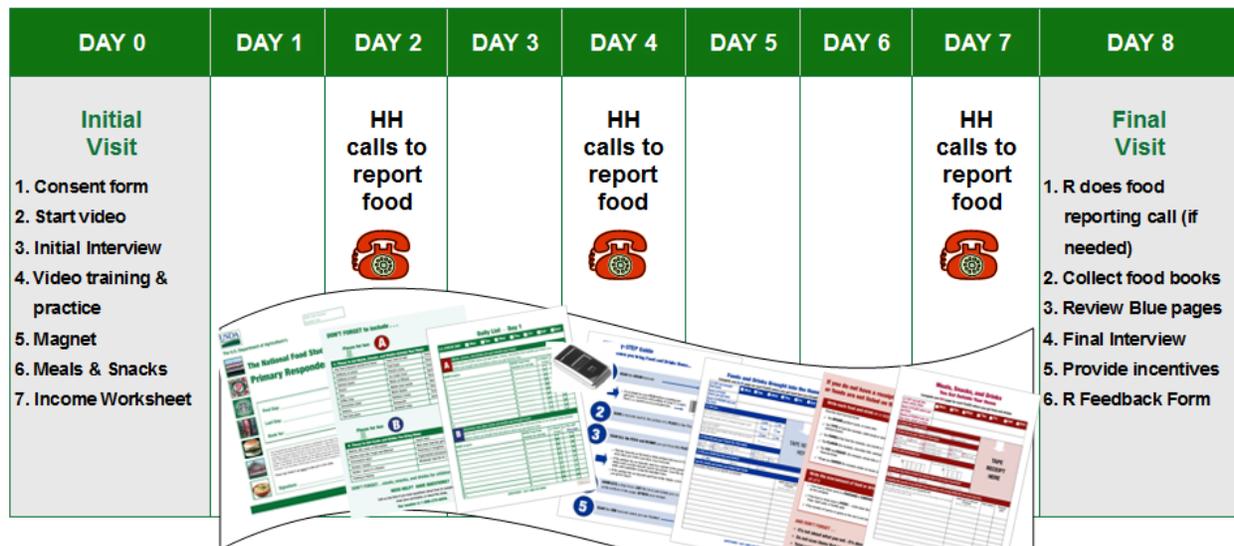
When an eligible household agreed to participate in the study, the interviewer conducted an Initial Visit (expected to last 1.5 hours on average) either immediately after screening or by appointment. During this visit, the interviewer administered the Initial Interview, trained the PR on how to track and report their household food acquisitions, and reviewed and distributed study materials for use during the week.

Study materials included Food Books, scanner, self-administered Meals and Snacks Form, Income Worksheet, and refrigerator magnet. The magnet showed seven days (labeled by the interviewer to correspond to the study week); three days (2, 5, and 7) had a reminder for the PR to call the Survey Operations Center (SOC) to report information about FAFH acquisitions. If a call was not received when scheduled, the SOC placed outbound calls to the PR.

Field interviewers completed a Final Visit with the PR after the end of the 7-day data collection week, during which they administered the Final Interview, collected study materials, and distributed incentives.

The household data collection week is depicted in Figure 1.1.

Figure 1.1. Household data collection week



The following study materials were provided to the household:

- **Primary Respondent Food Book** – For FAH acquisitions by all members of the household, and FAFH acquisitions by the PR
- **Adult Food Book** – Provided for each additional adult in the household to track FAFH
- **Youth Food Book** – Provided for each youth aged 11–18 to track FAFH
- **Meals and Snacks Form** – Provided to the PR for checking off the meals and snacks consumed by each household member on each day of the data collection week
- **Income Worksheet** – An optional form provided to the PR to complete during the data collection week in preparation for the Final Interview
- **Week-Ahead Magnet** – Magnet with reminder of the weekly schedule for Food Reporting Calls and the Final Visit
- **Handheld scanner** – A single handheld scanner provided to each household for scanning UPCs on food items included in FAH acquisitions

All materials were translated into Spanish, Korean, and Vietnamese.

To track and report food acquisitions, household members were asked to scan barcodes on foods brought into the home, save receipts from stores and restaurants, and report acquisition and food item information on Red Pages (for FAFH) and Blue Pages (for FAH) in Food Books (Figure 1.2).

Figure 1.2. Red Page and Blue Page

Meals, Snacks, and Drinks You Got Outside Your Home

Complete one RED page for each PLACE where you got food and drinks

(*) DAY you got this meal, snack, drink	<input type="checkbox"/> Mon	<input type="checkbox"/> Tue	<input type="checkbox"/> Wed	<input type="checkbox"/> Thu	<input type="checkbox"/> Fri	<input type="checkbox"/> Sat	<input type="checkbox"/> Sun
Name of PLACE where you got food:							
Names of PEOPLE who ate this meal, snack, or drink:							
(*) Check the meal or snack							
<input type="checkbox"/> Breakfast	<input type="checkbox"/> Lunch	<input type="checkbox"/> Dinner/Supper	<input type="checkbox"/> Snack/drink				
(*) How did you pay? Check ALL that apply							
<input type="checkbox"/> Cash	<input type="checkbox"/> Check	<input type="checkbox"/> Credit card	<input type="checkbox"/> Debit card				
<input type="checkbox"/> SNAP EBT	<input type="checkbox"/> School lunch card	<input type="checkbox"/> Free	<input type="checkbox"/> Gift card				
<input type="checkbox"/> Other EBT	<input type="checkbox"/> Loyalty card	<input type="checkbox"/> Coupons					
TOTAL paid							
Total paid including tax and tip		If you left a tip, how much?					
\$ <input type="text"/>		\$ <input type="text"/>					
(*) Did you buy food or drinks for anyone who is not in your household?							
<input type="checkbox"/> No	<input type="checkbox"/> 1 person	<input type="checkbox"/> 2 people	<input type="checkbox"/> 3 or more people				
Complete this section if your receipt DOES NOT list each food item or you DO NOT have a receipt.							
Write each food and drink on a separate line <small>Only include foods and drinks you got that are not on the receipt, such as bread and salad that come with a meal</small>	Write size or amount if known <small>(ounces, grams, lbs, etc.)</small>	How many?	Amount paid				

Foods and Drinks Brought into the Home

Complete one BLUE page for each PLACE where you got food that you brought home

(*) DAY you brought food home	<input type="checkbox"/> Mon	<input type="checkbox"/> Tue	<input type="checkbox"/> Wed	<input type="checkbox"/> Thu	<input type="checkbox"/> Fri	<input type="checkbox"/> Sat	<input type="checkbox"/> Sun
Name of PLACE where you got food:							
Location:							
Name of PERSON who got the food:							
(*) Did you ...							
Use store or manufacturer's coupons?	<input type="checkbox"/> yes	<input type="checkbox"/> no					
Use a store loyalty card or a frequent shopper card?	<input type="checkbox"/> yes	<input type="checkbox"/> no					
Save your receipt?	<input type="checkbox"/> yes	<input type="checkbox"/> no					
Enter total paid including tax and tip	\$ <input type="text"/>						
(*) How did you pay? Check ALL that apply							
<input type="checkbox"/> Cash	<input type="checkbox"/> WIC amount: \$ <input type="text"/>	<input type="checkbox"/> Debit card	<input type="checkbox"/> Credit card				
<input type="checkbox"/> Check	<input type="checkbox"/> SNAP EBT amount: \$ <input type="text"/>	<input type="checkbox"/> TANF EBT	<input type="checkbox"/> Free				
(*) Did you SCAN the food and drinks?							
<input type="checkbox"/> ALL	<input type="checkbox"/> None	<input type="checkbox"/> Some					
List ALL foods and drinks you COULD NOT SCAN							
Description (Please be as specific as possible)	Write size or amount if known <small>(ounces, grams, lbs, etc.)</small>	How many?					

B. Data processing

Processing of FoodAPS data files began during the field period. Data from computer-assisted personal interviews (CAPIs) and the handheld scanner were electronically transmitted from the field. Food Books and other forms were returned from the field and moved through multiple processing streams for data entry. Food Books were reviewed and reconciled with information reported by telephone; scanned barcodes were matched with product dictionaries to identify acquired food items; and FAH store receipts were reviewed to match item prices with scanned barcodes and enter information into databases for items that were not scanned or reported in Food Books.

FoodAPS data were carefully reviewed and processed to ensure high quality. For example, information about retail acquisition locations (name and address) were validated through matches with extant databases (and via web searches, where necessary) prior to geocoding and calculating distances. FAH information reported in Food Books and by scanner was verified (and corrected where necessary) or supplemented by information from store receipts. FAFH item descriptions were standardized through matches with restaurant menus (for top national chains) and cleaned via spell-check. Food items were assigned food codes in USDA's Food and Nutrient

Database for Dietary Studies (FNDDS, version 5.0), which allowed us to add to the data base information on nutrient and food group content (per 100 grams) for most FAH and FAFH items.⁴

⁴ Food group content was obtained from the USDA Food Patterns Equivalents Database (FPED).

III. FIELD TEST

A field test of all FoodAPS data collection procedures was conducted in two counties in the Northeast about a year before the full-scale survey (late February through May of 2011). The field test collected data from a sample of 400 low income households. Higher income households were not included because the cognitive task of reporting food acquisitions over a seven-day period was not expected to be a substantial burden for that population. A random sample of addresses was selected in survey areas and screened to identify eligible low-income households.

The primary purpose of the Field Test was to provide methodological information about two alternate Food Book designs and two alternate incentive levels.⁵ The findings from this test determined the design for the full-scale survey. One of the limitations of the field test, however, was that the scope of work did not include linking food items with nutrient information. Therefore the food item data were not fully processed in a way that would mimic the full-scale survey.

A. Findings unrelated to Food Book design and incentive level

The field test uncovered issues related to income reporting, telephone reporting, allocation of scanners, field operations, and the match of scanned barcodes with product information. All of these findings led us to revise procedures for the full-scale survey, but some issues persisted.

Did the field test uncover issues unrelated to Food Book design and incentives? Did these issues persist in the full-scale study?

Income reporting. The field test found that household income, on average, was underreported on the screener compared with the household interview. Because of this underreporting, the screener did not yield accurate counts of households within the income subgroups targeted for survey completes. The screener was revised for the full-scale study but underreporting on the screener persisted, and remains a challenge for future FoodAPS data collections if screening is needed to identify households in very low income groups.

Telephone reporting. Up to 20 percent of FAFH was not reported by telephone during the field test (based on a manual count of completed Red Pages). Underreporting persisted in the full-scale survey but we developed procedures to review and capture unreported Red Pages.

Allocation of scanners. During the field test we found it was difficult to predict the number of scanners needed by individual interviewers. For the full-scale survey, we increased the number of scanners per interviewer, but problems with scanner availability persisted. Midway through the data collection period we decided to hold an inventory of scanners at the SOC for overnight shipment to meet specific needs.

Operations. The field test allowed survey managers to observe the large burden on field staff in managing caseloads and materials. In response, we developed a customized **Sample Management Interface (SMI)** for our existing Sample Management System to reduce the

⁵ The main findings are detailed in previous memoranda to ERS and in the Survey Design document.

unique burden associated with managing FoodAPS caseloads and materials. The SMI largely solved the problems observed during the field test.

Match of scanned barcodes with product information. Field test findings indicated that 44 percent of scanned barcodes could not be linked to a brand, product name, and package size. The field test used the Gladson product dictionary to identify scanned items. After the field test, ERS obtained the Information Resources, Inc. (IRI) product data. Mathematica investigated the availability of other sources of information through conversations with several large supermarkets chains, but these conversations failed to identify any alternatives. The IRI data improved the match of scanned UPCs with product descriptions, but did not eliminate non-matches. Thus, a challenge remains for ERS to identify additional sources of data to link UPCs with product information.

B. Recommended changes to the field test

The FoodAPS field test was designed to test Food Book designs and incentive levels. Several other lessons were learned, but because food items were not linked with nutrient information, it did not truly mimic the full-scale study on a smaller scale.

What would we change for the field test if doing it again? What might be included in a future test?

If FoodAPS-2 includes a field test—and we believe that it should—we recommend that it include a test of study procedures from beginning to end, including all systems and procedures for processing the data. The following examples illustrate how this might have helped develop better procedures for FoodAPS:

- The field test indicated up to 20 percent of FAFH acquisitions were not reported by telephone. But the field test did not include compiling data from unreported Red Pages. Therefore, we did not recognize that some Red Pages only appeared to be unreported because of the standardization of the place name that occurred during the telephone interview.⁶
- The field test did not include linking food items with nutrient information. Therefore, we did not learn about many of the complexities of FAFH (combination meals and bundled food items) that are discussed in Chapter 8.

⁶ Telephone interviewers were instructed to enter only “school” and “work,” without proper place names. If the school name did not include the word *school*, then the capture process added a duplicate acquisition to the data.

IV. SAMPLING DESIGN AND SELECTION

The FoodAPS sampling design included 50 PSUs, with 8 interviewing areas (SSUs) selected within each. A sample of 20,000 addresses was selected within interviewing areas. Households at those addresses were screened to determine their membership in a target group, and eligible households were invited to participate in the study.

The respondent universe for FoodAPS included all households in the mainland United States, with two groups for analysis: (1) households receiving SNAP benefits; and (2) households not receiving SNAP benefits. Non-SNAP households were selected from three subgroups sampled at different rates so that, for sampling, four groups were selected. The goal was to obtain completed surveys from 5,000 households with target sample sizes for the four groups:

Group A: 800 non-SNAP households with income less than poverty (very low income)

Group B: 1,200 non-SNAP households with income greater than or equal to 100 percent and less than 185 percent of poverty (low income)

Group C: 1,500 non-SNAP households with income greater than or equal to 185 percent of poverty (higher income)

Group D: 1,500 SNAP households (SNAP).

The FoodAPS sampling design was very complex, including a multi-stage cluster design, a dual sampling frame (SNAP and non-SNAP), field listing to ensure accurate coverage of rural areas, in-person screening to identify households in each target group and control the flow of households into the survey, and two-phase sampling to re-release a sample of “hard to reach” addresses and improve their representation in the survey. Each of these features appears in sampling designs for other national surveys, although few other surveys include all of these features.

This chapter discusses two aspects of the sampling design that might be reconsidered for FoodAPS-2: (1) sample coverage and (2) survey targets. We also discuss screener response rate challenges.

A. Sample coverage

FoodAPS was designed to represent all households in the mainland United States, excluding only persons living in institutions and group quarters. The exclusion of Alaska and Hawaii is typical for many national in-person surveys because of cost considerations (for example, the USDA National Survey of WIC Participants-I and -II). On the other hand, the sampling design for NHANES included Alaska and Hawaii beginning with NHANES-II and the Consumer Expenditure Survey includes these states in the sampling frame.

The sample design excluded Alaska and Hawaii and did not select areas on Indian tribal lands. Is this typical of national surveys?

For FoodAPS, ERS should consider that the food environment and food prices in Alaska and Hawaii are significantly different from prices on the mainland. If outlying States were included,

would ERS want to analyze them on their own or include them in national estimates? What is the impact on overall sample size if researchers want to analyze the mainland separately?

Indian tribal lands were included in the sample frame but, by chance, none of the selected SSUs were on tribal lands. ERS may want to consider excluding them from the frame in the future. These areas can pose administrative challenges because tribal permission is often needed to conduct surveys on tribal lands. Tribal entities may also require access to or ownership of the collected data. In terms of analysis, including tribal areas may not pose analytic challenges if the selected areas are small and residents shop outside the tribal area. Large areas such as Navajo Nation, may pose questions related to food environment and food prices similar to those described above for Alaska and Hawaii.

B. Sample requirements and challenges in meeting survey targets

A requirement of the FoodAPS sampling design was the use of specific targets for survey completes in four groups defined by SNAP participation and income. Many surveys screen for inclusion based on categorical information (e.g. age, presence of children, race/ethnicity, or program participation). Many surveys also oversample low-income groups, defined broadly. However, screening to include households in narrow income groups is rare, perhaps because people typically have difficulty reporting their income precisely.

What were the key challenges for obtaining FoodAPS sample? Did FoodAPS meet those challenges?

FoodAPS used three approaches to deal with the challenge of meeting targets for the four groups defined by SNAP participation and household income.

1. The sampling design used a composite measure of size (MOS) when sampling geographic areas (PSUs and SSUs) to provide greater weight to areas with households in groups that were oversampled relative to their population.
2. The sampling design used a dual SNAP/non-SNAP sampling frame to identify sufficient SNAP households.
3. Households were screened to determine SNAP participation and income, and study eligibility was “turned on and off” to obtain a flow of households into the study that was roughly proportional to targets.

As designed at the proposal stage, the significant oversampling of very-low-income non-SNAP households was manageable—the flow of households into the study was proportional to targets when measured by screener responses. However, after the contract award and before fielding the full-scale survey, ERS imposed an additional requirement to count households in target groups based on income reported in the Final Interview (after the household completed the data collection week). This yielded different counts of households in each non-SNAP income group (A–C) and fewer households in group A than desired.

Mathematica implemented changes to the screener after the field test, but because of limited time and funding, the revised screener did not undergo field testing.

One of the most important findings from FoodAPS was that households tended to underreport income in the screener interview.⁷ Thus, the number of participating households in Group A was significantly below target and the Group C households might be disproportionately at the low end of the Group C income distribution (because we closed the survey to Group C mid-way through the field period, and filled Group C with households identified as Group C at the final interview after underreporting as Group A or B at the screener).

Other studies have struggled to find very low-income non-SNAP households.⁸ It is possible that more research should be done to understand how these households are identified in Census surveys. One might ask whether it is reasonable to collect data on monthly income, as required by ERS, to meet population targets based on annual income (in Census surveys); and whether narrow income group targets are appropriate for identifying low-income groups that disproportionately experience irregular income.

C. Screener response challenges

The field test attained a screener response rate of 58 percent; this improved to 72 percent for the full-scale survey but still fell below the target rate of 80 percent.

FoodAPS used two-phase sampling to reduce the potential of nonresponse bias and increase the response rate. After making up to 8 unsuccessful attempts to contact residents at an address, the case was retired and eligible for Phase 2, in which a sample of “hard to reach” cases were re-released for additional attempts at screening. The effectiveness of two-phase sampling was limited because few cases were retired after 8 unsuccessful attempts. At the time that we sampled for Phase 2, the number of retired cases was 1,087. Because the number of cases eligible for Phase 2 was small, two-phase sampling generated only a marginal increase in the screener response rate.⁹

How did FoodAPS address screener response rate challenges identified in the field test?

The implementation of two-phase sampling was limited in part by the lack of technology used in the screening process. Because screening was done on paper, it was difficult to monitor all attempts by interviewers to contact households. Anecdotal information suggested that interviewers were reluctant to retire a case if they knew they would be back in the neighborhood,

⁷ Respondents may underreport income for variety of reasons: they may forget a source of income, their income may be highly variable, and they may lack complete information about all household members' incomes.

⁸ The National Survey of America's Families (conducted in 1997, 1999, and 2002) used a short screening interview to determine household size and family income. The screener was found effective in increasing the number of low-income family interviews, but they noted that “asking income at the start of interview can increase the number of respondents refusing to take part in the study” and that “an additional problem comes from the inaccuracy of income reports when a single income question is used to screen households” (Triplett and Wherry 2006).

⁹ The Phase 2 sample comprised a random sample of addresses retired from Phase 1 as of October 16 (N=1,087 retired). The initial Phase 2 sample of 150 addresses (13.8% of the frame of 1,087 retired addresses) was re-released in October for further contacts. However, Phase 2 was reduced when sample was pulled out of the field on November 9. Thus the effective sample frame, sample size, and sampling rate for Phase 2 was 985, 138, and 14.0% respectively. Use of two-phase sampling improved the overall screener response rate by 1.8 percentage points.

and thus they did not log all attempted contacts. A larger Phase-II sample may be generated if the screener is administered electronically with GPS tracking of activities.

Other challenges for screener administration

The primary challenge for screening was the use of a paper instrument. There is no way of knowing whether response was affected by paper administration but two issues were encountered: (1) item nonresponse was higher than anticipated, and (2) skip patterns were not consistently followed.

Interviewers likely felt pressure to complete the screener quickly, and they could easily skip questions on the paper instrument. For example, household size and income were to be entered in two places on the screener; in the interests of time, however, interviewers could have entered data in only one place. Interviewers also made mistakes following the skip logic or determining eligibility. These issues could easily be prevented if the screener was administered electronically.

D. Recommended changes to the sampling design

The greatest challenges for obtaining FoodAPS sample were (1) managing the flow of sample against survey targets when target group membership was determined after completion of the survey week, and (2) attaining an adequate screener response rate. To control costs, FoodAPS-2 must address the issue of survey targets through a change in either requirements or procedures. Alternative solutions could include one or more of the following:

What changes could be made to mitigate the challenges faced by FoodAPS?

1. Relax the targets.
2. Conduct field tests to develop a more accurate screener.
3. Test ways to adjust the sample intake criteria to account for differences between income reported on the screener and on the final interview.¹⁰

A combined approach would use a composite MOS to identify geographic areas, an electronic screener that incorporates multiple criteria based on analyses of the FoodAPS data, and final targets applied to screener results. This approach would rely on screener results and relax the requirement to count households against survey targets based on income reported at the end of the survey week.

A reconsideration of survey targets may be warranted depending on how the FoodAPS data have been used for research. For example, are researchers reporting estimates for group A alone, or are most analyses based on the aggregate of groups A and B? If these groups are generally aggregated, then hard targets for each of groups A and B are not needed to guarantee statistical power for analysis.

¹⁰ FoodAPS data might be used to identify households with reporting discrepancies and to model those discrepancies in terms of differences in income, household size, types of income, and characteristics of respondents.

A final lesson is that screening with a paper instrument and paper contact sheets is complicated and interviewers made mistakes. As a result:

- 80 households that were not eligible for the study (based on open survey groups and screener responses) were misclassified by an interviewer and entered the study.
- Interviewer falsification was identified in one PSU, and all sample cases had to be validated.
- Two-phase sampling was not as effective as anticipated, because field staff were reluctant to “retire” cases based on the prescribed number of attempted contacts.

FoodAPS-2 will undoubtedly incorporate technological advances in survey methodology that were not available when FoodAPS was designed in 2009. These should include electronic contact information, electronic screening, and GPS validation of screening activity. In addition to producing higher quality data, electronic data collection would eliminate printing, shipping, and data entry costs (for 20,000 screened addresses). Some of the problems experienced by FoodAPS might be eliminated, or the risk significantly reduced with electronic screening.

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V. FIELD STAFF RECRUITMENT AND TRAINING

FoodAPS field interviewers played a critical role in the study: they were in direct contact with households to conduct screening, recruit eligible households, train respondents on food-reporting protocols, conduct interviews, distribute self-administered survey forms, and provide incentives.

A. Recruitment and retention of field managers and field interviewers

Field managers and interviewers were recruited at three points in time. A total of 152 interviewers were hired in April 2012 and attended a training in either the eastern or western division. We hired additional interviewers in June 2012 to fill vacancies due to attrition. Finally, in August 2012, we hired a final group of interviewers and trained them to do screening activities. Overall, FoodAPS recruited 10 field managers and more than 200 field interviewers. All field managers had prior Mathematica experience, eight as field managers and two as top-performing field interviewers.

*What were the main challenges for recruiting and retaining field staff?
What were the biggest surprises?*

Recruitment of field interviewers was challenging owing to the scale of the recruitment effort, the number of other studies competing for interviewing staff, the study-specific skill requirements, and the limited number of candidates in rural areas. Interviewers were recruited from Mathematica's database of prior employees, on-line recruitment sites (Indeed.com, Craigslist.org), and referrals from hired interviewers. Because of the number of other studies going on at the time, many interviewers known to Mathematica were already assigned to other projects. Thus the most effective strategies for FoodAPS were on-line sites and referrals.

The biggest surprises during recruitment were the difficulties finding enough candidates in rural areas, finding enough candidates with the requisite technical skills in the eastern areas of the country, finding enough Spanish-language bilingual interviewers on the west coast, and finding a Korean-language interviewer. Because of the small candidate pool in many areas of the country, FoodAPS hired many interviewers with no prior interviewing experience; many of the new interviewers were very successful but, not surprisingly, others had mixed performance. We addressed the difficulties in finding Spanish bilingual interviewers by moving bilingual interviewers among survey areas during the field period.¹¹ A qualified Korean language interviewer was identified mid-way through the data collection period and was trained to focus on screening activities.

Four months into the data collection period, it was apparent that (1) field interviewers were spending most of their time screening, and (2) we needed to release additional sample for screening because we were not finding enough non-SNAP households in the lowest income

¹¹ Census data indicated that Spanish-speakers were prevalent in 76 of 200 SSUs in the west and 47 of 200 SSUs in the east. Initial recruitment included 29 bilingual Spanish-speakers among 75 field interviewers in the western PSUs and 10 among 77 field interviewers in the eastern PSUs. The overall staffing was adequate, but Spanish-speaking households were dispersed across survey areas, so bilingual staff traveled where needed.

groups. To meet these challenges, additional interviewers were hired, trained to screen households, and deployed on a traveling basis where needed.

B. Field manager training

FoodAPS trained field managers during a two-day session before field interviewer training. This training focused on the field manager role, with the expectation that field managers would obtain full training on study content during the subsequent field interviewer training.

Budgetary constraints limited the length of field manager training. Additional training could be provided to managers at modest cost by assigning e-learning modules and quizzes to complete at home. Certified managers who passed all the quizzes would proceed to field manager training where they would receive additional training on these and field management procedures.

What worked well in field manager training? Did field managers have unexpected difficulties that might be addressed through additional training?

Field managers reported feeling prepared and confident going into the field. Monitoring of their weekly calls with field interviewers, however, indicated that some field managers conducted excessively detailed case reviews with interviewers (which increased the cost of field management). To avoid this problem, field manager training could include a demonstration of a weekly phone call with an interviewer to illustrate best practices and set expectations.

C. Field interviewer training

Field interviewer trainings in April 2012 and June 2012 included an at-home assignment followed by in-person training over five calendar days. The five days began with a half-day of general training for interviewers who were new to Mathematica. The next three days provided one full day of training on each of the three main field interviewer responsibilities: (1) screening; (2) the Initial Visit; and (3) the Final Visit. A final half-day was used to certify interviewers for data collection. Two training sessions for screener-only interviewers were held in August 2012. Their training focused on the screening component.

How were field interviewers trained? What worked well in the trainings? Did interviewers report the training to be effective?

1. At-home training

For at-home training, field interviewers tracked their food acquisitions during the week before in-person training. The at-home assignment served as a good primer on the study, but it did not truly mimic the household experience because interviewers did not receive hands-on training for scanning and using Food Books as households would. Thus, the at-home training component (the experience of tracking food acquisitions) might alternatively be completed after in-person training.

2. In-person training

The three full days of training included a mix of large group lectures, e-learning modules, small classroom sessions, and mock-interview practice. Interviewers provided positive reviews of the training, especially the e-learning modules, but they also indicated that a “full run-through” of all procedures from screening through the Final Visit (these were taught separately by different methods) would have been helpful.

D. Recommended changes for field staff recruitment and training

The greatest challenges for recruitment and training were identifying adequate staff in some areas; and developing a training schedule that covered all aspects of the survey and interviewer responsibilities within the allotted training budget.

To meet recruitment challenges, FoodAPS-2 might consider the use of specialized screener-only interviewers throughout the field period. These interviewers require less training and are likely to be more productive, on average, because they have fewer tasks to manage.

What would we change for field staff recruitment and training, if doing it again?

We recommend additional training time for field managers to learn all study material (in lieu of training them alongside field interviewers). This might be accomplished with at-home e-learning assignments. We also recommend training exercises to practice weekly reviews with field interviewers.

We recommend additional training time for field interviewers to provide a “full run-through” of field procedures from screening through the Final Visit and possibly changing the timing of the at-home exercise. In addition, two issues arose during data collection that might have been prevented or mitigated with additional training:

- **Appointments** – Training stressed the importance of conducting the Initial Visit immediately after screening and minimizing the use of appointments. Therefore, interviewers stopped screening if they did not have an available scanner to deploy to an eligible household. During the field period, we retrained interviewers to continue screening when they ran out of scanners and to set appointments for Initial Visits.
- **Retiring cases** – Interviewers needed to go to each sampled address a specified number of times during different time periods to attempt to conduct the screener. After the specified number, a case was to be retired. We found that interviewers were reluctant to retire cases, especially when they worked small geographic areas and knew they would be back in the neighborhood. Training could be enhanced to more fully explain the reasons for retiring cases and to dispel any notion that a retired case reflects poorly on an interviewer’s performance.

It is recommended that electronic screening be used for FoodAPS, which would allow some of the training time previously devoted to screening to be reallocated to these topics.

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VI. TELEPHONE STAFF RECRUITMENT AND TRAINING

FoodAPS conducted three food-reporting telephone calls with the PR to collect information from Food Books (green Daily List pages and red FAFH pages). Telephone interviewers entered data into a custom-built Food Reporting System (FRS). The FRS data entry screens resembled the Food Book pages, and the navigation system allowed interviewers to collect information with a loosely scripted interview. The interview was designed to prompt respondents to move through and report information from the pages of their Food Books.

A. Recruitment and retention of telephone interviewers

Thirty telephone interviewers and supervisors were recruited for training sessions in March 2012. Minor attrition occurred throughout the field period; additional recruitment and one-on-one training (by a supervisor) were conducted as needed. About two-thirds of FoodAPS telephone interviewers had prior experience with Mathematica, and the rest were recruited through newspapers, local colleges, and on-line sites (e.g., Monster.com).

*What were the main challenges for recruiting telephone interviewers?
What were the biggest surprises?*

The main challenge for recruitment of telephone interviewers was identifying staff who could effectively use the FRS rather than the traditional question-by-question script used in most computer-assisted telephone interviews (CATIs).¹² In using the FRS, telephone interviewers had to navigate two potential challenges: (1) as the PR reported food items, interviewers had to code the items (by selecting the best possible match from the drop-down list) and probe for more item-level details as needed; (2) interviewers had to do a larger amount of free-text typing than is typical for most telephone interviews.¹³ In addition, interviewers were responsible for detecting and retraining PRs who were struggling with the study protocols, and encouraging PRs who were reluctant to continue with the study.

If FoodAPS-2 uses a similar approach for telephone interviews, hiring managers will need to understand that some experienced telephone interviewers may not be suitable for this assignment. It will be very important to screen candidates' computer skills and competency with open-ended interviews. Performance requirements could be reduced if the FRS is enhanced (e.g. the FRS could require point-and-click selection of food items for the most common FAFH places) but the data collection procedures will continue to present challenges.

¹² A question-by-question script focuses on a single question and response at a time. In contrast, the FRS allowed the interviewer to see an entire Food Book page as data were filled in on it, and to ask clarifying questions about the acquisition if data appeared inconsistent. For example, interviewers provided "notes" to explain why prices were filled for "free" acquisitions (because someone outside the household paid for the food).

¹³ Free-text typing was needed for place names, place addresses, and food items not included in drop-down lists.

B. Telephone interviewer training

Like the field interviewers, telephone interviewers began their training with an at-home exercise (to report food acquisitions). After that, they completed two in-person training sessions on consecutive evenings in March 2012. During early April, training continued with practice sessions during which field staff (as part of their at-home training) completed food-reporting calls with the telephone interviewers.

How were telephone interviewers trained? What worked well in the trainings? Did interviewers report the training to be effective?

In-person training

Interviewers and supervisors provided feedback throughout the training and at its conclusion. Interviewers reported that the at-home training, e-learning modules, and trainer-led simulations were the most effective elements. Interviewers reported feeling more confident and knowledgeable about navigating the FRS after watching the simulations because trainers demonstrated best practices.

C. Recommended changes for telephone training

During data collection and processing, some issues were identified that might have been prevented or mitigated with additional training:

- **Google Maps for collection of place information.** The Google Maps feature in the FRS was designed to generate clean and validated data on place name and address for retail locations not included in the drop-down lists. Interviewers would have benefited from additional practice (1) using the Google Maps feature, and (2) entering location data as free text when a place could not be found with Google Maps.
- **Food Items.** The FRS was designed with drop-down lists to standardize food items upon entry. Interviewers may have benefitted from additional training on how to select food items from drop-down lists and when to use free-text entry. In addition, coding and processing of the FAFH data revealed that interviewers would have benefitted from training exercises designed to better familiarize them with the data they would be collecting, for example, menus of most popular restaurants and the most prevalent FAFH items reported from other places, with best practices for entering these data, for example, dealing with combination meals, upsizing, condiments, and other item and price idiosyncrasies.

What would we change for telephone recruitment and training, if doing it again?

VII. FOOD-AT-HOME INSTRUMENTATION AND DATA PROCESSING

FAH was defined for FoodAPS respondents as “food and drinks brought into the home.” For each FAH acquisition, respondents entered the name of the place and total amount paid on the Daily List and were instructed to “complete one Blue Page for each place where you got food that you brought home.” Blue Pages were in the PR Food Book along with instructions to “scan all the foods and drinks” and “attach your receipt.” The Blue Page collected information about the acquisition (where, when, payment type, payment amount) and information about food items that could not be scanned (name of item, size or amount, and how many). Store receipts provided item prices.

Respondents saved store receipts for 80 percent of FAH acquisitions and reported scanning some or all food items for 75 percent of FAH acquisitions, but usable barcodes (UPCs) were obtained for only 66 percent.¹⁴ If usable barcodes were not scanned, and items were not written on the Blue Page, then item descriptions were obtained from receipts.

A. Challenges for collecting FAH data on Blue Pages

FAH data from Blue Pages presented some challenges: (1) missing, incomplete, or inconsistent data; (2) a lack of accounting for non-food items; (3) missing or incomplete store addresses for acquisitions reported without a receipt; (4) incorrect use of the “size or amount” and “how many” fields; and (5) imprecise item descriptions.

What issues were encountered in the collection of FAH data using the Food Books? What changes do you suggest for the Blue Page?

Missing, incomplete, or inconsistent payment data. Data filled on Blue Pages was sometimes missing, incomplete or inconsistent. FoodAPS filled or corrected most of this data by manually checking store receipts.¹⁵

FoodAPS-2 could improve this process by entering all data from receipts so that Blue Page data can be compared electronically with receipts. In addition, the Blue Page might be redesigned to collect information only if a receipt is not provided.

No accounting for non-food items. Many FAH acquisitions include non-food items, bottle deposits, and tax. The Blue Page, however, collected only the total amount paid, the SNAP amount paid, and the WIC amount paid; and data entry from receipts was limited to food item prices. Thus, it was not possible to employ edit checks ensuring that all dollar amounts summed to the total paid.

¹⁴ Item descriptions were obtained from scanned barcodes (68.1 percent of items), Blue Pages (7.8 percent), and receipts (24.2 percent).

¹⁵ Only store name and address on the Blue page were compared to the receipt prior to data entry. Receipts were scanned to PDF files and manually reviewed, as needed, to resolve other inconsistent or missing data on the Blue page.

FoodAPS-2 could provide a better accounting of acquisitions by asking respondents to scan all items (food and non-food), and by entering all dollar amounts from receipts (prices for all items, tax amount, and all payment subtotals).

Missing or incomplete store addresses. Store addresses were reported on the Blue Page and edited if a store receipt was provided. If a receipt was not provided, store name and address were matched with extant data for validation prior to geocoding and constructing distance from respondent's home to store. Store addresses that were incomplete or did not match extant databases were manually investigated in Google Maps, which is a time-consuming process.¹⁶

FoodAPS-2 could revise procedures for the Final Visit to have interviewers review Blue Pages that lack a store receipt. If the store address is incomplete, the respondent could be asked to identify the store on a map so that the precise store address is collected.

“Size or amount” and “how many” fields. Respondents reported unscannable food items on the bottom of the Blue Page, including food item description, “size or amount,” and “how many.” “Size or amount” was intended to capture package size (a dozen eggs; a six-pack of soda), and “how many” was intended to capture the number of units purchased at a given price. Respondents often used the “amount” and “how many” fields incorrectly. For example, a dozen eggs was recorded with “how many” equal to 12, instead of “amount” equal to 12 (or dozen) and “how many” equal to 1. FoodAPS discarded “size and amount” and “how many” whenever a receipt provided either weight or count of items obtained at a price. When no receipt was provided, all reports of “how many” greater than one were manually reviewed but resolution of these data is difficult when a receipt is not provided.

The “size and amount” and “how many” fields yielded inconsistent data on both Blue and Red pages. Therefore, we recommend cognitive testing to determine terminology or page design to better communicate these concepts to respondents.

Food item descriptions. It is difficult to provide respondents with clear instructions for reporting food items on a paper instrument. Respondents were asked to complete the bottom of the Blue Page (“write each food and drink on a separate line”) for items that cannot be scanned. Therefore, items were written on Blue Pages if they lacked a UPC. Most of these items were fresh fruits and vegetables; meat, fish, and poultry; and deli items.

A challenge for FoodAPS was that items written on Blue Pages sometimes lacked the detail needed to precisely match the items with a USDA food code, and different respondents reported identical items differently. For example, two respondents might purchase chicken breasts, and one writes “chicken breasts” on the Blue Page while the other writes only “chicken.”

FoodAPS-2 could collect more structured data about items that cannot be scanned by using electronic entry in lieu of paper Food Books (a mobile or computer application, or a scanner like that used for the Nielsen Homescan survey). Electronic entry could be guided by a series of

¹⁶ To search for a store, a coder centered Google Maps on the SSU, searched for the store name, and identified the “best match” for the address information provided. Manual searches were typically needed when respondents provided a route number rather than a street name, or provided the street but no number.

structured prompts for information about items that cannot be scanned. For example, respondents would select a broad food group (meat), then a subgroup (chicken), then a type (breast). Size or amount prompts can be tailored to specific food categories.

B. Challenges for collecting and processing FAH data with scanners

As noted above, respondents scanned barcodes for 75 percent of FAH acquisitions, but usable barcodes were obtained for 66 percent. Respondents reported that they liked the scanners but some issues were encountered with how the scanners operated, how they were used, and how the scanned data were linked to product information.

Were any issues encountered with the collection and processing of scanner data?

Scanner operation. At the start of the survey period, we received a few reports of “broken scanners.” These scanners were replaced in the field and examined at the SOC. Respondents had inadvertently turned off the audible beep on the scanners and assumed they did not work (when in fact, data were being captured). After these reports, we reprogrammed all scanners so that respondents could not change the settings.

FoodAPS-2 may avoid surprises with scanner operation by fully reviewing all configurable options prior to deployment to ensure that respondents cannot inadvertently change scanner operations.

Respondents’ use of scanners. A few respondents did not use the scanner and opted instead to write all food items on the Blue Page. In addition, many respondents missed at least one item when scanning their groceries.

FoodAPS-2 may encourage more scanning by simplifying scanning instructions with a barcode on each Blue Page instead of the “begin” and “place” barcodes. The problem of missed food items might be mitigated by asking respondents to scan all acquired groceries, including food and non-food items.

Linking scanner data with product information. The primary issue for processing scanner data was that a large number of scanned barcodes were not defined in the product dictionaries obtained for the study. If not defined, the barcode was dropped from the study database and the item description was obtained from the receipt. Descriptions from receipts tend to be highly abbreviated, in contrast to the precise item description, brand name, package size, and product category codes obtained from product dictionaries.

FoodAPS-2 might mitigate the problem of undefined barcodes by obtaining additional product information or using a scanner that can be pre-loaded with defined barcodes and alert respondents when a scanned barcode is not defined.

C. Challenges for collecting FAH data with store receipts

Respondents saved receipts for 80 percent of acquisitions and 6 percent of acquisitions were free so a receipt was not expected; 14 percent were purchases without a saved receipt.

FoodAPS-2 might explore alternative protocols for obtaining receipts or pictures of receipts. This exploration could be guided by examination of the FoodAPS data to determine if missing receipts were more likely from certain types of places.

Were any issues encountered with the collection of store receipts?

D. Data entry for FAH using the FRS and Price Entry System

Blue Page data were entered into the FRS, and receipt data were entered into the Price Entry System. These systems were integrated: key information from Blue Pages was preloaded in the Price Entry System so that coding staff selected an acquisition matching the receipt and did not need to enter store name, address, and total amount paid.

Scanner data were also preloaded in the Price Entry System so that prices could be entered next to each scanned item.

Did the FRS and Price Entry System operate as designed?

For the most part, these systems worked as designed. But, as noted earlier, inconsistent or missing data on Blue Pages had to be resolved by a costly manual review of receipts. In addition, a small number of Blue Pages combined multiple acquisitions; and the data entry staff struggled with the drop-down lists for food items listed at the bottom of Blue Pages. Therefore, we recommend the following changes:

1. **Enter all information from receipts and include edit checks.** Entry should include:
 - a. All payment types and subtotals corresponding to each payment type
 - b. All prices (including non-food items), plus bottle deposits and tax
 - c. An indicator of taxable items identified on the receipt

An edit check should alert entry staff when dollar amounts do not sum to the total or when the implied tax rate is outside a specified range.

2. **Identify Blue Pages with multiple acquisitions prior to entry.** We suspect this occurred when a respondent visited multiple stores on one shopping trip. These could be transcribed to separate Blue Pages prior to entry, using receipts to fill Blue Page fields as needed.
3. **Revise collection of food item names.** If food items are reported on the Blue Page, revise the drop-down in the FRS to include only major fresh food categories to focus on the most prevalent Blue Page items to improve the standardization of item descriptions.

E. FAH data processing¹⁷

There were two challenges for processing FAH data that were unrelated to Blue Page design: (1) assigning place type and (2) assigning food category to items written on Blue Pages or extracted from receipts.

Assigning place type. Place type identifies the type of store or other place where FAH was acquired.

FoodAPS used the USDA Store Tracking and

Redemption Subsystem (STARS) list of authorized

SNAP retailers to identify store type. Places were matched with STARS using both name and address, because different locations of the same store chain might be identified by a different store type. For example, a grocery store chain can offer stores of different sizes, and a convenience store could be free-standing or co-located with a gas station.

What were the biggest challenges for processing FAH data?

The match with STARS was expected to be simple for 80 percent of acquisitions because store names and addresses were validated by receipts prior to data entry. Nonetheless, these matches were challenging because:

- STARS sometimes lists a parent company name instead of the storefront name.
- STARS addresses could appear as highway numbers instead of street names.
- STARS data were a year old at the end of the data collection period and some stores changed ownership (and name) during the field period.
- STARS data were provided only for states represented in the study, but some SSUs were near State borders and respondents shopped out-of-State.

Resolution of these issues generally required manual lookups in Google Maps to confirm that disparate addresses were the same, or to confirm the storefront name at a particular address. Out-of-state stores were sent to ERS for a match with the full STARS database.

Acquisitions without a receipt often had abbreviated store names or incomplete addresses. These were researched in Google Maps by centering the map on the SSU and searching for the provided information. Google results often allowed a match with STARS to obtain store type, otherwise the store type was taken from the Google Maps business database.

The challenges of assigning place type might be mitigated by:

- Combining STARS data from the beginning and end of the data collection period to include all store name changes
- Obtaining a national STARS data file, to include “out-of-state” stores

¹⁷ Nutrient coding is discussed separately in the next section.

- Obtaining a store list from a different source with store names listed according to the store front, and not ownership entities

Assigning food categories. Items with scanned barcodes that matched the IRI database were coded with food categories from that database. But assignment of food categories was a challenge for all item descriptions written on a Blue Page or extracted from receipts.

The IRI category codes were assigned to non-UPC items through a multi-step process. First, we identified prevalent keywords (by parsing individual words in item descriptions), then wrote programming code to assign categories based on keyword searches. Each category assignment was manually reviewed.

We recommend that FoodAPS-2 explore use of a machine learning algorithm to more efficiently assign food categories to food items.

F. FAH nutrient coding

The primary challenges for assigning USDA food codes to FAH items were (1) the large number of unique food items, and (2) the lack of information in USDA nutrient databases for foods in their “as purchased” form.¹⁸ The USDA databases that ERS instructed us to use are designed to provide nutrients for food items in the form in which those foods are consumed.

Challenges for assignment of gram weights were (1) IRI package size did not identify fluid versus dry ounces, and (2) 30 percent of items needed imputed gram weight.

What were the primary challenges for assigning USDA food codes to FAH items? What were the limitations of USDA food codes for FAH items? What challenges were encountered in assigning gram weights to FAH items?

Coding the large number of unique food items. Nearly 45,000 unique FAH items were reported by FoodAPS respondents. Given the available resources and the project schedule, it was not feasible to assign USDA food codes to each item individually. Therefore, we used the hierarchical IRI food category and attribute codes to collapse the number of unique food items into a smaller number of records for assignment of USDA food codes.¹⁹ In agreement with ERS, we developed separate procedures for coding (1) UPC items that matched the IRI database, and (2) items written on Blue Pages or extracted from receipts.

The IRI database has some limitations but it is not clear that these can be overcome without substantial investment of resources to research individual food items. The limitations include:

¹⁸ The “as purchased” form corresponds to the form in which a household acquired the food (for example, dry pasta, raw meat, cake mix, bread dough, and popcorn kernels) and does not necessarily reflect the form in which the food was consumed.

¹⁹ Attributes contain important product a “not specified” (NS) or “not further specified” (NFS) code when available in USDA databases variations that may not be indicated in the item description (for example, fat or sodium content).

1. IRI did not assign attributes for some food categories²⁰
2. When attributes were assigned, they could be missing for some items
3. When attributes were available, they could be inconsistent with the item description
4. Some food categories were very heterogeneous so that each item needed individual review.

Items reported on Blue Pages and extracted from receipts were coded with high-level IRI category codes and USDA food codes were assigned based on the assigned categories.²¹ Because of budgetary constraints, these items were not individually reviewed. Therefore, the assigned USDA food code is the best match for the “type” or “category” but might not be the best match for the individual food item. In many cases, NS and NFS codes were assigned. In addition, assumptions had to be made for meats, because the level of specificity needed for nutrient coding was not provided on Blue Pages or printed on receipts.

FoodAPS-2 might more precisely link food items to USDA food codes by collecting more precise item information from respondents. As described above, this may be achieved with a different scanning technology to alert respondents to undefined barcodes and prompt respondents for structured information about food items. We recommend development of structured prompts that link directly to USDA food codes.

Limitations of the USDA food codes. No single USDA database contains all the data required for all FAH items purchased by FoodAPS respondents. The Food and Nutrient Database for Dietary Studies (FNDDS) was the primary source of nutrients, and FNDDS food codes provide a link with the Food Patterns Equivalence Database (FPED). However, some foods are not represented in FNDDS, and nutrients were then assigned codes from the USDA National Nutrient Database for Standard Reference. When such a code was assigned, the food needed a second code to link it to FPED.

Three overriding issues were observed during assignment of food codes:

1. For some food categories, USDA databases do not include all product variations observed in the IRI database.
2. For some food categories, the USDA database is highly specific, but Blue Page entries and receipts did not include enough information to make a precise match, and NFS/NS codes were assigned.
3. Some FAH items do not exist in the USDA databases in the “as purchased” form.

FoodAPS met these challenges by assigning USDA food codes that represent the “best match” available given the methods for food code assignment agreed upon with ERS.

²⁰ Items with missing attributes were assigned a “not specified” (NS) or “not further specified” (NFS) code when available in USDA databases; otherwise default food codes were selected for the food category.

²¹ Sixty percent of items were assigned codes for department, aisle, and type; 40 percent were also assigned the more specific “category.”

Improvements in data collection may mitigate problem (2), but enhancements to the USDA nutrient databases will be needed to mitigate (1) and (3).

Assignment of grams weights. A gram weight is needed to use the nutrient and FPE values. We encountered three main challenges in assigning gram weights

1. IRI package sizes do not distinguish between fluid and dry weights, so we needed to assign a fluid weight indicator to items before converting ounces to grams.
2. A single source of refuse factors is not available for all USDA food codes where refuse is part of the food as purchased. For example, refuse factors are not provided for canned vegetables and meats (which contain canning liquid), shellfish, and some meat products.²² When a refuse factor was unavailable, yield factors were assigned.
3. Most items reported on Blue Pages or taken from receipts (30 percent of all items) were missing a “size or amount,” so gram weights were imputed.

The third challenge was most significant and will require changes to data collection procedures to minimize the number of food items reported on a Blue Page or taken from receipts. The set of structured prompts for item information, discussed earlier, can incorporate prompts for “amount”, with units that are specific to the reported food item.

G. Recommended changes for FAH data collection

FoodAPS revealed three main challenges for collecting and processing FAH data: (1) Blue Page information was sometimes missing or inconsistent, (2) a large number of foods were not reported by a scanned barcode, and (3) USDA databases do not contain information for all reported foods in their “as purchased” form.

FoodAPS-2 may substantially improve the quality of collected data by:

- Entering all information from store receipts into the study database (and using edit checks during the entry process)
- Including a barcode on each Blue Page to link scanned data with Blue Pages.
- Instructing respondents to scan all items, including non-foods, to possibly reduce the incidence of missed items
- Deploying a scanner that can be programmed to alert respondents to unrecognized barcodes and issue a set of structured prompts for entering item information.
- Reviewing Blue Pages that lack receipts during the Final Visit, and asking respondents to identify the store on a map so that the precise store address is collected.

What changes are recommended for the collection of FAH data if doing it again?

²² *Refuse* is the inedible parts of food (for example, bones, peels, cores, and stems). USDA nutrient and food pattern databases provide values per 100 grams of the edible portion of a food. When a food is acquired in a form that includes refuse, a refuse factor is needed to adjust the weight of the food “as purchased” to reflect the edible portion.

- Obtaining a comprehensive database of food stores to identify place type (this database should have storefront names and addresses, and national coverage)

In addition, the USDA nutrient databases are designed to provide data for foods in their “as consumed” form. Development of “as purchased” equivalents would greatly facilitate the coding process for future rounds of FoodAPS.

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VIII. FOOD-AWAY-FROM-HOME INSTRUMENTATION AND DATA PROCESSING

FAFH was defined for FoodAPS respondents as “meals, snacks, and drinks you got outside your home.” Respondents were instructed to “complete one Red Page for each place where you got food and drinks.” Red Pages were located in the Primary, Adult, and Youth Food Books. Three times during the data collection week, the PR was asked to report FAFH information from Food Books by telephone.

The primary challenge for FAFH data collection was that respondents often relied on recall to report these data. In contrast to FAH acquisitions, most respondents did not refer to FAFH receipts: 40 percent of FAFH acquisitions had no receipts because they were free, and respondents saved a receipt for only 57 percent of paid acquisitions. In addition, respondents usually did not bring the food home, so they could not look at the acquisition while reporting it in Food Books.

A. Challenges for collecting FAFH data with Food Books

Collecting FAFH data with Food Books presented some challenges that might be addressed with revisions to the Red Pages: (1) missing or incomplete addresses for retail places, (2) duplicate reporting of the same acquisition in multiple Food Books, (3) missing items or prices due to the way FAFH is priced, and (3) imprecise item descriptions.

Missing or incomplete address. The Red Page includes a field for respondents to write the “name of place” where food is acquired, but there is no field for the address.²³ During telephone calls, we asked the PR to report the address of FAFH retail places (from a receipt, if saved, or from memory). Many FAFH retail places have missing or incomplete address information, so we could not verify FAFH places through a match with extant data and could not provide verified geocodes.

What issues were encountered in the collection of FAFH data using the Food Books? What changes do you suggest for the Red Page?

FoodAPS-2 may obtain better data about FAFH retail locations by adding an address field to the Red Page. Many respondents will not have a receipt with this information, but with the prevalence of smartphones today, they may be encouraged to look up this information.

Duplicate reporting of the same acquisition. The Food Books included the instruction, “When family members eat at a restaurant together, write the place in only one book.” Nonetheless, many acquisitions were reported in multiple Food Books. We suspect that all household members wanted to “get credit” for participating in the study in order to receive their incentive payment. It

²³ The Blue Page includes fields for “name of place” and “location.” Location was not included on Red Pages because we did not want to collect personal identifying information (PII) when acquisitions are from school, work, family, and friends.

was a challenge to identify duplicates, and then to determine if multiple reports were true duplicates or separate reports that should be combined.²⁴

FoodAPS-2 may more easily identify duplicates by adding a checkbox to the Red Page so that respondents may indicate whether the meal is also reported in other Food Books.

FAFH pricing. In contrast to paid FAH acquisitions, not every FAFH item in a paid acquisition is necessarily individually priced. FAFH includes bundled items that are not priced, and fast-food “combo meals” that include multiple items priced together (sometimes with a nominal charge for upsizing).²⁵

Respondents did not consistently report bundled items such as water, bread, and side dishes provided with restaurant meals. Combination, or “combo,” meals typically include a main item (e.g. burger, sandwich, breakfast sandwich, chicken bucket), a side (e.g. fries, hash browns, coleslaw), and a drink. Respondents reported combo meals in the following ways: (1) only the name of the combo meal, with the combo price; (2) all items in the combo, with a single price associated with one item; (3) all items in the combo, with individual prices for each (some receipts listed these prices); (4) all items, with a single combo price and a nominal price for a side or drink (indicating an upsize charge).

FoodAPS-2 might obtain more consistent reporting of bundled items and combo meals by redesigning the Red Page to two lines per “item”: (1) menu item name and price, and (2) description of the meal (What was on the plate? or “What came with that?”).²⁶

Additional pricing issues included use of coupons and discounts that could not be accounted for precisely on the Red Page. The Red Page has a check box to indicate “coupon” as a method of payment, but someone who gets an item free with, for example, a “buy one get one free” coupon has no way to indicate that.

FoodAPS-2 may consider adding item-level indicators of discounts, as well as acquisition-level indicators for employee discounts, senior discounts, and employee meals.

Imprecise food item descriptions. It is difficult to provide respondents with clear instructions for reporting food items on a paper instrument. Respondents were instructed to complete the bottom of the Red Page: “Write each food and drink on a separate line if your receipt does not list each food item or you do not have a receipt.” Telephone interviewers could probe for the contents of a meal with questions such as, “Did anything come with that?”

²⁴ For example, we combined data if the PR reported the total paid for the household and her meal, while each other household member reported their meal.

²⁵ A medium combo meal pairs a main item with a medium side and drink, and can be upsized to obtain a large side or large drink.

²⁶ Visually, this two-line design would look like the two-line register display in popular checkbook programs such as Quicken or Money.

A challenge for FoodAPS was that respondents often reported identical items differently. For example, some reported an item by its name on the menu (“chicken tenders platter”), and others reported every food included (“chicken tenders, French fries, and coleslaw”). Even respondents who took a similar approach might describe the same item differently, with more or less detail. FoodAPS validated FAFH foods reported from the top fast-food and casual-dining restaurants to provide consistent food descriptions for these items,²⁷ but it is not possible to validate information about items obtained from local and regional restaurants.

If FoodAPS-2 adopts our suggested two-line approach for item information, the consistency of reported meal components is likely to improve. However, identical items are likely to be reported differently because restaurants describe items differently on their menus, so FoodAPS-2 will need to code a large number of individual food items or develop methods for efficiently identifying like items.

B. Red Page review and capture

Red Pages that did not match the telephone reports were “captured” and entered into the database. This process succeeded in capturing a large number of acquisitions that would otherwise have been missed (20 percent). However, this process also added duplicate records to the database that later had to be identified and removed.

Duplicate records were captured because telephone interviewers were instructed to record “school,” “work,” “family,” and “friend” without including proper names. However, if a respondent wrote a proper school name in the Food Book and that name did not include “school,” then the Red Page would not match a reported acquisition and would be “captured.”

What worked well and did not work well for the Red Page review and capture process?

FoodAPS-2 could reduce the likelihood of capturing duplicate data by including on the Red Page checkboxes for type of place (school, work, family, friend, restaurant, store, other) to make it easier to match Red Pages with telephone reports.

C. FAFH data processing²⁸

There were two challenges for processing FAFH data that were unrelated to Red Page design: (1) assigning place type to diverse FAFH places; and (2) resolving inconsistent Red Page data.

Assigning place type. FoodAPS matched names of retail FAFH places to InfoUSA to obtain place type, and

What were the biggest challenges for processing FAFH data?

²⁷ Food items were matched with the MenuStat database, built by the New York City Department of Health and Mental Hygiene, with funding in part from the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention (available at MenuStat.org).

²⁸ Nutrient coding is discussed separately in the next section.

if unmatched, places were searched in Google Maps.²⁹ For places not found in InfoUSA or Google, keywords in the place name were used to assign place type.

FoodAPS-2 may streamline assignment of non-retail place type by including checkboxes on the Red Page for the major types of non-retail acquisitions (school, work, family, and friend). For retail places, FoodAPS-2 may consider expanding the geographic scope of InfoUSA data, or relying only on the Google Maps business database for retail places.

Resolving inconsistent Red Page data. Three areas of the Red Page led to inconsistent information for a single acquisition: (1) when “free” was reported along with payment information, (2) when size/amount was misreported as how many, or vice versa, and (3) when item prices did not sum to the total.

To mitigate these issues, we recommend:

- Clarify the difference between “free” food and food for which the respondent did not pay. (“Total paid” and prices are often reported when someone outside the household pays for food that is free to the respondent.)
- Clarify the difference between size/amount and how many by incorporating size in the item descriptions displayed in drop-down lists for telephone interviewers, where available as a standard option. MenuStat data can be used to incorporate size in item descriptions for top restaurants.
- To resolve item prices that do not sum to the total paid, include an edit check in the Red Page capture process so that data entry staff can flag and resolve problems with the reporting of “how many.”

D. FAFH nutrient coding

Each food item reported in FAFH acquisitions was linked with a USDA food code and assigned a gram weight,³⁰ except school foods, which were assigned nutrients and gram weights based on data from the School Nutrition and Dietary Assessment-IV (SNDA-IV) study.

The main challenges were: (1) standardizing the large number of unique food descriptions; (2) assigning gram weight when size or amount was missing; and (3) working with the limitations of the USDA databases.

Standardized item descriptions. A large number of unique food descriptions were due to the use of free text entry during telephone interviews and Red Page

What challenges arose in assigning USDA food codes and gram weights to FAFH items? What were the limitations of USDA food codes for FAFH items?

²⁹ Searches were in the vicinity of the survey area because the same place name could be a different place type in different areas of the country.

³⁰ USDA food codes were assigned so that nutrients and food pyramid equivalents data could be obtained from USDA databases: the Food and Nutrient Database for Dietary Studies (FNDDS version 5.0) and the Food Patterns Equivalents Database (FPED 2009–2010).

capture. Standardization was accomplished through an iterative and largely manual process. Items from top restaurants were standardized by manually matching them with the MenuStat database.

FoodAPS-2 might obtain more standardized data upon entry by: (1) expanding the contents of drop-down lists, (2) including MenuStat item descriptions in drop-down lists, and (3) redesigning the FRS to discourage free text entry.

Assignment of gram weights. Gram weight was calculated from reported size and amount for only 15 percent of items; assigned from the MenuStat database for 26 percent of items; and imputed for the remaining 59 percent. For beverages, assignment of gram weights posed a conundrum because many establishments offer free refills, however, we assigned a gram weight consistent with the reported container size.

FoodAPS-2 might consider a checkbox to report free refills of beverages. Additional research may improve methods for gram weight imputations, especially for non-retail acquisitions such as meals with family or friends where food acquisitions are not necessarily standard but may vary with demographics such as age and gender.

Limitations of USDA nutrient codes. The USDA databases include food codes for some specific fast-food restaurant items, but all other restaurant foods were matched to the most similar food in the USDA database. MenuStat includes nutrient information, but we did not use it, because it includes neither all nutrients of interest to ERS nor FPEs.

ERS may want to use MenuStat nutrients to evaluate the accuracy of USDA databases when applied to restaurant foods. This information may be used to prioritize expansions of the USDA databases to include more restaurant foods, or to explore ways of using MenuStat nutrients to adjust USDA values.

E. Recommended changes for FAFH data collection

FoodAPS revealed several challenges for collection and processing of FAFH data. These are due to: (1) complex FAFH pricing, (2) duplicate reporting of the same acquisition in multiple food books, (3) variation in respondents' reports of food items, (4) a large number of different acquisition places which were difficult to categorize by place type, and (5) missing addresses for retail places.

FoodAPS-2 may substantially improve the quality of collected FAFH data by revising the Red Page:

What changes are recommended for the collection of FAFH data if doing it again?

- Use a two-line approach for item information—(1) menu item name and price, and (2) description of the meal—to improve reporting of meal components.
- Include checkboxes to indicate types of places (school, work, family, friend, restaurant, store, other) with place name and address filled for restaurant, store, and other places only.
- Ask “Did anyone in the household pay for the food?” to direct respondents to different sections for paid and free acquisitions.

- Ask “Is this acquisition reported in another Food Book?” to identify multiple reports of the same acquisition.

Improvements in the FRS could include:

- Provide a pop-up “menu board” with checkboxes for interviewers to select food items and sizes when a fast-food restaurant is reported (in lieu of drop-down lists).
- Populate drop-down lists with MenuStat item descriptions and sizes for casual-dining restaurants.

Alternatively, a complete redesign of the FAFH data collection could replace the paper Food Book with electronic reporting. This might be feasible via a smart phone app, as nearly two-thirds of Americans now own smart phones³¹ and the study can provide a device to those without. This option must be carefully designed so that it does not increase respondent burden.³² If electronic reporting is considered, we recommended that respondents be asked to take pictures of receipts and menus so that respondent reporting can be validated.

The lessons from processing FoodAPS FAFH data also suggest research questions to explore prior to the next round of data collection:

1. For what types of places did respondents report saved receipts?
2. What are the characteristics of acquisitions that were “captured” and not reported by telephone? What are the characteristics of households with captured acquisitions?
3. What types of households have a large number of acquisitions, and what types of acquisitions? For example, do they have recurring acquisitions?

The answers to these questions may provide insights for improving procedures and instruments for FoodAPS-2.

³¹ Pew Research Center, 2015 [<http://www.pewinternet.org/2015/04/01/us-smartphone-use-in-2015>].

³² If respondents need to navigate multiple menus or enter much free text, electronic reporting could take longer than filling a paper form.

IX. HOUSEHOLD INTERVIEWS AND SELF-ADMINISTERED FORMS

FoodAPS collected a large amount of data from participating households to add context to the food acquisition data: demographics, participation in food and nutrition programs, food security, income, major categories of non-food expenditures, general health status, attitudes about healthy food, consumer behavior related to food shopping, special dietary needs, meal and snack patterns, and feedback about the survey. These data were collected with CAPIs conducted at the start (Initial Interview) and end (Final Interview) of the study week; and with three self-administered paper forms (Meals and Snacks Form, Income Worksheet, and Feedback Form).³³

A. Challenges for administering and processing household interview data

There were three main challenges associated with the household interviews: (1) a single PR was asked to provide a large amount of information for other household members by proxy; (2) we needed to process and standardize a large percentage of free-text responses to “Where do you do most of your food shopping?”; and (3) the Initial Interview was long when considered within the context of the entire household visit.

What issues were encountered with administration of the household interviews and processing of the interview data?

1. Proxy reporting and data anomalies

Proxy reports include information about age, education, marital status, height, weight, special dietary needs, and income by source for each household member other than the PR. It also included household-level information, such as expenses and SNAP information. PRs might have limited knowledge from which to report this information, and proxy reports might be largely responsible for missing data, inconsistent data, and extreme values.

Demographics. Most demographic information is collected in the Initial Interview. Some missing data might be due to lack of knowledge about unrelated household members; a few inconsistencies were found between the responses for relationship to respondent and age.³⁴

FoodAPS-2 may consider programming the Initial Interview to end with a displayed list of missing items so that the interviewer could fill a form to be completed by the PR before the Final Visit. To resolve inconsistent relationship information, additional edit checks could specify minimum or maximum expected age differences between the PR and other household members for each relationship code.

SNAP participation. SNAP information was reported with some inconsistencies between receipt of SNAP “now” and the date of last benefit receipt. In addition, a match with SNAP administrative data indicated some underreporting of SNAP participation and identified a small

³³ The screener interview is discussed in Chapter 3.

³⁴ While miscodes are rare, they generally occur when the interviewer asks about a person’s relationship to respondent and the respondent answers with her own relationship to the person of interest. Instead of saying, “She’s my daughter,” the respondent says, “I’m her mother,” and *mother* is mistakenly coded.

number of households with multiple SNAP units for which benefit amounts were underreported on the survey.³⁵

FoodAPS-2 could use an edit check during the interview to resolve inconsistencies between current participation and date of receipt. FoodAPS-2 may also consider additional survey questions to identify multiple units (and the benefit amount for each unit), and include SNAP participation on the Income Worksheet (and ask again in the Final Interview) to identify participation that was not reported in the Initial Interview.

Income. Income for persons other than the PR suffered the highest rates of nonresponse on the household interviews.³⁶ FoodAPS developed the Income Worksheet as a strategy to reduce this nonresponse and distributed it during the Initial Visit so that PRs could collect information from other household members before reporting income during the Final Interview. The worksheet was voluntary and only 57 percent of PRs completed it. In addition to missing data, income also exhibited passive refusals, whereby the respondent reports “no income” rather than “don’t know” or “refuse.”

FoodAPS-2 might consider making the Income Worksheet mandatory. In addition, edit checks can be added to the earnings, retirement, and disability income questions (per person) on the Final Interview based on reported work status on the Initial Interview. If the screener is implemented electronically, the categories of household income reported on the screener could also be used as an edit check on the categories reported on the Final Interview.

An additional issue is the distinction between gross and net earnings. FoodAPS asked respondents to report gross earnings, followed by a question to confirm “Is that take-home pay or the amount before taxes are taken out?” For those who report take-home pay, we suggest adding follow-up questions to confirm that taxes or other withholdings are taken, and obtain gross amount, if known.³⁷

Body mass index (BMI). Extreme values were found in BMI calculated from reported height and weight. Height and weight were individually subject to edit checks during the Final Interview, but BMI was calculated after the interview during data processing.

FoodAPS-2 could eliminate extreme values for BMI by adding edit checks on calculated BMI during the interview.

³⁵ Ten percent of SNAP households did not report SNAP participation to the survey. Some households with multiple SNAP units reported the total SNAP benefits for all units, while others reported SNAP benefits for only one unit.

³⁶ Among persons aged 16 or older with any income, 9.8 percent had item nonresponse to at least one income question (see the variable RINCCOMPLETE); the rates of item nonresponse were 6.8 percent and 12.9 percent for PRs and all other household members, respectively.

³⁷ Some people may be paid in cash with no difference between gross and net earnings.

Distance and travel time. Extreme values were observed in the responses to questions about distance and travel time to work and food stores. Respondents might have mistakenly provided round-trip data, the figures could be typos, or they could be valid values.

FoodAPS-2 could add follow-up questions to confirm extreme values for distance and time, and collect data for verifying extreme values (for example, the city and state of work or food store).³⁸ We also recommend adding a question to add context for the distance to food stores: “Do you normally shop for food close to home or close to work?”

2. Food store name and address

In the Initial Interview, respondents were asked to identify the food stores where they did most of their shopping (primary and secondary stores). This presented two challenges: (1) to develop a list of stores to include as response categories in the instrument (a drop-down list with a manageable number of entries), and (2) to code the free-text responses entered by interviewers when a store was not selected from the drop-down list.

To populate the drop-down lists, we identified the minimum radius around each SSU that contained at least 3 supermarkets, and included in the drop-down list all stores in the radius except convenience stores. The lists were limited so that interviewers could navigate them easily. The drop-down lists included store name and address as a single selection to distinguish multiple locations of the same chain. The challenge for data processing was that 30 percent of primary and secondary food stores were entered by interviewers as free text, rather than a selection from the drop-down lists.³⁹

FoodAPS-2 could consider expanding the list of stores included for selection in drop-down lists, or alternatively develop a method by which respondents may select their food stores on a map.

3. Length of household visits

The Initial Visit lasted one and a half hours and the Final Visit lasted one hour, on average. We received some feedback that the Initial Visit was long. It may be possible to shorten this visit by streamlining respondent training. There was no feedback about the length of the Final Visit, but the Final Interview includes a series of questions that could be shortened.

The Initial Visit training video posed two problems: (1) the interviewer needed to look over the respondent’s shoulder to see the prompts to pause playback, making the process awkward and possibly increasing administration time; and (2) there is no way for us to know that respondents were engaged in the video.

³⁸ As noted in the FoodAPS documentation, large travel times to work are not uncommon in industries such as trucking or air travel, where workers travel to a hub to begin multi-day work shifts.

³⁹ Free-text responses may reflect that (1) the drop-down lists were not comprehensive because households shopped outside the selected radius; (2) respondents did not know store addresses; or (3) respondents provided store addresses that, while correct, did not match the drop-down list (for example, the respondent says *Route “X”* while the drop-down list shows *“Local Named Rd”*).

For FoodAPS-2, we suggest (1) compiling separate video files so that the end of play signals hands-on training, and (2) using interactive e-learning videos to engage the respondent with the on-screen instruction and record the respondent's engagement.

For the Final Interview, we suggest that FoodAPS-2 reduce the number of questions about household guests. FoodAPS asked, "How many guests," on each day of the week for each meal on that day. The presence of guests provides context for FAH. However, FAH spending is measured for the week, not each day, so the relevant measures are the number of breakfast guests, lunch guests, and dinner guests during the week. Revising this series of questions can reduce interview length and the number of variables included in the data file.

B. Challenges for administering and processing forms data

There were two main challenges with the self-administered forms: (1) obtaining response, and (2) matching person names on the Meals and Snacks Form with person names in the interview data.

Obtaining response. Among households completing the survey, 57 percent completed the Income Worksheet, 91.7 percent completed the Meals and Snacks Form, and 97.7 completed the Feedback Form.

As noted earlier in this chapter, we suggest changing the voluntary nature of the Income Worksheet for FoodAPS-2. The cause of nonresponse for the Meals and Snacks Form and Feedback Form is not known. It is possible that the Meals and Snacks Form was lost or damaged during the week, and some households may have simply refused to complete the Feedback Form.

Were issues encountered with administering the forms and processing the forms data?

For FoodAPS-2, we suggest two changes: (1) add an interviewer check item to the Final Interview to record whether the Meals and Snacks Form was completed and returned, and if it was not, ask the respondent why not; and (2) administer the Feedback Form electronically (the interviewer can hand their tablet or laptop to the respondent and ask them to launch a Feedback application).

Processing the Meals and Snacks Form. During the Initial Visit, the interviewer asked the PR to enter the days of the week and names of household members on the Meals and Snacks form. Many respondents used nicknames or abbreviations that were difficult to match with the names on the household roster. (Only 69 percent of names matched exactly.)

FoodAPS-2 might resolve this problem in one of two ways: (1) the interviewer fills the form by writing names in the same order that they were entered into the interview roster, or (2) the interviewer reads the names from the roster and asks the PR to write each one in order.

Possible changes to the Feedback Form. The Feedback Form was intentionally brief, and we suggest keeping it so. However, some questions might be changed to elicit more specific feedback.

We suggest replacing these questions:

- How easy or difficult was it to keep track of the foods you got?”...
- How easy or difficult was it for you to get other household members to take part in the study?

...with questions that assess the respondent’s sense of data quality:

- Do you think you reported all your FAH acquisitions, or do you think you missed some? If missed some, ask how many: one, two, three, or more than three?
- Do you think you reported all your FAFH acquisitions, or do you think you missed some? If missed some, ask how many: one, two, three, or more than three?
- Not counting yourself, who did the best job of reporting their FAFH acquisitions? Do you think he/she reported all their acquisitions or missed some?
- Not counting yourself, who did the worst job of reporting their FAFH acquisitions? Do you think he/she reported all their acquisitions or missed some?

In addition, we suggest adding a question to help assess whether the study week represents a typical week for FAH and FAFH acquisitions. For example, “Did your household spend less, more, or about the same on foods brought into the home?” and “Did your household spend less, more, or about the same on food acquired outside the home?”

C. Recommended changes to household interviews and forms

FoodAPS revealed several challenges for collecting and processing data from household interviews and self-administered forms. We recommend the following changes to improve data quality:

- Add edit checks for consistency of relationship and age; SNAP “now” and date of last benefit receipt; person-level income and work status; and household-level income and categories of income reported on screener.
- Add edit checks to confirm extreme values for BMI, and follow-up questions to validate extreme values of distance and travel time to work and food stores.
- Use a mapping application to collect the store name and address in response to “Where do you do most of your food shopping?”
- Revise expectations for the Income Worksheet, making it mandatory to complete.
- Use interactive household training videos to engage respondents, with separate video files to play in advance of each hands-on training segment.
- Reduce the number of survey questions needed to obtain information about the number of guests receiving meals during the week.
- Convert the Feedback Form to an electronic instrument (the interviewer can hand a tablet to the respondent so it remains a self-administered form).

What would we change for the collection of household interview and form data, if doing it again?

- Revise procedures for filling names on the Meals and Snacks Form to simplify the assignment of person numbers that match interview data.
- Add an interviewer check item at the end of the Final Interview to record whether the Meals and Snack and Income Worksheet were completed. If not completed, as the respondent why not. This could inform strategies to improve response.

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