

WIC Nutrition Education Study: Phase II Report

September 2018

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Agriculture**

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Phase II Report

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Executive Summary

ES.1 Background

The mission of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is to safeguard the health of low-income pregnant and postpartum women, infants, and children up to age 5 who are at nutritional risk by providing nutritious foods to supplement diets, information on healthy eating, breastfeeding promotion and support, and referrals to health care and other services (U.S. Department of Agriculture [USDA], Food and Nutrition Service [FNS], 2015). WIC is recognized as a premier public health nutrition program, serving as an adjunct to health care to prevent occurrence of nutrition and health problems and to improve the nutritional and health status of participants. WIC nutrition education is designed to emphasize the relationship between nutrition, physical activity, and the health of women, infants, and young children and to help program participants achieve positive changes in dietary and physical activity behaviors for improved nutritional status and health (U.S. Government Publishing Office, n.d.).

USDA, FNS administers the WIC Program and provides policy guidance and resources for implementing nutrition education. Ninety WIC State agencies (50 geographic States, 34 Indian Tribal Organizations, 5 U.S. territories, and the District of Columbia) provide program services either directly or through local agencies. Federal regulations and FNS guidance create a framework for State and local agencies to plan and deliver nutrition education. Two key guidance documents shape WIC nutrition education: the Value Enhanced Nutrition Assessment or VENA (USDA, FNS, 2006a) guidelines for conducting a comprehensive nutrition assessment to frame effective, personalized education and the WIC Program Nutrition Education Guidance (USDA, FNS, 2006b), which describes the process of integrating nutrition assessment and education and the features of effective nutrition education. These policies were developed as part of an ongoing FNS initiative called Revitalizing Quality WIC Nutrition Services that emphasizes strengthening and enhancing WIC nutrition services through adopting a participant-centered approach. State and local agencies incorporate into the design of their nutrition education programming methods and practices for individualized education that is tailored to the interests, culture, and demographics of their participants. A diverse workforce of nutrition educators delivers the nutrition education services in WIC sites across the nation.

National data regarding delivery of WIC nutrition education and the impact of WIC nutrition education on WIC participants' nutrition and other behaviors have been limited. To address this data gap, FNS contracted with RTI International and its team members—Altarum Institute and researchers from the University of California, Agriculture and Natural Resources, Nutrition Policy Institute—to conduct the *WIC Nutrition Education Study*. This study comprised two phases:

- Phase I of the study, conducted in 2014, provided a comprehensive, nationally representative description of WIC nutrition education policies, practices, and features based on surveys of local WIC agencies and sites and in-depth interviews with a subset of sites that responded to the survey (USDA, FNS, 2016).
- Phase II was a pilot study conducted during 2015–2016 in six WIC sites to test and refine methods to evaluate the impact of WIC nutrition education on participants' nutrition and physical activity

attitudes and behaviors. The findings from the Phase II pilot study were intended to inform the design of a national evaluation study.

This report presents the methods and results of the Phase II pilot and discusses implications for the design of future evaluations of WIC nutrition education and considerations for nutrition education practice. Based on the results of the pilot, further exploration of potential approaches to inform an appropriate design of future evaluations to effectively measure the impact of WIC nutrition education is needed.

All of the research questions addressed in the pilot study are exploratory, and conclusions should not be made about the effectiveness of WIC nutrition education based on the results presented in the report. The results are not representative of participants at all WIC sites, and the analyses may not be sufficiently powered to detect statistically significant results for all measures examined.

ES.2 Study Methodology

The pilot study was designed to address research questions about the impact of WIC nutrition education on participant nutrition and physical activity behaviors, the processes for delivering nutrition education, and participant experiences and satisfaction with nutrition education. To answer the study's research questions, the study team implemented a process evaluation and an impact evaluation in six WIC sites. The pilot study provided an opportunity to test the feasibility of the process and impact evaluation methods while limiting the data collection burden to a relatively small number of WIC staff and participants.

Data Sources and Data Collection Procedures.

The pilot study comprised the collection of both qualitative and quantitative data from WIC staff and participants and direct observations of pilot site staff providing nutrition education (see sidebar). In addition to describing nutrition education delivery in the six pilot sites, some of the site-level data were used as independent variables in the impact analysis. Data collected from WIC staff and participants captured information on participants' experiences and satisfaction with nutrition education. The Participant Surveys provided participant-level data on participant outcomes and experiences with nutrition education for use in the impact evaluation, as well as quantitative data on participants' perceptions of goal setting and participant–educator interactions.

Data Sources for the Pilot Study

Interviews with site's point of contact (POC) at initial, interim, and final
Web-based Nutrition Educator Survey
Onsite observations of one-on-one and group education sessions
Focus groups with participants
Spanish-language interviews with participants (one site)
Participant Surveys at initial, interim, and final
Administrative data for subset of respondents to Participant Surveys

For the Participant Surveys, the enrollment of participants into the study and completion of the initial survey took place in person at the six sites. The interim survey generally took place 6 months after the initial survey, and the final survey generally took place 12 months after the initial survey. Data collection procedures for the interim and final surveys included mailing the survey two times and contacting nonrespondents by telephone to complete the survey. Gift cards were provided upon survey completion to encourage response. Because of differences in behavioral outcomes, separate questionnaires were

provided to respondents based on whether they were pregnant, postpartum, or a caregiver with a child aged 6 months to 4 years eligible for WIC when enrolling in the study. A total of 842 participants were enrolled into the pilot study and completed the initial survey. A total of 453 participants completed the final survey;¹ thus, the loss to follow-up was 54%. Of the 453 participants at final, 69 were in the pregnant-at-enrollment group, 89 were in the postpartum-at-enrollment group, and 295 were in the caregiver-with-child enrollment group,² with an average of 75 participants per site.

The use of multiple data collection methods with information from different sources provided a comprehensive view of WIC nutrition education in the six pilot sites. Additionally, the use of multiple data collection procedures provided the opportunity to assess consistency across methods (e.g., observations versus surveys) and respondent types (e.g., WIC participants versus nutrition educators).

Site Selection. The selection of the pilot sites was designed to capitalize on the variability of WIC nutrition education and other site characteristics. The study team had originally envisioned a selection procedure that would be scalable to a large-scale evaluation. However, it was determined that a purposive approach would be more suitable for the pilot. As described in more detail below, six WIC sites that varied on features of nutrition education and other site-level characteristics were purposively selected using data from the Phase I Site Survey.

To ensure that the study proceeded in a timely fashion, six State agencies that do not have lengthy Institutional Review Board (IRB) approval processes were identified and a pool of 12 candidate sites from those States was developed that varied on features of nutrition education related to exposure (number and length of contacts), use of VENA/participant-centered approaches, and other features using data from the Phase I Site Survey. From this pool of 12 sites, six were selected to provide a mix of sites so that two of the sites generally rated low on these features, two rated medium, and two rated high. Several other factors were considered in site selection, including choosing sites in States to provide coverage of six of the seven FNS regions and having a range of caseload sizes with at least one site with a caseload of less than 1,500 and one rural site. Selections were also made so that the six sites included a mix of modes: in addition to one-on-one sessions, three sites offered group sessions and three sites offered both group sessions and technology-based education according to the Site Survey. Lastly, consideration was also given to selecting at least one site that served Spanish-speaking participants.

Research Design. The pilot study used a longitudinal, exposure-response design. This approach was selected because it was not possible to have a true comparison group because Federal rules mandate that nutrition education is offered to all WIC participants. Six sites were purposively selected as described above, and site-level data were collected to describe delivery of nutrition education through interviews with the site POC, a survey of nutrition educators, observations of nutrition education, focus groups and interviews with participants, and administrative data for a subset of participants.

¹ Participants did not have to complete the interim survey to be eligible for the final survey.

² For simplicity, the study participants are referred to as women, although men were eligible for participation as a caregiver if they met the screening criteria. For the caregiver/child survey, 91% of the participants were the child's mother and 10% were another type of caregiver (5% father, 3% grandmother, 1% other family member, and <1% nonfamily member or friend).

Participant-level data were collected at three periods (initial, interim, final) to measure exposure and participant attitudes and behaviors related to nutrition and physical activity. Self-reported data on frequency of visits, duration of visits, and use of educational tools were used to classify participants into exposure groups (i.e., high versus low exposure). The exposure groups (i.e., classes) were identified using latent class analysis (LCA), which is a statistical procedure used to identify a set of discrete, mutually exclusive classes for grouping individuals based on their responses to a set of observed variables. The procedure examines the relationship among individuals' responses to a set of observable, measurable characteristics and clusters participants so that participants in the same class have response patterns (in this case, exposure to nutrition education) that are more similar to others in their class than they are to persons in another class.

Analysis Procedures for the Process Evaluation. The process evaluation characterized the delivery of nutrition education at the six pilot sites and provided data on site-level characteristics for use in the impact evaluation. Quantitative data from the Nutrition Educator Survey, observations of nutrition education, responses from POC Interviews, and Participant Surveys were tabulated. Transcripts from the participant focus groups and Spanish-language interviews were analyzed to identify key themes and exceptions to these themes. The results of the process evaluation, presented in Chapter 3, integrate the data from these sources to characterize the similarities and differences in nutrition education among the six sites. To inform future studies, results from different data sources were compared, noting where they did, or did not, lead to consistent results. Additionally, the impact of certain site-level characteristics (e.g., extent of use of VENA/participant-centered education practices and nutrition educator characteristics) was explored using statistical modeling as part of the impact evaluation.

Analysis Procedures for the Impact Evaluation. Before conducting the impact analyses, a series of outcome analyses was conducted to examine within-person change between the initial and final periods for all outcomes. These analyses were conducted separately for the three enrollment groups because a woman's status (e.g., from pregnant to postpartum or number of months postpartum) may influence her dietary intake and level of physical activity. Because the pilot study was meant to be a proof of concept, a subset of these measures was selected for inclusion in the impact analyses. Only measures that demonstrated significant change for the outcome analysis were considered for additional analysis. Priority was placed on measures that were based on a validated survey question, measures that seem to have the strongest alignment with WIC nutrition education, and the extent to which the evaluation study participants received WIC nutrition education related to the measure. This resulted in a set of five measures for the impact analysis.³

For these measures (referred to as the measures of interest), difference-in-difference (DiD) models compared within-person change over time between two groups with varying levels of exposure to nutrition education for the measures of interest. Models comparing the two exposure groups were estimated to determine the characteristics of WIC nutrition education delivery that are effective in achieving improvements in participant behaviors (e.g., attributes of group education, types of reinforcers, content of nutrition education, and combinations of features of WIC nutrition education). Additionally,

³ Six measures were originally selected; however, analysis could not be conducted for the sixth measure, pregnant women's efficacy to increase consumption of brown rice, because of the limited amount of data.

models comparing high-exposure with low-exposure participants were estimated to assess whether the impact of nutrition education on participant behaviors varies by participant demographic and household characteristics. Finally, site-level models examined the impact of site-level factors such as nutrition educator staff training and credentials, agency characteristics (e.g., caseload size), and site-level features of nutrition education delivery (e.g., extent of use of VENA/participant-centered education practices).

ES.3 Characterization of Nutrition Education in the Six Pilot Sites

Because this was a pilot study and purposive selection was used to select the sites, the results presented in this report are neither nationally representative nor generalizable; rather they are intended to characterize the variety of approaches used to deliver nutrition education. The pilot sites were sufficiently diverse to test the feasibility of data collections methods intended to discern differences and describe nutrition education provided by WIC sites. The use of multiple data sources provided a rich description of the nutrition education characteristics and practices in the six pilot sites. **Exhibit ES-1** summarizes the characteristics of the six pilot sites.

The process evaluation revealed some similarities, while confirming key differences in delivery mode, nutrition educator characteristics, participants' exposure to nutrition education techniques used by nutrition educators, and other features. All sites have degreed nutritionists as nutrition educators, and Sites B and D use them exclusively. Other sites also rely on additional types of staff to deliver nutrition education such as nutrition paraprofessionals, nurses, breastfeeding peer counselors, and clerical staff. All participants in the six sites take part in one-on-one nutrition education, but only participants in Sites A and C are frequently involved in group education, and in Sites A and E many participants receive some of their nutrition education via the Internet. The number of nutrition education contacts offered to participants in different categories is similar across most sites with the exception that Sites B and D offer more than the average number of contacts for multiple participant categories.

For two features of nutrition education—length of nutrition education contacts and use of VENA/participant-centered practices in one-on-one sessions—a rating of low, medium, or high was assigned based on data collected in Phase II. For three of the six sites (Sites C, D, and E), the rating is the same for both features, while it is different for the remaining sites, suggesting that these two characteristics may not always be aligned. In particular, Site A rated high for length of nutrition education contacts but low for use of VENA/participant-centered practices.

Exhibit ES-1. Characteristics of the Six Pilot Sites

Characteristic	A	B	C	D	E	F
Monthly participation ^a	1,836	1,355	2,923	5,748	3,268	1,882
Electronic benefits transfer for food benefit delivery	•		•		•	
Qualifications of Nutrition Educators ^b						
Professional	•	•	•	•	•	•
Paraprofessional	•		•		•	•
Secondary Education Modes (other than one-on-one, face-to-face) ^c						
% group	40%	<10% ^d	20%	<10% ^d	10%	10% ^d
% technology-based	40%		5%		40%	
% other					25%	70%
Number and Length of Nutrition Education Contacts						
Nutrition education contacts above average for certification period ^e		•		•		
Average number of minutes of nutrition education for certification, not high-risk visits based on observations	12	6	7	9	4	6
Average number of minutes of nutrition education for secondary education, not high-risk visits based on observations	6	3	6	7	4	7
Rating for length of nutrition education contacts based on observations ^f	High	Low	Medium	High	Low	Medium
Use of VENA/Participant-Centered Practices in One-on-One Sessions						
Rating based on observations of one-on-one sessions ^g	Low	Medium	Medium	High	Low	High

Sources: Phase I 2014 Site Survey and verified in POC initial interview, onsite observations, and Nutrition Educator Survey

• = Applicable to the site

^a Participation (caseload) information is an average of 5 months of participation data during the pilot period and was calculated using data obtained in the POC initial interviews.

^b Qualifications of nutrition educator staff were obtained in the Nutrition Educator Survey. Professional includes degreed nutritionists (with or without registered dietitian credential) and nurses.

^c The percentage of secondary education/follow-up visits using this mode of nutrition education as reported in the Phase I Site Survey and verified in the POC initial interviews. The mode was considered frequently used if used for 40% or more of the visits.

^d Breastfeeding groups only.

^e Number of contacts per certification period (reported during pilot) exceeds average of all sites for 10 participant categories as reported in the POC initial interviews.

^f Assigned rating of low, medium, or high based on sum of average number of minutes of nutrition education for certification and secondary education visits for not-high-risk participants. The two sites with the lowest number of minutes were assigned a rating of low, the two sites with the highest number of minutes were assigned a rating of high, and the remaining two sites were assigned a rating of medium.

^g Assigned rating of low, medium, or high based on an index (0–100) that was calculated by summing the percentage of observations in which the following were observed and then dividing by four: participants spoke 40% or more of the time, educator used open-ended questions frequently, educator provided general or specific affirmations, and participant's needs and interests determined focus of discussion. The two sites with the lowest values for the index were assigned a rating of low, the two sites with the highest values for the index were assigned a rating of high, and the remaining two sites were assigned a rating of medium.

ES.4 Results of Analyses to Examine Within-Person Change over Time

The outcome analyses tested for change over time between the initial and final periods for the approximately 40 different outcome measures included in the pilot study. This analysis was conducted by enrollment group, for a total of 129 comparisons. As shown in **Exhibit ES-2**, 25 measures demonstrated statistically significant change ($p \leq .05$): 7 measures demonstrated positive improvement and 18 measures worsened (e.g., had more screen time instead of less screen time or had more added sugar from sugar-sweetened beverages). Among these, 8 measures were for the pregnant-at-enrollment group, 3 were for the postpartum-at-enrollment group, and 14 were for the caregiver-with-child group. Measures with significant changes detected represented a variety of behaviors: readiness to change (2), self-efficacy (7), food acquisition (2), dietary intake (7), eating behaviors (2), child feeding style (2), and physical and sedentary activity (3). The measures with significant changes detected also represented a variety of foods: fruit (1), vegetables (2), sugar-sweetened beverages (SSBs) (4), dairy (4), whole grains/fiber (5), and not food specific (9).

Because the results are so varied and represent a variety of populations, behaviors, and foods, it is difficult to draw any overall conclusions. For example, among women who were pregnant at enrollment, the proportion of participants who often or almost always use the Nutrition Facts label to choose foods increased between the initial and final periods, but the proportion decreased between the initial and final periods among caregivers with an eligible child. For the dietary intake measures, intake worsened for dairy, added sugar from SSBs, fiber, and whole grains for one or more of the three subpopulations (e.g., intake for added sugar from SSBs increased and intake for whole grains decreased).

When interpreting these results, several limitations should be considered. First, some outcomes may be influenced as a woman moves from pregnancy to postpartum status and as a child gets older; thus, changes in outcomes may not necessarily be associated with receiving WIC nutrition education. Second, the availability of foods in the WIC food package may influence what women and children eat. Because the final period was 12 months after the initial survey for most participants, seasonality is not a concern because both the initial and final data collection took place during the summer months.

Exhibit ES-2. Summary of Analysis Results for Examining Within-Person Change over Time in the Pilot Study

Behavior	Enrollment Group	Food	Change
Readiness to Change			
Readiness to eat vegetables at dinner every day	Pregnant	Vegetables	⬆
Readiness to serve child SSBs no more than once a month	Caregiver/child	SSBs	⬆
Self-efficacy			
Can eat fruit for snack instead of cookies or chips every day	Pregnant	Fruit	⬇
Can almost always eat brown rice instead of white rice	Pregnant	Whole grain/fiber	⬇
Can serve child SSBs no more than once a month	Caregiver/child	SSBs	⬆
Can serve child vegetables (including baby food) at dinner every day	Caregiver/child	Vegetables	⬇
Can serve child low-fat or fat-free/skim milk instead of whole milk every day	Caregiver/child	Dairy	⬇
Can serve child whole grain bread instead of white bread	Caregiver/child	Whole grain/fiber	⬇
Can serve child whole wheat or corn tortillas instead of white flour tortillas	Caregiver/child	Whole grain/fiber	⬇
Food Acquisition and Management			
Use Nutrition Facts on food labels to choose foods	Pregnant	Not food specific	⬆
Use Nutrition Facts on food labels to choose foods	Caregiver/child	Not food specific	⬇
Eating Behaviors			
Eat meal while watching TV	Pregnant	Not food specific	⬇
Caregiver cooks homemade meal for child	Caregiver/child	Not food specific	⬇
Child Feeding Style			
Caregiver kept track of what child eats and drinks	Caregiver/child	Not food specific	⬇
Caregiver talked to child to encourage him/her to eat or drink	Caregiver/child	Not food specific	⬆
Dietary Intake			
Dietary intake for added sugar from SSBs	Pregnant	SSBs	⬇
Dietary intake for fiber	Pregnant	Whole grains/fiber	⬇
Dietary intake for dairy	Pregnant	Dairy	⬇
Dietary intake for dairy	Postpartum	Dairy	⬇
Dietary intake for added sugar from SSBs	Caregiver/child	SSBs	⬇
Dietary intake for whole grains	Caregiver/child	Whole grain/fiber	⬇
Dietary intake for dairy	Caregiver/child	Dairy	⬇
Physical and Sedentary Activity			
Number of hours watch TV or DVDs daily	Postpartum	Not food specific	⬆
Number of hours of moderate or vigorous physical activity per week	Postpartum	Not food specific	⬆
Number of hours the child spends on screen time daily	Caregiver/child	Not food specific	⬇

Source: Participant Surveys, Initial and Final

Notes: Measures that demonstrated statistically significant change ($p \leq .05$); ⬆ = behavior improved; ⬇ = behavior worsened

ES.5 Results of the Impact Analyses

Difference-in-Difference Models Addressing Exposure to Nutrition Education

To test for differences between levels of exposure, latent class analysis (LCA) was conducted to assign participants post hoc to two groups, labeled as either low or high exposure, based on their self-reported nutrition education experiences for number and length of contacts, receipt of reinforcers during visits, and follow-ups between visits. Responses to the Participant Surveys at three points in time, with each response describing the prior 6 months, were used in the classification process. Based on the results of this analysis, 81% of caregivers with an eligible child were in the low-exposure group and 19% were in the high-exposure group.⁴ The actual differences between the two exposure groups were quite modest: the high-exposure group reported approximately 17⁵ more minutes (45 vs. 28 minutes) of contact and receipt of slightly more reinforcers (0.7) and follow-ups (1.3) over a 6-month period. Given the degree of imbalance between the groups and the very modest differences in reported exposure to nutrition education observed between low- and high-exposure groups, it would not be fair or accurate to say that the following models are a true test of the impact of WIC nutrition education.

Measures of Interest Selected for the Impact Analyses

- Caregivers' readiness to serve child (aged 1-4 years) SSBs no more than once a month
- Caregiver can serve child (aged 1-4 years) SSBs no more than once a month (self-efficacy)
- Children's (aged 2-4 years) dietary intake for whole grains
- Number of hours child (aged 1-4 years) spends on screen time daily
- Caregiver cooks homemade dinner for child (6 months-4 years)

Compared with the high-exposure group, the low-exposure group included more participants who had received WIC benefits for 1 year or more. This is an important factor for future consideration because in an analysis comparing participants based on amount of exposure to WIC nutrition education, the length of time receiving WIC benefits could bias findings (e.g., long-term WIC recipients may already be well versed in the nutrition education messaging and may have adapted their behaviors accordingly).

Difference-in-difference (DiD) models assessed change over time (initial to final) between the low- and high-exposure groups for the five caregiver/child behaviors examined (see sidebar). When compared across exposure groups, there were no significant differences in the changes observed for any of the measures of interest. The fact that these DiD models did not identify a relationship between exposure to WIC nutrition education and behavior change does not fully address whether such a relationship may exist. Fully addressing that question would require an evaluation that includes a randomized control group or a carefully constructed quasi-experimental design.

⁴ It is important to note that these are empirically derived classifications and the terms “low” and “high” with respect to exposure are relative and do not imply that the majority of participants had low exposure to WIC nutrition education.

⁵ Estimated as the total difference over the 6-month period based on participant-reported frequency * duration, where:

- Low exposure = 16.62 minutes * 1.64 visits = 27.56 minutes per 6-month period, and
- High exposure = 21.94 minutes * 2.05 visits = 44.98 minutes per 6-month period

Additional Analyses Exploring the Effects of Nutrition Education

To examine the influence of participant characteristics and nutrition education program features (e.g., goal setting, content, perception that education was participant centered) on participant behaviors, the analyses included linear and logistic regression models. These models controlled for the age of the child, the length of time the participant or her child has received WIC benefits, and site. Results of the influence of participant-level characteristics on behavioral outcomes were mixed and should be interpreted with caution. For most of the research questions examined, at least one predictor variable was observed to be significantly associated with at least one of the behavioral outcomes. A review of the results shows no clear pattern from which to draw any conclusions; thus, it is difficult to see how these findings fit together to explain participant behavior and it cannot be ruled out that these associations may be not be valid.

The analysis also examined the influence on participant behaviors of site-level factors such as nutrition educator characteristics and staff training, site characteristics, and site-level features of nutrition education delivery. For this analysis, multilevel models controlled for the age of the child, the length of time the participant or her child has received WIC benefits, and site. None of these models yielded statistically significant results for any of the factors examined. Having only six sites in these analyses limited the tests of statistical significance for site-level variables. Additionally, the results of analysis comparing the distribution of the six sites by the low- versus high-exposure groups revealed no statistically significant differences, suggesting that participant-reported levels of exposure to nutrition education were similar across sites.

Limitations of the impact analyses include the following:

- **Concerns about the quality of the self-reported data.** Using a self-administered survey to collect a 6-month retrospective history of WIC nutrition contacts may have been a challenge for some participants. Additionally, problems with a skip pattern used in the survey may have led to underestimating the number of nutrition education contacts received for some participants. Furthermore, the wording of some survey items, although subjected to limited cognitive interviewing, could have resulted in participants misunderstanding some questions.
- **Exposure groups defined by the LCA model may not truly differentiate levels of nutrition education.** Without the ability to predefine and apply variations in nutrition education—either qualitatively or quantitatively—evaluators will be left with a post hoc approach such as the LCA that relies on summarizing observed behavior.
- **Attrition and sample size.** Attrition can limit generalizability when individuals recruited into a study fail to complete the study for reasons that are systematically related to the intervention. For the pilot study, there was some systematic attrition (e.g., older participants were more likely to remain part of the evaluation than younger participants). Attrition can also negatively affect an evaluation when completion rates for the follow-up data collection reduce sample size. For the pilot study, attrition over time among some of the WIC participant subgroups, particularly among women who were pregnant at the initial survey, limited the ability to model some measures of interest.

These and other limitations of the impact analyses have implications for the design of future evaluations, as discussed below.

ES.6 Conclusions: Lessons Learned and Recommendations for the Design of Future Evaluations

Evaluation of WIC nutrition education is necessary to inform and enhance WIC nutrition education policy and practice with regard to optimal educational topics and methods, strategies to maximize participant engagement, best approaches for delivery and reinforcement of messages, and ways to effectively prepare and support WIC nutrition educators. As detailed below, the pilot study identified several issues that would need to be considered more fully and addressed in the design of future evaluations. Lessons learned centered on modifying the data collection procedures for future surveys of participants to maximize response and improve data quality, refining the measurement of outcomes, and exploring alternatives to the pilot study's exposure-response design to address the limitations of this approach. One of the main findings from the pilot study is that conducting a nationally representative impact evaluation of WIC nutrition education may not be the best approach to assess the effectiveness of WIC nutrition education. Other approaches may be more suitable for addressing some of the challenges associated with evaluating WIC nutrition education as detailed in this report.

This pilot study clearly demonstrates the limitations of using a research design that relies on post hoc assignment of participants to comparison groups based on self-reported measures of exposure (operationalized by frequency and duration of contacts and other factors). Impact evaluation requires a priori identification of a specific intervention and the application of that intervention to a sample of individuals with data collected contemporaneously on a similar group of individuals not exposed to the intervention. If these criteria cannot be achieved, possible alternative approaches include epidemiological designs or a series of smaller, quasi-experimental studies that examine specific aspects of nutrition education.

Summarized below are the main recommendations and considerations for the design of a future evaluation study based on lessons learned from the pilot and input from the study's Advisory Panel.

Research Design

- Enroll participants who are receiving WIC benefits for the first time and follow them longitudinally. Such an approach would establish a better baseline for the purpose of examining the effects of WIC nutrition education.
- For site selection, apply a systematic procedure to maximize the natural variation in sites. For example, assess sites on a number of distinct modes or other features of nutrition education delivery such as use of VENA/participant centered-education practices or educator characteristics; categorize sites as "low," "medium," or "high"; and then select sites from within each category.
- Prioritize and limit the number of research questions (and participant behaviors) to be addressed by the evaluation and relate the survey questions more explicitly to the nutrition education topics to which participants are exposed.

Data Collection Procedures

- Replicate the procedures used in the pilot study to recruit and enroll study participants without interrupting or interfering with scheduled services at WIC sites and while minimizing burden on WIC site staff. Successful procedures included engagement of a POC at each site; ongoing communication

with the site contact during the enrollment period; and the use of highly trained, skilled data collectors who are flexible to the needs of each site.

- Collect information at the site level on the delivery of nutrition education using multiple sources such as interviews with the site contact, a survey of nutrition educators, and observations of one-on-one and group sessions. The data collection approaches used in the pilot were able to discern differences in nutrition education features across sites. Additionally, the pilot helped identify which data sources are most useful for describing different features of nutrition education; for example, observations are most appropriate for collecting information on length of nutrition education contacts because self-reported data from surveys and interviews may not be accurate.
- Instead of relying on participant self-reports, work with participating sites to use onsite, electronic, real-time data collection to collect information on participants' nutrition education experiences such as number and length of nutrition education contacts, mode of delivery, and use of reinforcers.
- Collect administrative data about study participants including data on number of visits, risk status, and participant outcomes such as weight of the mother, birth weight of the infant, body mass index, breastfeeding status, and food package redemption.
- Use electronic data collection for surveys of participants instead of telephone or mail surveys. The use of a Web-based survey, coupled with reminders via text or email, may help increase survey response and improve data quality.
- Review the literature to explore the use of alternative incentive structures (e.g., offering higher instead of lower incentives for follow-up surveys) as another strategy for increasing response for participant surveys.

Measurement of Outcomes

- Use validated scales (i.e., multiple items) when available to measure the outcomes of interest. Measuring fewer outcomes using valid scales may be a stronger approach than measuring many outcomes using fewer questions per outcome (as was done for the pilot).
- Improve the link between the selected outcome measures and the content of nutrition education offered by the sites included in the evaluation study. This may be challenging because WIC nutrition education is tailored to meet the needs of individual participants. This was attempted in the pilot study, but the information was not specific enough (e.g., information was collected on whether participants received information on “shopping for and preparing healthier foods” but not on whether participants received messaging on planning meals ahead of time and using the Nutrition Facts on food labels to choose foods, which were the two specific measures included in the study).
- Limit outcome measures to those likely to change over time (and in response to nutrition education). For example, the pilot study found that most participants reported already liking fruit and vegetables, so it may not be very useful to ask about these outcomes because there is limited room for change.

ES.7 Conclusions: Considerations for Nutrition Education Practice

Data collected from WIC site staff and participants during the pilot study provided a rich description of the delivery of nutrition education in the six sites. Although these data are limited because of the small number of pilot sites, they provide insights into the participant experience with a variety of modes and incorporation of VENA or participant-centered practices into nutrition education. Additionally, these data

provided information on participant perceptions about their WIC nutrition education experience and suggestions for improvements. Themes from the pilot study data and considerations for nutrition education practice are summarized below.

Participants want individualized WIC services. Participants want options and “tailored” services, ranging from how WIC visits are scheduled to the approach to setting goals; participants view education sessions as successful when they are engaged in the discussion and actively involved in determining the focus of the conversation. Thus, it is important that WIC staff receive training and support on VENA and participant-centered practices.

Participant choice in nutrition education modes is important. Participants in the pilot study had different preferences for receiving nutrition education. The implication is that ongoing collection of input from WIC participants is important for ensuring the site offers choices in nutrition education that meet the specific needs of the population.

Prioritizing topics to address a participant’s needs and interests is a key feature of participant-centered education. Educators who focused the nutrition education discussion on the priority needs and interests of the participant demonstrated the most features of VENA or participant-centered principles. This finding is consistent with WIC Nutrition Education Guidance that advises educators to prioritize the topic(s) of greatest need or interest to the participant rather than addressing multiple issues.

Participants want nutrition education focused on achieving positive behaviors rather than addressing deficits. Some pilot study participants had the perception that WIC staff members focus on what participants are doing wrong and that WIC places too much emphasis on children’s weight and growth charts. Shifting the focus of the nutrition education away from deficits to a more positive approach that identifies participant strengths and internal motivations for change may improve participants’ perception and engagement in WIC nutrition education. Additionally, participants may respond better to messages that emphasize the positive behaviors that influence a healthy weight and less on weight metrics such as pounds and percentiles.

Approaches for monitoring and evaluating nutrition education should encompass technology-based modes. Over the period of the evaluation, the capacity to use technology has increased rapidly. For a few of the pilot sites, offsite Internet education is increasing, and group education is declining. The sites associated this change with implementation of electronic benefits transfer (EBT). As States transition to EBT, the modes for WIC nutrition education may continue to change. Thus, WIC programs and technology-based education providers need to continue developing technology-based education that participants value and that is also effective in helping participants adopt healthy behaviors.

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1. Introduction

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is administered at the Federal level by the Food and Nutrition Service (FNS) of the U.S. Department of Agriculture (USDA), which provides grants to WIC State agencies to deliver program services to eligible participants. There are WIC State agencies in all 50 geographic States, as well as 34 Indian Tribal Organizations, five U.S. territories, and the District of Columbia (USDA, FNS, 2015). WIC State agencies provide program services, including nutrition education and breastfeeding support, either directly or through contracts or agreements with local health agencies and community-based organizations.

WIC's mission is to safeguard the health of low-income women, infants, and children up to age 5 who are at nutritional risk by providing nutritious foods to supplement diets, information on healthy eating, breastfeeding promotion and support, and referrals to health care (USDA, FNS, 2015). WIC nutrition education services and food benefits are designed to prevent occurrence of nutrition and health problems and to improve the nutritional and health status of participants. Federal regulations and guidance provide a policy framework for nutrition education. Within this framework, State and local agencies plan and implement nutrition education that is customized for the culture and demographics of their participants and their programmatic goals.

National data regarding delivery of WIC nutrition education and the impact of WIC nutrition education on WIC participants' nutrition and other behaviors have been limited. To address this data gap, FNS contracted with RTI International and its team members—Altarum Institute and researchers from the University of California, Agriculture and Natural Resources, Nutrition Policy Institute—to conduct the *WIC Nutrition Education Study*.

This chapter describes the purpose of the *WIC Nutrition Education Study*, provides an overview of WIC nutrition education and findings from Phase I, presents a brief summary of previous evaluations of WIC nutrition education, and concludes with an overview of Phase II and its research questions.

1.1 Purpose of the *WIC Nutrition Education Study*

The *WIC Nutrition Education Study* comprised two phases. Phase I provided a comprehensive, nationally representative description of WIC nutrition education policies, practices, and features. Phase II was a pilot study in six WIC sites to test and refine methods to evaluate the impact of WIC nutrition education on participants' nutrition and physical activity attitudes and behaviors. FNS, the WIC community, and researchers can use the findings from this pilot study to inform the design of future evaluations. This report presents the methods and results of the Phase II pilot study and lessons learned, including considerations for nutrition education practice and recommendations for designing future evaluations.

The findings from Phase I provided a rich description of how nutrition education is delivered throughout the United States and highlighted the variation in the nutrition education participants receive and the qualifications and training of WIC educators. Additionally, Phase I findings provided an understanding of how nutrition education policies and practices align with WIC Program Federal requirements and

guidance. The Phase I research questions focused on the key factors associated with delivering nutrition education, including staffing patterns and qualifications of educators; methods, frequency, and duration of education; facilities and available resources; and approaches to address linguistically diverse participants. To answer these questions, nationally representative surveys of local agencies (Local Agency Survey) and WIC sites (Site Survey) were conducted in 2014. The survey data were supplemented with in-depth telephone interviews with staff members at a subset of WIC sites and an abstraction of WIC State Plans. The Phase I report synthesizes the data from these sources to provide a comprehensive, nationally representative description of WIC nutrition education (USDA, FNS, 2016).

In addition to describing the current state of WIC nutrition education, the findings from the Phase I data collection provided the necessary information to purposively select sites for the Phase II pilot. As described in Section 2.4, sites were selected to provide variation in the types of nutrition education modes used and exposure levels (e.g., number and length of contacts), use of participant-centered practices, caseload size, geography, and other characteristics.

The purpose of Phase II was to conduct a pilot study in six WIC sites to inform and test the feasibility of a design for a practical evaluation that could be nationally representative of the impact of WIC nutrition education on participants' nutrition and physical activity attitudes and behaviors. The pilot study was conducted in 2015–2016 and included two components: a process evaluation that characterized the delivery of WIC nutrition education in the six sites and an impact evaluation that used a longitudinal, exposure-response design to assess the influence of WIC nutrition education on participants' nutrition and physical activity attitudes and behaviors. Although these two components focused on different research questions, they are complementary and rely on data from a survey of participants and data collected at the six sites through interviews, observations, staff surveys, and focus groups. The results of the pilot suggest that conducting a nationally representative impact evaluation of WIC nutrition education may not be the best approach to assess the effectiveness of WIC nutrition education. Other approaches may be more suitable for addressing some of the challenges associated with evaluating WIC nutrition education, and these approaches are discussed later in the report.

1.2 Overview of WIC Nutrition Education and Findings from Phase I

WIC nutrition education is designed to improve the health of at-risk pregnant, breastfeeding, and postpartum women; infants; and young children. As stated in WIC Federal regulations (7 CFR 246.11(b)), the goals of WIC nutrition education are to “1) emphasize the relationship between nutrition, physical activity, and health with special emphasis on the nutritional needs of pregnant, postpartum, and breastfeeding women, infants and children under 5 years of age; and 2) assist the individual who is at nutritional risk in achieving a positive change in dietary and physical activity habits, resulting in improved nutritional status and in the prevention of nutrition-related problems through optimal use of the WIC supplemental foods and other nutritious foods” (U.S. Government Publishing Office, n.d.). WIC Federal regulations further state (7 CFR 246.11(a)), “Nutrition education, including breastfeeding promotion and support, shall be designed to be easily understood by participants, and it shall bear a practical relationship to participant nutritional needs, household situations, and cultural preferences, including information on how to select food for themselves and their families” (U.S. Government Publishing Office, n.d.).

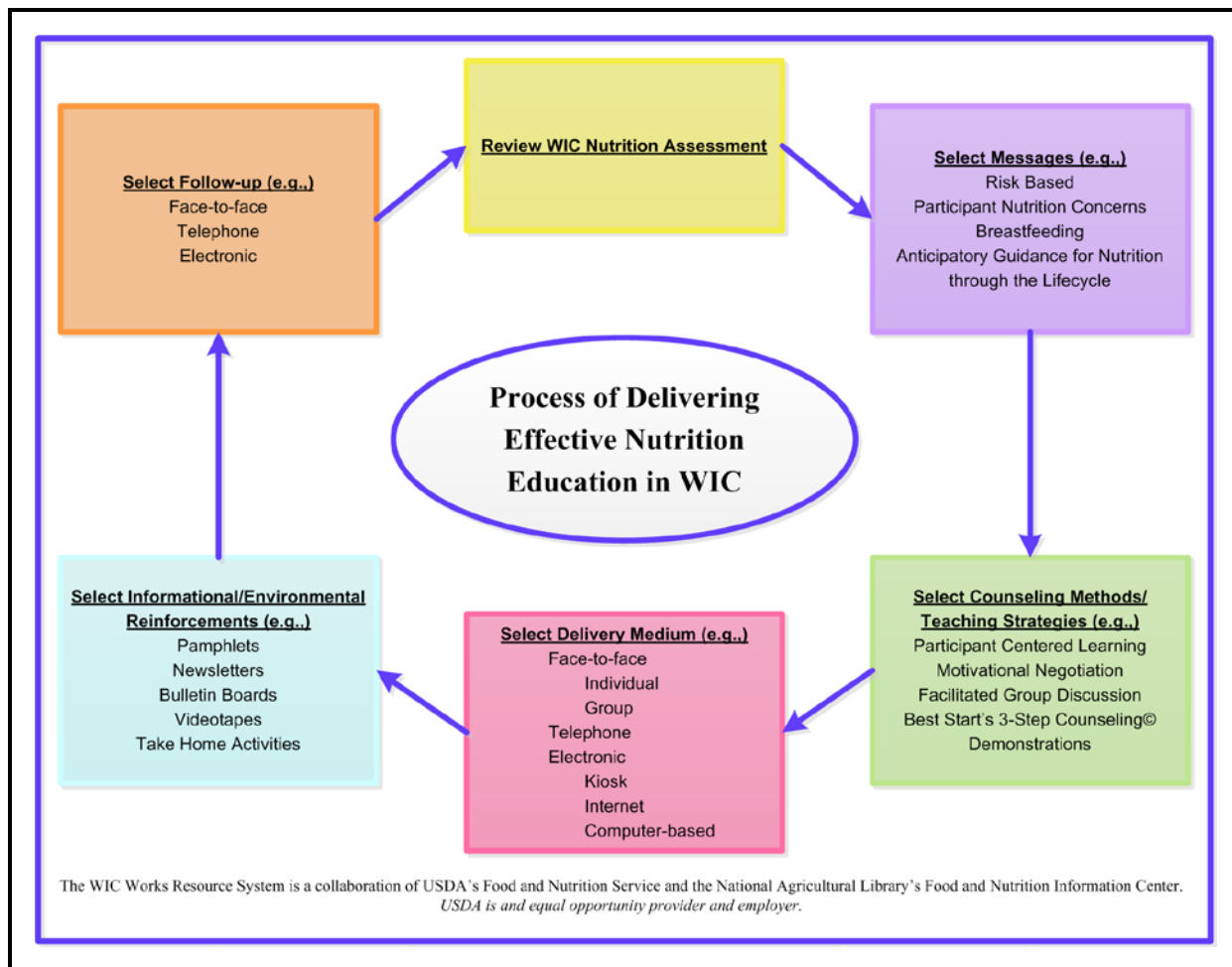
FNS, State agencies, and local agencies all play important roles in achieving these nutrition education goals. FNS oversees implementation of the WIC regulations by providing nutrition education policy guidance, training resources, and leadership for national nutrition education and breastfeeding initiatives. WIC State agencies are responsible for ensuring that nutrition education is available to all participants through coordinating the nutrition education component, providing training and resources to WIC staff members, and establishing standards and monitoring procedures to ensure nutrition education requirements are met. Local agencies plan and deliver nutrition education services to meet Federal requirements and State standards and address the unique needs of their WIC population.

An ongoing FNS initiative called Revitalizing Quality Nutrition Services (RQNS) is “an evolving process of continuous program improvement” to enhance and strengthen nutrition services, including adopting a more client-centered nutrition education approach with a focus on motivating lifelong healthy behaviors (USDA, FNS, 2015). RQNS is the foundation of other FNS initiatives developed in collaboration with the National WIC Association, including Value Enhanced Nutrition Assessment (VENA). VENA guidance (USDA, FNS, 2006a) provides information for conducting a comprehensive nutrition assessment to frame effective, personalized education; referrals; and food packages. The complementary WIC Program Nutrition Education Guidance (USDA, FNS, 2006b) describes the approach for integrating nutrition assessment and education and the features of effective nutrition education (see **Exhibit 1-1**).

Responding to the RQNS initiative, State and local WIC agencies have invested in efforts to assess their nutrition services, modify policies and practices, train staff members, and conduct other activities to revitalize and improve nutrition education. Overall, findings from Phase I demonstrate progress toward achieving the RQNS goals. WIC nutrition educators are adopting “participant-centered” education styles and techniques that focus on evoking a person’s inner motivations for adopting healthy behaviors (USDA, FNS, 2016). The names given to these styles of nutrition education vary, but the fundamental spirit includes working collaboratively with each participant, eliciting and supporting their motivation to change, and respecting participants’ independent thoughts and actions.

While Phase I concluded that nutrition educators are using VENA and participant-centered concepts, it identified variation in the extent to which these practices are integrated into nutrition education delivery as well as variation in other site-level characteristics and practices. **Exhibit 1-2** summarizes the findings from Phase I on site-level nutrition education characteristics and practices. The six sites for the Phase II pilot were purposively selected to obtain diversity in some of these characteristics such as number and length of contacts and the use of participant-centered practices. The Phase II evaluation collected additional data on these and other site-level features as well as participant-level data on participant outcomes and their nutrition education experiences to provide a comprehensive view of nutrition education delivery in the six pilot sites and to attempt to quantify the impact of WIC nutrition education on participant nutrition and other outcomes.

Exhibit 1-1. Process of Delivering Effective Nutrition Education in WIC



Source: U.S. Department of Agriculture, Food and Nutrition Service. (2006b). *WIC program nutrition education guidance*. Retrieved from https://wicworks.fns.usda.gov/wicworks/Learning_Center/ntredguidance.pdf

Exhibit 1-2. Phase I Site-Level Nutrition Education Characteristics and Practices**Nutrition Education Staff**

- Many nutrition educators are experienced and well educated; over half have worked for WIC for 7 or more years, and nearly two-thirds have a bachelor's or graduate degree.
- Registered dietitians (RDs) are the most common type of staff member (58% of WIC sites have RDs), but many sites also use degreed nutritionists (not RDs), paraprofessionals, administrative staff, nurses, and breastfeeding peer counselors to deliver nutrition education.
- The number of nutrition educators varies with the number of WIC participants served ranging from 3 for very small sites (caseload ≤ 300) to 10 for large sites (caseload $\geq 2,500$).
- Site participant-to-full-time equivalent (FTE) educator ratios range from 65 participants to 1 FTE educator for very small sites (caseload ≤ 300) to 494 participants to 1 FTE educator for large sites (caseload $\geq 2,500$).

Nutrition Education Modes

- One-on-one, face-to-face nutrition counseling is the universal delivery method for nutrition education and is employed by all WIC sites.
- About half of sites also provide group education sessions, and half use offsite technology-based methods (e.g., via the Internet).
- Except for one-on-one, face-to-face counseling, which is used for all visit types, the mode varies by type of visit (e.g., group sessions are most often used for secondary education follow-up visits).

Nutrition Education Practices

- WIC nutrition educators are striving to provide nutrition education that is individualized and tailored to the needs of each participant with participant involvement throughout the process. The most common method for choosing session content is "participant chooses the topic(s) she wants to talk about" (52% of sites).
- About 80% of sites reported that participant behavioral goals are almost always or often set during one-on-one counseling sessions, and many nutrition educators reported using techniques that increase participant engagement in goal setting to help participants adopt healthy behaviors for themselves and their children.
- Nutrition educators use a variety of methods to reinforce the information provided; the most widely used methods are written materials, bulletin boards, and education props.
- All sites follow up with participants at subsequent visits, and 47% also contact participants by phone before their next scheduled visit to follow up with them.

Nutrition Education Exposure

- The frequency and amount of time site staff members spend with participants on nutrition education are tailored based on participants' risk status, nutritional needs, interest, and level of motivation for adopting healthy behaviors.
- The length of nutrition education sessions varies by type of visit. Nutrition counseling sessions during certification visits average 19 minutes, one-on-one counseling sessions for secondary education follow-up visits average 12 minutes, and group secondary education follow-up sessions average 21 minutes in duration (the range for all types of visits was less than 5 minutes to more than 60 minutes).

Source: Phase I 2014 Site Survey (USDA, FNS, 2015).

1.3 Summary of Previous Research to Evaluate WIC Nutrition Education

To date, limited research has been conducted to evaluate the impact of WIC nutrition education on participants' nutrition and physical activity attitudes and behaviors. In the late 1990s, FNS sponsored the first major study to assess the effectiveness of WIC nutrition education, titled the *WIC Nutrition Education Assessment Study* (USDA, FNS, 1999). The study evaluated outcomes of WIC nutrition education in six local agencies in three States. The research design included multiple waves of data collection with pregnant and postpartum participants to measure changes in knowledge, attitudes, and behaviors over time at three time points: (1) at the WIC site before initial certification (usually on the day of the certification visit),⁶ (2) at 32 to 36 weeks' gestation, and (3) at 4 to 6 months postpartum (usually by telephone). The follow-up interviews collected information on the number of nutrition education

⁶ Newly enrolling pregnant women were recruited into the study before WIC certification. Although the woman was newly certified for her current pregnancy, she may have participated in WIC during previous pregnancies and/or as the mother of an infant or child WIC participant.

contacts received, topics addressed in those sessions, and participant satisfaction. The study also included abstraction of data from WIC records, interviews with local agency directors, and onsite observations of nutrition education delivery to assess the quality of nutrition education at each study site.

The study findings were reported as site-specific outcomes showing site-level change in outcomes from the baseline to the second and third data collection points. Findings included measurable improvement in participants' nutrition knowledge at five of the six study sites. Additionally, the study found no change or modest improvements across the sites in participants' nutrition attitudes and perceptions during pregnancy and some positive improvements in the types of food eaten during pregnancy. The study authors noted several major limitations of the study. First, it was not designed to provide a nationally representative picture of WIC nutrition education delivery and its impacts. Second, because WIC policies precluded the researchers from withholding nutrition education, thus establishing a "true control group" at each site, they used a quasi-experimental design, comparing outcomes pre- and post-intervention at each site and summarizing the findings across the sites. Finally, although the authors had planned to conduct analysis comparing findings by the intensity (e.g., number and length of contacts) of nutrition education delivered because three of the six sites were assumed to have a higher level of intensity of nutrition education, site observations and WIC records revealed great variability in intensity within sites, so the authors were unable to conduct this analysis.

More recently, evaluations of WIC nutrition education have focused on examining WIC participants' receptivity to various education delivery methods, including studies to compare enhanced WIC delivery services with the usual delivery (one-on-one or group sessions). Delivery methods examined included facilitated group discussion (Abusabha, Achterberg, McKenzie, & Torres, 1998; Krummel, Semmens, MacBride, & Fisher, 2010), learner-centered education (Cena et al., 2008; Gerstein et al., 2010), and peer education (Chang, Nitzke, & Brown, 2010; Havas et al., 1998; Ikeda, Pham, Nguyen, & Mitchell, 2002; Whaley, Ritchie, Spector, & Gomez, 2010). Generally, these studies were limited by the use of convenience sampling for the delivery comparisons and compared augmented WIC services with usual practice.

Modern technology provides new opportunities for disseminating information and reinforcing nutrition messages. Studies have been conducted on using informational Web sites (Bensley et al., 2006), touch-screen video (USDA, FNS, 2001), interactive CD-ROMs (Block et al., 2000; Campbell et al., 2004), computer kiosks (Carroll, Stein, Byron, & Dutram, 1996; Trepka, Newman, Huffman, & Dixon, 2010), and online education modules (Au, Whaley, Gurzo, Meza, & Ritchie, 2016; Bensley, Anderson, Brusk, Mercer, & Rivas, 2011). The studies have suggested that WIC participants like technology-based methods, but the impact and cost-effectiveness of the various methods are not well known. Two recent studies comparing online and in-person group nutrition education provided to women enrolled in WIC found that both modes can result in improvements in knowledge, self-efficacy, and behaviors related to increasing healthy breakfast intake (Au, Whaley, Gurzo, et al., 2016) and reducing sodium intake (Au, Whaley, Rosen, Meza, & Ritchie, 2016).

Possibly because of the diversity of education approaches and topics, relatively few evaluation studies have been published on the effectiveness of the content of WIC nutrition education. Some topics have been studied, including healthful cooking (Birmingham, Shultz, & Edlefsen, 2004; Tessaro, Rye, Parker,

Mangone, & McCrone, 2007), low-fat milk messages (Ritchie, Whaley, Spector, Gomez, & Crawford, 2010; USDA, Economic Research Service, 2007), physical activity messages (Fahrenwald, Atwood, Walker, Johnson, & Berg, 2004), yogurt messaging plus coupons (Fung, Ritchie, Walker, Gildengorin, & Crawford, 2010), and fruit and vegetable education plus coupons (Anderson et al., 2001; Whaley et al., 2012). In most cases, the studies found significant effects on behavior change and attitudes. Most of the

Advisory Panel

The study's Advisory Panel provided input on the study design, reviewed the study instruments, and reviewed drafts of the reports for Phases I and II. The Advisory Panel participated in two all-day meetings to discuss the study design (January 2013) and to review the results from the pilot and discuss design options for effective future evaluations of WIC nutrition education (August 2016). The Advisory Panel members were:

- Thomas Baranowski, PhD, Professor of Pediatrics, Baylor College of Medicine
- Maureen Black, PhD, Professor, University of Maryland School of Medicine
- Isobel Contento, PhD, Professor of Nutrition Education, Teachers College, Columbia University
- Jacqueline Marlette-Boras, MHS, RD, LDN, WIC Director, Maryland WIC Program (retired August 2017)
- Margaret Saunders, MS, RD, WIC Director, Community and Economic Development Association of Cook County, Inc.

studies addressed nutrition changes of pregnant or postpartum women (USDA, FNS, 1999), while a few targeted preschool children (USDA, FNS, 2001). A few published results of WIC interventions focus on healthy behaviors for life and on dietary messaging linked to the new WIC food package (Ritchie et al., 2010).

Because of limitations of past research conducted on the effectiveness of WIC nutrition education, FNS sponsored the current study, which sought to overcome the design limitations of the 1999 *WIC Nutrition Education Assessment Study*. The pilot study was designed to assess the effectiveness of WIC nutrition education as delivered, taking into consideration participant-level and site-level variation of nutrition education received, rather than examining WIC participants' receptivity to various education delivery methods as has been done more recently.

1.4 Phase II Overview and Research Objectives

The pilot study was conducted to test the feasibility of a design for a practical evaluation that can be nationally representative of the impact of WIC nutrition education on participants' nutrition and physical activity attitudes and behaviors. Designing an evaluation of WIC nutrition education that would be nationally representative is a challenging task, and the results of the pilot underscore these challenges. A nationally representative evaluation would need to address the wide variation in WIC nutrition education delivery and participant characteristics and the challenges such as identifying an appropriate control or comparison group, minimizing selection bias, and considering the dynamics of WIC participation and the variation in participant exposure level to WIC nutrition education. The small number of WIC sites and participants in the pilot provided the opportunity to test the feasibility and efficacy of the evaluation

methods while limiting the data collection burden on WIC site staff and WIC participants. This report describes the approach used in the pilot study to help address these challenges and the extent to which the pilot study was successful in addressing these challenges. The side bar identifies the study's Advisory Panel members.

The pilot study included research questions about the process or implementation of nutrition education to capture WIC participant experiences with nutrition education (see **Exhibit 1-3**) and the impact of WIC nutrition education on a number of nutrition-related and other outcomes (see **Exhibit 1-4**). To address these questions, the study was designed with both process and impact data collection components.

Process Evaluation. The purpose of the process evaluation was to characterize the delivery of WIC nutrition education at the six pilot sites and to provide information on participant exposure and experiences with nutrition education for use in the impact evaluation. Additionally, the pilot was designed to assess whether the data collection methods used could discern differences in nutrition education delivery across the six sites to help inform the design of future evaluations. As previously noted, the study team used data from Phase I to select six pilot sites with variation in selected nutrition education practices and features (e.g., number and length of nutrition education contacts) as well as diversity in geographic location and caseload size. The six sites that participated in the pilot do not represent all WIC sites or all models of providing nutrition education, but they are sufficiently diverse to test the feasibility of process evaluation methods intended to discern and describe nutrition education provided by WIC sites.

The study team collected information from local agency and site staff members at each of the six sites using semistructured interviews (referred to as the Point-of-Contact, or POC, Interviews) and a survey of nutrition educators. Participant Surveys, focus groups, and interviews with Spanish-speaking participants provided information on participants' experience with nutrition education and their satisfaction. Onsite observations of nutrition education provided information on the delivery of nutrition education at the sites. Participating sites provided administrative data on the number of visits by study participants during the evaluation period. Some of the data from these sources were also used in the impact evaluation to assess the influence of site-level features on the effectiveness of nutrition education.

The rich description of the nutrition education practices and capabilities for the pilot sites offers the reader a case study perspective, because little WIC research provides this many sources of information about nutrition education delivery at the site level. The pilot study findings also offer insights that may help inform WIC nutrition education practice. However, the presentation of the results does not necessarily reflect the variation one might expect across WIC sites in a nationally representative sample.

It is important to note that the Phase II pilot study does not provide nationally representative information on the impact of WIC nutrition education; instead, this pilot study is intended to test the methodology to inform the development of future evaluations of the impact of WIC nutrition education on participants' nutrition and physical activity behaviors.

Impact Evaluation. The purpose of the impact evaluation was to (1) pilot an evaluation of the impact of WIC nutrition education on participants' nutrition and physical activity attitudes and behaviors in six WIC sites (to test the study's research questions) and (2) refine an evaluation of the impact of WIC nutrition education on participants' nutrition and physical activity attitudes and behaviors in six WIC sites (to test the methodology for the study).

Exhibit 1-3. Research Questions and Location in Report: Process and Delivery of WIC Nutrition Education in the Six Pilot Sites (Results Presented in Chapter 3) ^a

Research Questions	Location in Report
10. What dosage of WIC nutrition education do participants receive and how does this vary by participant's WIC category and risk level?	3.2.1 and 3.2.2 (Exhibits 3-2, 3-3, 3-4; Appendix Exhibits I-1, I-2, I-3)
10a. What is the number of WIC nutrition education sessions participants attended or received (including the certification visit and follow-up contacts)?	3.2.2 (Exhibits 3-3, 3-4)
10b. What is the length of time (in minutes) participants spend in the nutrition education component of their certification visit? Does this differ for initial certification and subsequent certification?	3.2.2 (Exhibit 3-6; Appendix Exhibit I-4)
10c. What percentage attend nutrition education follow-up visits and among those who attend follow-up visits, what is the length of time (in minutes) participants spend in nutrition education follow-up visits? Are the follow-up visits scheduled in conjunction with medical visits or voucher pick-up, etc.? What is the attendance (show rate) for follow-up appointments?	3.2.2 (Exhibits 3-5, 3-7; Appendix Exhibits I-1, I-2)
10d. Is there a mechanism in place to assess use of reinforcers, such as mailed/mailed assessments and questions and answers at follow-up?	3.6
10e. What is the number of reinforcers and contacts participants received as part of WIC nutrition education? How does this differ by participant characteristics and method of service delivery?	3.6 (Exhibits 3-24, 3-25, 3-26, 3-27)
10f. What is the length of time that participants report accessing/using reinforcers outside of the WIC clinic setting? How does this differ by participant characteristics, type of material, and method of delivery?	3.6
10g. How is the type of nutrition education training that individual WIC educators receive associated with positive behavioral outcomes for participants?	3.3 (Exhibit 3-9, Appendix Exhibits I-5, I-6, I-7) for training educators receive and 5.5 (Exhibit 5-20)
10h. What characteristics of the nutrition education goal-setting process are most significantly associated with positive behavioral outcomes for participants?	3.10 (Appendix Exhibits I-11, I-12) and 5.4 (Exhibits 5-8, 5-9)
11. What attributes are observed during face-to-face nutrition education contacts?	3.4.1 and 3.4.2 (Exhibits 3-10, 3-11, 3-12, 3-13, 3-14; Appendix Exhibits I-8a, I-8b, I-8c, I-9, I-10)
11a. How often do WIC staff consult with participants to establish specific behavioral goals when providing nutrition education? How does this vary by participant characteristics, local agency characteristics, and WIC staffing patterns?	3.4.3 (Exhibits 3-15a, 3-15b, 3-17, 3-19)
11b. How often and to what extent are participants engaged in selecting their own behavioral goals?	3.4.3 (Exhibits 3-16, 3-17, 3-18)
11c. How often and to what extent are the goals for participants' nutrition education derived from the nutrition assessment?	3.4.3
11d. Are participant-set goals more often attained and acted on than those set by the educator?	3.4.3, 3.10
11e. What attributes characterize group nutrition education sessions, including but not limited to content, timing/convenience, personalization and tailoring of information and goals discussed, effectiveness and skill set of the educator/facilitator, and support of peers?	3.5 (Exhibits 3-22, 3-23; Appendix Exhibit I-13)
11f. What attributes characterize individual nutrition education sessions, including but not limited to content, timing/convenience, privacy of sessions, personalization and tailoring of the information and goals discussed, and effectiveness and skill set of the educator/facilitator?	3.4.1 (Exhibits 3-10, 3-11, 3-12, 3-13; Appendix Exhibit I-9) 3.4.2 (Exhibit 3-14; Appendix Exhibit I-10) 3.3 (Exhibits 3-8, 3-9)
11g. How often, in what manner, and to what extent do WIC staff help participants consider ways they can overcome personal and environmental barriers to improving their dietary and physical activity habits?	3.4.3 (Appendix Exhibit I-11)
11h. How often, in what manner, and to what extent do WIC staff use referrals to assist in achieving nutrition education goals?	3.7 (Exhibits 3-28, 3-29; Appendix Exhibit I-14)
12. What environmental and contextual factors at the local and State levels support or challenge the implementation of effective WIC nutrition education?	3.4.3 (Exhibits 3-20, 3-21) 3.8 (Exhibit 3-30; Appendix Exhibit I-15) 3.9 (Exhibit 3-31)
13. How satisfied are WIC participants with the nutrition education they have received at WIC and what do they feel would make it more useful to them?	3.10 (Appendix Exhibit I-16)

^a Parts of two of the process evaluation research questions (Questions 10g and 10h) were also addressed in the impact evaluation.

Exhibit 1-4. Research Questions and Location in the Report: Impact of WIC Nutrition Education on Participants' Behaviors (Results Presented in Chapters 4 and 5)

Research Questions	Location in Report
1. After exposure to WIC nutrition education, what, if any, statistically significant changes can be identified in:	
1a. pregnant and postpartum women's readiness to eat a healthy diet?	4.5.1, 4.5.2, 4.5.3
1b. parents'/caretakers' readiness to feed their children a healthy diet?	4.5.1, 4.5.2, 4.5.3
1c. the dietary habits of women and children?	4.5.8
1d. the physical activity habits of women and children?	4.5.9
1e. food-related behaviors of women [and children]?	4.5.4, 4.5.5, 4.5.6, 4.5.7
1f. How much of these changes can be attributed to WIC nutrition education?	5.5.1
2. Are there particular combinations of features of WIC nutrition education that are more effective than other combinations in achieving improvements in readiness to eat a healthy diet, readiness to feed the child participant a healthy diet, dietary habits, physical activity habits, and food-related behaviors?	5.5.2
3. Does the impact vary by (a) nutrition educator characteristics; (b) agency characteristics; (c) dosage and duration of nutrition education; or (d) participant's characteristics, length of time on WIC, exposure to previous WIC nutrition education, participation in other programs, or use of emergency food providers?	5.5.3, (a, b), 5.5.1 (c), 5.5.2 (d)
4. What dosage and mode of nutrition education delivery (initial and follow-up) are most effective in helping participants improve their dietary and physical activity habits, readiness to change behaviors, and other food-related behaviors?	5.5.2
5. What attributes of individual nutrition education sessions are most effective in helping WIC participants improve their dietary and physical activity habits, readiness to change behaviors, and other food-related behaviors?	5.5.3
6a. What attributes of group nutrition education sessions are most effective in helping WIC participants improve their dietary and physical activity habits, readiness to change behaviors, and other food-related behaviors?	5.5.2
6b. What skills and attributes of the nutrition educator (for group sessions) are most effective in helping participants improve their dietary and physical activity habits, readiness to change behaviors, and other food-related behaviors?	5.5.2
6c. What types and dosage of reinforcers are most effective in helping participants improve their dietary and physical activity habits and their readiness to change these behaviors?	5.5.2
7. What other characteristics of WIC nutrition education delivery are most effective in helping WIC participants improve their dietary and physical activity habits, readiness to change behaviors, and other food-related behaviors?	5.5.2
8. What experiences with WIC nutrition education are most often cited by women and child caretakers as motivating them to change their own or their children's dietary and physical activity habits, readiness to change behaviors, and other food-related behaviors?	5.5.2
9. How does the content of WIC nutrition education affect participants' dietary, physical activity habits, readiness to change behaviors, and other food-related behaviors?	5.5.2

For the impact evaluation, a longitudinal comparison using an exposure-response research design was used. Survey data were collected from approximately 800 WIC participants at three time points—initial, interim, and final—over a 1-year period to examine changes in the measures of interest in relation to exposure to WIC nutrition education over time (e.g., short and long term). This data collection is referred to as the Participant Surveys. Analysis of the pilot study data provided information on whether this approach was effective in measuring the strength of association between exposure to WIC nutrition education and changes in outcome measures (e.g., readiness to change, self-efficacy, dietary intake, eating behaviors, and child feeding behaviors) among study participants in the six sites. Additionally, the pilot study sought to identify the attributes of WIC nutrition education (e.g., the extent to which participant-centered practices are incorporated), the characteristics of WIC sites, and the characteristics of WIC nutrition educators that are potentially most effective in helping WIC participants improve their dietary and physical activity habits. These analyses considered participant-level and site-level variation.

Because this was a pilot study, the results are not nationally representative and therefore not generalizable to all WIC participants. Additionally, the impact evaluation was not sufficiently powered to detect significant changes in all of the outcome measures examined. Therefore, all of the analyses conducted in response to the research questions in Exhibit 1-4 must be considered exploratory, and conclusions should not be made about the effectiveness of WIC nutrition education based on the results presented in this report. Instead, the analyses conducted provide insight into the feasibility and effectiveness of the pilot study design, instruments, and analysis procedures for answering these questions in future evaluations.

The results of the pilot study provide useful information for designing future evaluations. Throughout the report, the approaches that worked and did not work are articulated to offer direction for how to design future evaluations. The pilot addressed issues such as whether the data collected in the Participant Surveys provided useful information on participant outcome measures and exposure (e.g., number and length of contacts); how the data collection procedures can be refined to improve data quality, increase response rates, and enhance study participant retention; and whether the data collection and analysis procedures used were able to address the study's research questions as intended. Additionally, the pilot helped assess whether there is sufficient variability in the exposure to WIC nutrition education to make an exposure-response design feasible for a large-scale evaluation. Finally, the pilot provides information for conducting a power analysis to design future evaluations.

As discussed in more detail later in this report, results of the pilot study suggest that conducting a nationally representative impact evaluation of WIC nutrition education may not be the best approach to assess the effectiveness WIC nutrition education. Other approaches such as an epidemiological design may be more useful to capture the contribution of WIC nutrition education to observable and measurable improvements in participants' attitudes and behaviors. The lessons learned from the pilot study are summarized in the report's conclusion and the implications for the design of future evaluations, synthesizing the findings from the process and impact evaluation components.

1.5 Organization of the Report

The following chapters describe the study's methods and results for Phase II of the *WIC Nutrition Education Study*. Outlined below is a brief summary of each chapter and relevant appendices:

- **Chapter 2, Study Design and Data Collection Methods for the Pilot Study:** Describes the study design, the conceptual framework, the approach used to select the pilot sites, data sources and data collection methods, and the analysis procedures for the process evaluation. Appendices A through F provide the data collection instruments, Appendix G provides information on the psychometric properties of the measures used in the Participant Surveys, and Appendix H provides additional information on the data collection procedures for the Participant Surveys.
- **Chapter 3, Characterization of WIC Nutrition Education in the Six Pilot Sites:** Summarizes the results of the process evaluation and lessons learned based on an analysis of the POC Interviews, a survey of WIC nutrition educators, observations of WIC nutrition education, administrative data, focus groups and interviews with participants, and the Participant Surveys. Considerations for WIC nutrition education practice are also presented based on key themes that emerged from the process

evaluation. Appendix I provides supplemental results for the process evaluation, which are discussed in this chapter.

- **Chapter 4, Analytical Approach and Results for Descriptive and Outcome Measures for the Pilot Study:** Describes the analytical approach and presents the results of analyses that examined within-person change between the initial and final periods in outcome measures describing participant behaviors. Appendix J provides information on the creation of the dependent variables for the outcome and impact analyses, and Appendix K provides supplemental results for the outcome analysis, which are discussed in this chapter.
- **Chapter 5, Analytical Approach and Results for the Impact Analyses for the Pilot Study:** Describes the analytical approach and presents the results for the impact analyses, which assessed the impact of exposure to WIC nutrition education on participant behaviors and examined other site-level and participant-level characteristics that may influence participant behaviors. Appendix L provides information on the supplemental and sensitivity analyses, and Appendix M provides the model specifications.
- **Chapter 6, Conclusion:** Concludes the report by discussing lessons learned from conducting the pilot study and the implications for designing future evaluations of WIC nutrition education. Appendix N provides a memo summarizing a meeting with the study's Advisory Panel on implications of the pilot study findings for future evaluations.

2. Study Design and Data Collection Methods for the Pilot Study

This chapter describes the evaluation design for the pilot study, the sample size, conceptual framework, selection of the six pilot sites, data sources and collection methods, and the analysis procedures for the process evaluation that was conducted to characterize the delivery of nutrition education at the pilot sites. As described in more detail in this chapter, the six sites were purposively selected to capture diversity in participants' exposure (e.g., number and length of nutrition education contacts), the site's implementation of Value Enhanced Nutrition Assessment (VENA) or participant-centered practices, and other factors. The longitudinal design at the individual level was intended to capture within-person change in response to the variation in exposure. Capturing within-person change is important because WIC nutrition education is meant to be individualized according to participants' needs. The sample size for the pilot was determined before the intervention and research design were fully elaborated. The sample size is sufficient to support the process evaluation and help inform the design for future evaluations but was not sufficient to address many of the research questions related to participant behavior, particularly those that required subgroup analysis.

2.1 Evaluation Design for the Pilot Study

2.1.1 Alternative Designs Considered for the Pilot Study and the Selection of the Exposure-Response Design

As detailed below, one of the challenges of evaluating the impact of WIC nutrition education is the lack of a comparison group. Summarized below are the alternative designs considered and the dose-response design (referred to as exposure-response in this report) that was chosen for the pilot study. Chapter 5, which presents the analysis approach and results for the impact evaluation, discusses the appropriateness of an exposure-response design for future evaluations of WIC nutrition education.

Alternative Designs Considered for the Pilot Study

The most common limitation of WIC nutrition education studies has been the lack of a true comparison group (Institute of Medicine [IOM], 2011). Federal rules mandate that nutrition education is offered to all WIC participants. Thus, no study can randomly withhold nutrition education from WIC participants, and it is unlikely that any WIC participant would receive no nutrition education. In an effort to minimize this limitation, the study team considered a number of options for comparison groups. The following approaches were explored:

1. **Dose-response designs**, either at the participant or site level, capitalize on natural variation in the mode, approach, and dosage of WIC nutrition education. This approach was chosen. How it was implemented in this study is discussed at greater length below.
2. **Systematic comparison designs**, such as an alternative education comparison or modified crossover design, provide greater control for selection bias but introduce more burden on WIC sites and may be appropriate only for a somewhat limited set of evaluation questions, namely questions regarding which mode of nutrition education is most effective.

3. Designs using **non-WIC comparison groups**, such as regression discontinuity, attrition comparison, and National Health and Nutrition Examination Survey (NHANES) group comparison, present challenges in recruitment and control for selection bias. More fundamentally, the non-WIC comparison group designs are unable to distinguish the effects of WIC nutrition education from the effects of the WIC food package. For example, consideration was given to comparisons with nationally representative studies such as NHANES, which contain a sample with dietary intake data and an indication of whether survey respondents received WIC benefits. However, those who are eligible for WIC but are not enrolled in WIC may differ from those who do enroll in the program given the broad reach of WIC. The two groups would differ because the non-WIC samples would not be exposed to the WIC food package and referrals in addition to WIC nutrition education so that a comparison would not satisfy the primary goal of the study, which is to evaluate the impact of nutrition education alone.

For reasons that are discussed below and based on guidance from the study's Advisory Panel, the feasibility of a dose-response design that capitalizes on natural variation at the site level in frequency and duration of WIC nutrition education was assessed in the pilot study. Variation at the site level was used to select sites that ostensibly varied in average level of WIC nutrition education provided. As described in greater detail in Section 2.4, the study team purposively selected two sites considered as high, two sites considered as medium, and two sites considered as low in terms of frequency and duration of WIC nutrition education, use of VENA/participant-centered practices, and other characteristics potentially related to exposure. However, variation at the individual level, as described in the next subsection, was used to test the dose-response effect of WIC nutrition education on nutrition and other behaviors.

The pilot study design also specified collecting information from the sites through interviews with a site point of contact (POC); a survey of nutrition educators; observations of nutrition education delivery for one-on-one and group sessions; and surveys, focus groups, and interviews with participants to characterize the delivery of nutrition education and to collect information on site-level characteristics for the impact evaluation. Although a number of the a priori research questions suggested examining the impact of site-level features on participants' nutrition and other behaviors, the limited number of sites per condition resulted in a study design that is unlikely to produce valid, unbiased estimates of program impacts.

Dose-Response Design that Was Tested for Feasibility in the Pilot Study

Classically, dose-response studies involve a random assignment of the intervention by researchers; however, for the pilot study, WIC sites were purposively selected based on variation in the amount of nutrition education delivered and other characteristics, and the variation in receipt of WIC nutrition education at the participant level was assigned after the fact using a statistical approach called latent class analysis (LCA), discussed in more detail below. Using this design, the study compared outcomes between groups of individuals that reported receiving different levels of exposure to nutrition education. In this report, the groups are referred to as exposure groups, rather than dosage groups, because "dosage" is traditionally used in the medical field where it denotes a highly controlled and regulated amount, whereas "exposure" comes from prevention research and is thus more appropriate for an intervention that is applied or received with a high degree of variability. The pilot study design involved comparing WIC

participants who were categorized into different exposure groups based on self-reported experiences with WIC nutrition education during an 18-month reporting period using responses to the Participant Surveys.

The exposure-response design used in the pilot study sought to answer the following questions and provide empirical evidence of the feasibility of using an exposure-response design for future evaluations of WIC nutrition education:

- Is it feasible (without undue burden to WIC staff and participants) to determine exposure to WIC nutrition education at the individual participant level?
- In what ways do the characteristics of WIC participants who receive different levels of exposure to WIC nutrition education differ?
- How similar are WIC participants who have a high versus low exposure to WIC nutrition education?
- How reliable are staff and participant self-reports of exposure to WIC nutrition education compared with observation?

To answer the first question, exposure groups (i.e., classes) were identified using LCA. In brief, LCA is a statistical procedure used to identify a set of discrete, mutually exclusive classes for grouping individuals based on their responses to a set of observed variables. The procedure examines the relationship among individuals and clusters participants so that participants in the same class have response patterns that are more similar to others in their class than they are to persons in another class. The response patterns represent the latent construct, which in this study is level of exposure. Participant Survey responses to questions about the frequency and duration of the nutrition education received, the number of different types of reinforcers, and the number of different types of follow-ups were included in the LCA model, as suggested by Olander (2007).

Separate LCA models were estimated for two of the study groups: pregnant at enrollment and caregivers with an eligible child. Each LCA model provided a two-class solution.⁷ The caregiver group included one class for which average exposure on all four of the observed measures was higher than the other class. The pregnant-at-enrollment group included one class for which average exposure on three of four observed measures was higher than the other class; the average for the fourth variable (duration) was similar in the two groups (23.20 minutes versus 22.13 minutes). However, although the two-class solution is statistically and substantively supported, it did result in a high degree of imbalance: 97% of women who were pregnant at enrollment and 81% of caregivers were in one exposure group. Additionally, the actual differences between the two exposure groups for the mean exposure scores appear to be quite modest (as shown in Exhibit 5-3). The variety of factors that drive the number of nutrition education contacts offered underscores the challenge of assessing the effect of nutrition education exposure on participant outcomes, as further discussed in Chapter 5.

The LCA results need to be viewed with caution because of concerns about the quality of participants' self-reported data on number and length of contacts. Specifically, skip patterns built into the design of the survey directed some participants to leave questions on exposure blank, resulting in incomplete data for

⁷ LCA models were not estimated for the postpartum-at-enrollment study groups. As described in Section 4.6, the measures selected for inclusion in the impact evaluation did not include measures for this study group.

modeling exposure. To compensate for incomplete data, exposure was modeled as an average across data from all three data collection periods. This may have resulted in over- or underestimation of exposure. Using WIC administrative data is an option for collecting information on number of contacts received, but these data may not always be accurate. Appendix L provides a comparison of the participant-reported data on number of visits with the information on number of nutrition education visits from WIC administrative data for the subset of participants for which administrative data were provided. Based on this comparison, there were inconsistencies between the two data sources. Alternative strategies for collecting accurate information on number and length of nutrition education contacts are discussed in Chapter 6.

Level of exposure to WIC nutrition education is but one important consideration for assessing the effectiveness of WIC nutrition education; therefore, analyses were also conducted to explore the effect of other variables at the participant and/or site levels, such as characteristics of the nutrition educator, characteristics of the site, and features or attributes of the delivery of WIC nutrition education (e.g., extent of use of VENA or participant-centered practices). For these analyses, regression models were used that implicitly model change over time by examining the difference in the outcome measure (dependent variable) between the initial and final periods, controlling for the value of the outcome measure at the initial period (as described in Sections 5.2 and 5.3).

2.1.2 Longitudinal Design for Participant Surveys

The pilot study employed a longitudinal design with data collection at an initial, interim, and final time period (data collection took place from July 2015 to September 2016). WIC participants were recruited at the six pilot sites, with the goal that enrollment in the study, informed consent, and completion of questions on dietary intake and several other nutrition behaviors took place before the participant's WIC appointment and completion of the remaining questions took place after the participant's WIC appointment.⁸ This was done so that participants' responses to the dietary intake and nutrition behavior questions were not influenced by discussions with WIC staff and the receipt of nutrition education.⁹ The first data collection was administered when women were enrolled in the study, and they were assigned to groups based on their status at that time: pregnant women, postpartum women, and mother or other caregiver with eligible child aged 6 months to 4 years.¹⁰ Note that enrollment refers to enrollment into the study, not WIC certification.

The study team had considered limiting study participation to participants who were receiving WIC benefits for the first time so that they would not have had any prior exposure to WIC nutrition education. It was determined that this was not feasible because it would greatly increase the resources and amount of time needed to enroll eligible participants. For the pilot study, most of the participants who enrolled in the study had previous exposure to WIC (77% for women who were pregnant at enrollment, 83% who were postpartum at enrollment, and 96% for caregiver with an eligible child), such that the pilot lacks optimal

⁸ As directed by FNS, study enrollment and survey administration were to cease when the participant was called for her appointment, and study activities were to be completed after the participant's appointment. Section 2.10.2 provides additional information on study enrollment procedures.

⁹ Section 4.7 provides the results of a comparison of survey responses to assess whether when participants completed the survey (before or after their appointment) influenced their responses.

¹⁰ Children can receive WIC benefits up to their fifth birthday; however, because the study followed the individual receiving WIC benefits for approximately 12 months, enrollment was limited to children up to age 4 years.

baseline measurement for most respondents. For future evaluations, study planners may want to consider limiting participation to individuals who are receiving WIC benefits for the first time or oversampling such individuals in spite of the additional expense and complexity in order to establish a better baseline for the purpose of examining the effects of WIC nutrition education.

The initial survey asked about participants' behaviors and WIC experience during the previous 6 months. The interim and final surveys each collected data on the previous 6 months, thus providing data for an 18-month time period. Participation in the interim survey was not a consideration for eligibility for the final survey. The timing of the initial and final surveys and survey version varied based on the participant's status at study enrollment and is detailed in Section 2.10. For women who were pregnant at enrollment, the timing of the interim and final surveys allowed the study to capture information on breastfeeding intentions and duration. For women who were postpartum at enrollment, conducting the interim survey 6 months after enrollment and the final survey 12 months after enrollment allowed the study to capture information on breastfeeding duration and to control for any seasonal variation. For caregivers with an eligible child, conducting the final survey 12 months after enrollment allowed the study to control for any seasonal variation. Caregivers (e.g., father, aunt, or friend who acts as a proxy) were eligible for study participation if they were knowledgeable about the child's eating habits and were planning to attend the child's WIC appointments and thus receive nutrition education instead of the mother.¹¹

Participants were screened for study eligibility based on a limited number of exclusion criteria (see **Exhibit 2-1**). When recruiting participants for the study, interviewers used laptop computers to administer a questionnaire to screen participants for eligibility (see Appendix F).

Exhibit 2-1. Exclusion Criteria for the Participant Surveys

Exclusion Criteria	Rationale for Exclusion
Respondent is younger than 18 years old	Did not enroll minors into the study because of the need to obtain parental consent
Respondent does not read/understand English or Spanish	Survey instrument was only available in English and Spanish
<u>Criteria for caregiver enrollment group when the respondent is not the mother of the infant/child:</u> individual is not knowledgeable about what the child eats on a daily basis	Caregiver had to be knowledgeable about the child's eating habits because this was a primary outcome of the study
<u>Criteria for caregiver enrollment group when the respondent is not the mother of the infant/child:</u> individual is not the person coming to WIC visits over the next 12 months	Caregiver had to be a designated proxy (i.e., receiving nutrition education) to assess the impact of nutrition education on the caregiver's and child's behaviors
<u>Criteria for caregiver enrollment group:</u> The only family member receiving WIC benefits is between 4 and 5 years old	Because the child was followed for a 12-month period, the child would have been older than 5 years and not receiving WIC at the final time point

¹¹ For simplicity, the study participants are referred to as women, although men were eligible for participation as a caregiver if they met the screening criteria. For the caregiver-with-eligible-child study group, at enrollment 91% of the participants were the child's mother and 10% were another type of caregiver (5% father, 3% grandmother, 1% other family member, and <1% nonfamily member or friend).

2.1.3 Sample Size for the Participant Surveys

Sample size estimates provide guidance on reasonable expectations for observing statistically significant changes in outcomes of interest. Developing sample size estimates requires an understanding of the sampling design, planned analyses, expectations about the minimum detectable effect, and characteristics of the population and measures involved. For the purposes of estimating statistical power, it was assumed that the test statistic evaluating the program impact would involve a two-tailed hypothesis test with a Type I error rate of 0.05 and a Type II error rate of 0.20, yielding 80% statistical power. Additionally, it was assumed that impact models would use linear and logistic models with difference-in-difference estimators to quantify program effects. Furthermore, the pilot study was not designed to detect changes separately among the three study enrollment groups (i.e., pregnant at enrollment, postpartum at enrollment, and caregiver with eligible child). However, in the process of developing the survey instruments, it was noted that many of the outcome measures are subgroup specific (i.e., pregnant women were not asked about child feeding practices and dietary intake). Accordingly, subgroup analyses became a necessary feature of the study and the analyses in this report. Because the sample size had been determined at the proposal stage, there was not an option to increase the sample size to meet the analysis needs at the subgroup level. For future studies, evaluators should consider whether outcomes of interest are subgroup specific and match measures to populations with an eye toward sample size and statistical power calculations.

Sample size requirements are influenced by the selected outcome because different outcomes are expected to yield different effect sizes. For example, improvement in more distal outcomes such as dietary intake would be less amendable to change and would, accordingly, require a larger sample size; analysis of this outcome would require 566 cases at enrollment, given equal allocation across exposure groups, and 722 cases at enrollment, given an unequal 2:1 allocation across exposure groups.

Accordingly, the data collection protocol for the pilot study specified 800 participants at enrollment and assumed a 75% cooperation rate for an estimated 600 participants at the final time period, with approximately 100 participants per site. The actual cooperation rate between the enrollment and final time periods was 54%, for a total of 453 participants at the final time period (Section 2.10 provides additional information on the number of completed surveys and cooperation rates for each time period). Thus, for future evaluations, a lower cooperation rate should be assumed and different data collection procedures employed to decrease study attrition, increase cooperation, and take into consideration whether analyses will be conducted at the subpopulation level.

The sample size for the pilot was determined before the research design was fully elaborated. The sample size is sufficient to support the process evaluation and help inform the design for future evaluations but was not sufficient to address many of the research questions related to participant behavior, particularly among study subgroups. For this reason, the analyses conducted for the pilot study should be considered exploratory, and caution should be exercised in drawing any conclusions about the results.

2.2 Conceptual Framework and Measures for the Outcome and Impact Analyses

2.2.1 Conceptual Framework

Exhibit 2-2 illustrates the conceptual framework for the pilot study, which was adapted from the approach described by the 2011 IOM report on planning a WIC research agenda, which included recommendations for the future of WIC nutrition education (Ontai et al., 2009; IOM, 2011; Townsend, Young, Ontai, Ritchie, & Williams, 2009). The conceptual framework was largely driven by social cognitive theories of behavior change and, in particular, the transtheoretical model (Prochaska, Reddings, & Evers, 2002). The framework suggests that behavior change begins with readiness for change (Contento, 2011; Greene et al., 1999; Havas et al., 1998; Prochaska & Velicer, 1997), which, in turn, influences behavioral antecedents (i.e., proximal outcomes) such as enjoyment of foods and self-efficacy for eating or serving healthy foods (Henry, Reimer, Smith, & Reicks, 2006; Hildebrand & Betts, 2009; Mullen, Hersey, & Iverson, 1987). The framework describes intermediate outcomes such as changes in food acquisition and management (Glanz et al., 2012) and changes in nutrition-related behavior (e.g., eating dinner together [Townsend et al., 2009; Ritchie, Welk, Styne, Gerstein, & Crawford, 2005]) that are driven by antecedent factors and, in turn, drive changes in the distal outcomes including dietary habits of women and children (Gerstein et al., 2010; Havas et al., 1998; Whaley et al., 2010). These behavioral outcomes are consistent with WIC nutrition education guidance for women, infants, and children.¹² Although of interest to FNS, changes in health outcomes such as weight status or body mass index were not considered because such outcomes would go beyond the length of the pilot study.

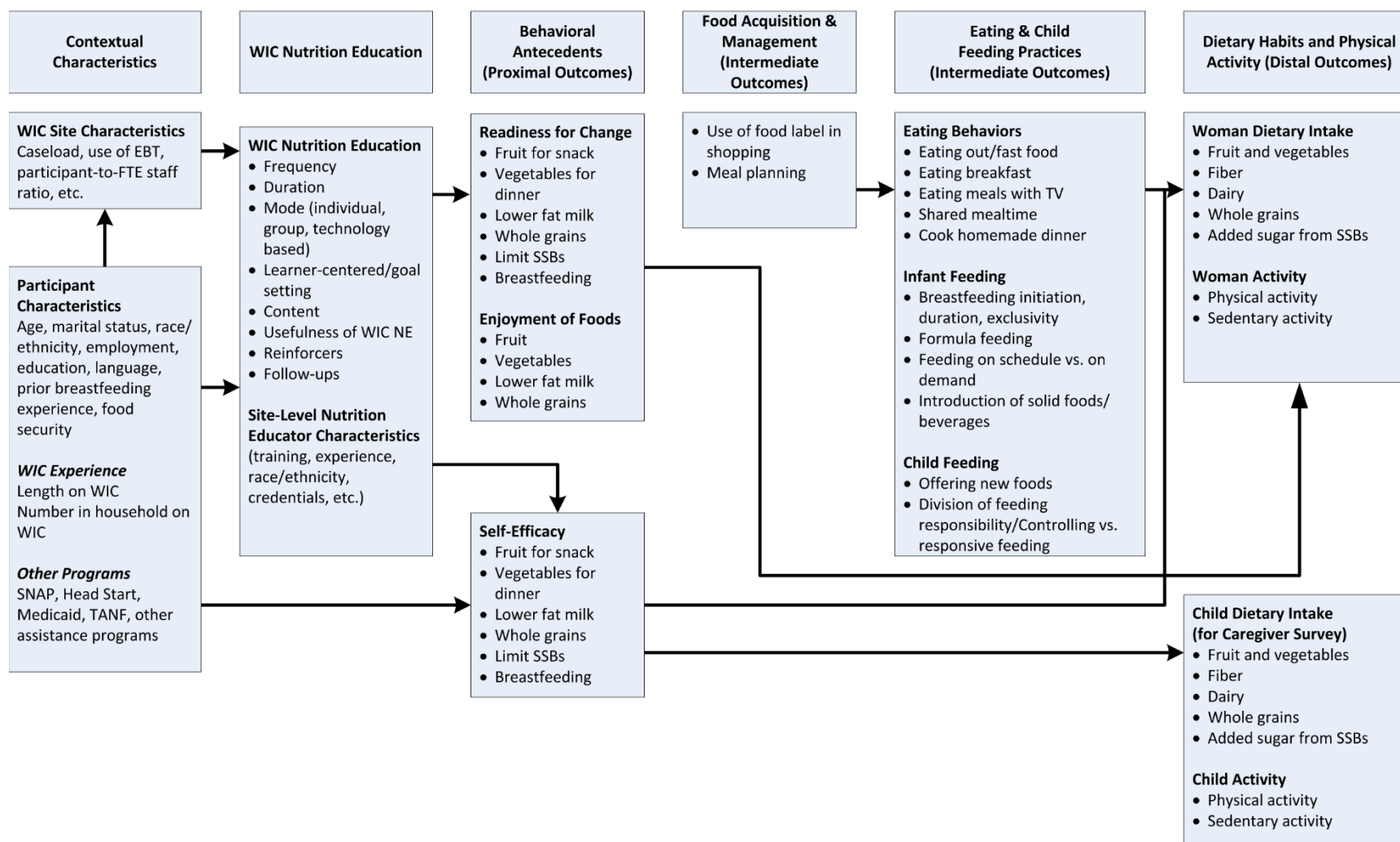
The conceptual framework for this study was selected because it mirrors the best practices described by WIC VENA principles (USDA, FNS, 2006a) and is articulated in the *WIC Program Nutrition Education Guidance* (USDA, FNS, 2006b). These principles stress the value of participant-centered learning, motivational interviewing,¹³ goal setting, reinforcement, and follow-up. As a component of this approach, the transtheoretical (or stages of change) model holds that if a nutrition educator uses effective open-ended probes, the educator can ascertain a WIC participant's readiness for change. Ascertaining readiness for change allows the educator to better tailor the way messages are presented to potentially motivate change. If a participant is in a precontemplation stage, then messages about the value of nutrition for a healthy child are important. When a participant is in a precontemplation stage, a nutrition educator will work with the participant to identify the "pros and cons" of changes and use techniques such as motivational interviewing to increase the participant's recognition of the "pros" and decrease the salience of the "cons." Conversely, if a participant is "contemplating" making changes or "engaged in taking action," the nutrition education messages are most effective if they target "how to change." Participants acting on such messages will be best seen by an increase in self-efficacy, which was measured in the Participant Surveys, through the use of questions such as "How sure are you that you can serve your child vegetables at dinner every day?"¹⁴

¹² See, for example, *Infant Nutrition and Feeding: A Guide for Use in WIC and CFS Programs*, available at <https://wicworks.fns.usda.gov/infants/infant-feeding-guide>.

¹³ Motivational interviewing is generally considered an embodiment of, or most closely reflecting, self-determination theory.

¹⁴ The purpose of this text is to explain the stages of change model relative to WIC nutrition education. The pilot study did not take into account the tailoring of messages and targeting "how to change."

Exhibit 2-2. Conceptual Model of Variables for the Phase II Pilot Study



Adapted from IOM (2011); Ontai, Ritchie, Williams, Young, & Townsend (2009); Townsend et al. (2009).

Note: For caregivers with an eligible child, information was collected on the caregivers' readiness to serve the child healthy foods and the caregivers' self-efficacy to serve the child healthy foods. For enjoyment of foods and eating behaviors, information was collected to describe the child's preferences and behaviors.

FTE = full-time equivalent, NE = nutrition education, SSBs = sugar-sweetened beverages, SNAP = Supplemental Nutrition Assistance Program, TANF = Temporary Assistance for Needy Families.

The conceptual framework and social-cognitive theories provided a blueprint for developing the data collection instruments for the pilot study, as summarized in the sections that follow. In particular, Section 4.4.1 and Appendix J detail the theoretical rationale and other considerations for coding the dependent variables in this study.

2.2.2 Outcome Measures

In selecting the outcome measures, consideration was given to understanding how best to measure how much of the change in participant behavior can be attributed to WIC nutrition education and the interest in understanding the effectiveness of specific features of nutrition education. The participant outcomes (and corresponding survey questions) were organized to correspond to the conceptual model shown in Exhibit 2-2.

The following outcome measures were considered for the pilot study:

- readiness to change to consume healthy foods/serve child healthy foods
- enjoyment of healthy foods for pregnant/postpartum women and children
- self-efficacy for consuming healthy foods/serving child healthy foods
- food acquisition and management (e.g., use of labels and meal planning)
- eating behaviors (e.g., limit eating out, avoid eating meals with TV on)
- mother/caregiver child feeding behaviors and feeding style
- dietary intake for pregnant/postpartum women and children
- physical and sedentary activity of pregnant/postpartum women and children

Descriptive information was also collected on infant feeding behaviors and breastfeeding (intentions, self-efficacy) for women who were pregnant or postpartum at enrollment.

Chapter 4 describes the analytical approach and results for the outcome analysis, which examined changes in participant behaviors over time, including information on how data from the Participant Surveys were used to create the outcome variables. Survey questions for outcomes on eating or serving healthy foods asked about consuming more fruit and vegetables, switching from refined to whole grains, consuming low-fat or fat-free milk instead of reduced-fat or regular milk, and limiting consumption of 100% juice and sugar-sweetened beverages (SSBs). With the exception of SSBs, these foods are included in the WIC food package; thus, women and their children should have access to these foods, so this should be kept in mind when considering the results of the outcome and impact analyses. Given that the WIC food package is designed to provide supplemental nutrition on most healthy foods (fruit and vegetables, whole grains, and high-quality/low-fat proteins), it would be difficult to assess only nutrition outcomes that would not be confounded by the WIC food package. In addition to SSBs, outcome measures for the pilot study not confounded by the WIC food package include child feeding practices, physical activity, healthy weight, food shopping and preparation, and breastfeeding.

The outcome measures listed above are associated with behaviors that may be topics covered in WIC nutrition education sessions. As discussed in Chapter 4, although the site-level and participant-level data collection captured information on nutrition education topics, this information was very general (e.g., eating behaviors) and did not provide information on whether specific behaviors were discussed (e.g., limit eating out). Also, because WIC nutrition education should be individualized, the site-level data on nutrition education topics may not necessarily reflect the content received by individual participants. This is important to keep in mind when interpreting the results of the outcome and impact analyses because changes in these outcomes would not be expected as a result of exposure to WIC nutrition education if the behavior was not covered in the nutrition education received by participants. Study planners for future evaluation studies should consider how to collect more detailed information on nutrition education content and ensure that the content provided to participants is aligned with the specific outcome measures addressed in the evaluation.

2.3 Data Sources

As shown in **Exhibit 2-3**, the pilot study comprised the collection of both qualitative and quantitative data from WIC staff and participants and from direct observations of pilot site staff providing nutrition education. In addition to describing nutrition education delivery in the six pilot sites, some of the site-level data were used as independent variables in the impact analysis. Data collected from WIC staff and participants also captured information on their experiences and satisfaction with nutrition education. The Participant Surveys provided participant-level data for the impact analysis as well as data on participants' perceptions of goal setting and participant/educator interactions, which are summarized in the description of the six pilot sites. The Office of Management and Budget (OMB) (OMB approval number 0584-0599) and RTI's Committee for the Protection of Human Subjects, which operates as RTI's Institutional Review Board (IRB), approved all data collection protocols and instruments.

Exhibit 2-3. Summary of Data Collection Procedures for the Pilot Study ^a

Method	Respondent	Description	Response
Semistructured interviews with POC	Site supervisors and/or managers	Three interviews—initial, interim (~6 months), and final (~12 months)—conducted in person or by phone to verify/update data provided in the Phase I 2014 Site Survey	18 interviews completed (3 per site)
Nutrition Educator Survey	Site staff who provide nutrition education (as identified by POC as having a role in providing nutrition education)	One Web-based survey conducted near beginning of pilot	60 surveys completed (100% of nutrition educators in six sites)
Onsite observations	Site staff who provide nutrition education in one-on-one, face-to-face visits or in group sessions	Two to three observations of each staff member delivering education during one-on-one visits One to three observations per staff member facilitating group sessions (in sites where group sessions occurred)	90 observations of one-on-one nutrition education Seven observations of group nutrition education
Focus groups	Participants enrolled in the pilot	Two focus groups conducted in English at each site near the end of the pilot	90 participants (10 to 18 per site; 77% of participants recruited)
Spanish-language interviews	Spanish-speaking participants in site with largest percentage of Spanish-speaking participants	Six telephone interviews conducted in Spanish	Six interviews completed (75% of participants recruited)
Participant Surveys	Pregnant women, postpartum women, and mothers/caregivers of child receiving WIC benefits	Enrollment/initial survey conducted at WIC site; interim and final ^b surveys conducted by mail, with nonrespondents contacted by phone to complete survey	842 enrolled and completed initial survey, 550 completed interim survey (65% of initial survey), 453 completed final survey (54% of initial survey)
Administrative data	WIC sites provided data for sample of respondents to the Participant Surveys	Request made via email, and the six sites provided data electronically	The six sites provided data for a total of 199 participants (~33 per site)

^a Data collection took place from July 2015 through September 2016.

^b Participation in the interim survey was not a consideration for eligibility for the final survey.

2.4 Site Selection and Recruitment

2.4.1 Site Selection

The selection of pilot sites was designed to capitalize on the variability of WIC nutrition education and other site characteristics. The study team had originally envisioned a selection procedure that would be scalable to a large-scale evaluation. The original approach specified selecting the six pilot sites from the 80 sites that completed the Phase I in-depth interviews. These 80 sites were purposively selected to obtain diversity in caseload size, use of WIC electronic benefit transfer, geographic location, site type (e.g., local health department, State run, nonprofit organizations), mode of delivery of nutrition education, and number and length of nutrition education contacts.

The original design specified classifying the 80 sites into three tiers (low, medium, high) based on a multiple-component index describing exposure to nutrition education, using information from the Local Agency and Site Surveys. This index was to comprise measures of frequency of contacts, duration of contacts, mode of delivery (individual, group, technology based), use of VENA/participant-centered practices, use of reinforcers, and other factors. However, because a study with six sites cannot be

nationally representative, the study team used a purposive approach to sample selection as described below to ensure that selected sites would not have lengthy IRB or other approval processes that could potentially delay the start of the pilot study and, most importantly, to ensure diversity in geographic characteristics, size, participants' exposure to nutrition education, and other features.

The study team worked with FNS to identify six State agencies that do not have lengthy IRB approval processes from which to select the six pilot sites (one site per State agency). The selected State agencies were from six of the seven FNS regions. The initial pool of sites was limited to sites in the six States that participated in the 80 in-depth interviews and had sufficiently large caseloads (i.e., greater than 1,500) to facilitate enrolling participants into the study. The director for each State agency was contacted by email and later by telephone to identify any sites to exclude from consideration for Phase II (e.g., because the site was recently or currently involved in another FNS study). Initially, two sites were purposively selected from each State to provide a mix of caseloads, modes, and variation in how nutrition education is delivered at the site based on an informal review of the Phase I data. An Excel file was prepared that included the following information on these 12 sites from the Phase I Local Agency or Site Surveys:

Site Characteristics

- Monthly caseload
- Site type (e.g., stand-alone WIC site, Federally Qualified Health Center, or health department)
- Percentage of participants at the site who speak a language other than English
- Modes of nutrition education (one-on-one, group, technology based)

Nutrition Education Characteristics

- Number of nutrition contacts offered during the certification period across all participant categories for high-risk and not-high-risk participants
- Average length of nutrition education contacts for enrollment certification visits, individual secondary education visits, and high-risk follow-up visits
- Ranked “participant chooses the topic(s) she wants to talk about” as method most often used to determine discussion topics for one-on-one counseling sessions (as a measure of extent of use of VENA or participant-centered practices)
- Ranked “participant usually identifies the goal(s)” as method most often used to select participant goals for one-on-one sessions (as a measure of extent of use of VENA/participant-centered practices)
- Number of different types of follow-up methods
- Number of different types of reinforcers used during group sessions
- Staff-to-client ratio
- Whether nutrition educators at the site had received training in VENA/participant-centered education during the past 12 months

FNS reviewed the list of 12 candidates and requested that the pilot include a small site with a caseload of fewer than 1,500 and a rural site; thus, we replaced the sites for one State with two sites that met these

criteria. From within this pool of 12 sites, the information on nutrition education characteristics (listed above) was reviewed, and two sites were selected that rated high for most of these characteristics, two sites were selected that rated medium for most of these characteristics, and two sites were selected that rated low for most of these characteristics. Selections were also made so that the six sites included a mix of modes: in addition to one-on-one sessions, three sites reported offering group sessions and three sites reported offering group sessions and technology-based education according to the Site Survey. Selections were also made to reflect a range of caseload sizes, with one relatively large site, one relatively small site, and the remaining sites with varying caseload sizes within this range. Consideration was also given to selecting at least one site that had some Spanish-speaking participants. Thus, although the sites were subjectively sorted by low, medium, and high, the final selection of the six sites was based on additional factors to provide a mix of sites for the pilot. Because this approach was not systematic, the rating of low, medium, and high is not provided for the pilot sites.

2.4.2 Site Recruitment

To initiate the recruitment of sites, the study team used the FNS-approved recruitment materials for the initial contact with the six State agencies and followed up by phone to discuss the pilot with them. The State agencies provided their approval and assisted the study team in contacting the selected sites and the local agencies that operate them. Conference calls with the sites and the local agencies addressed topics such as (1) purpose and objectives of the pilot, (2) study activities to occur at the site along with timelines, (3) support (e.g., materials and recruitment staff) to be provided by the study team, and (4) role and expectations of the local agency/site. Site Survey responses on modes and other selected nutrition education practices were confirmed to ensure that the site had not made significant changes that would make it unsuitable for the pilot.

All six selected sites agreed to participate in the pilot, eliminating the need for alternate site selection. Local agency management staff identified a POC to receive study correspondence and to discuss logistics for implementing the pilot. Each local agency/site received a confirmation letter outlining the activities and data collection steps for the site-level data collection and an agreement form that described the roles and responsibilities of the study team and the sites. The letter also included timelines, resources, and other details and agreements reached during the recruitment phase. A copy of the confirmation letter was provided to the State agencies associated with the pilot sites.

2.4.3 Site Descriptions

As previously noted, the pilot sites were intentionally selected to have variation in nutrition education practices to test the evaluation methodology. It is worth reiterating that these six sites are not representative of the diversity of nutrition education practices in all WIC sites across the country, and process evaluation results shared in this report do not provide a nationally representative description of WIC nutrition education. The report from Phase I of this study includes descriptive data that are nationally representative (USDA, FNS, 2015).

Exhibit 2-4 provides information on selected characteristics of the six sites (referred to as sites A through F to maintain confidentiality of the sites). Of the six pilot sites, most were operated by a local or county health department, although not all were co-located in a health department facility. One site was affiliated with a Federally Qualified Health Center. All six sites provide WIC and nutrition education services at least 20 days per month. The sites varied in the total participant caseload served and in the number of staff involved in nutrition education. The smallest site served an average of fewer than 1,400 WIC participants per month and the largest served nearly 6,000 per month. The number of staff who provided nutrition education ranged from 3 to 19; some of these staff provided nutrition education full time, while others were part-time employees or had other duties in addition to providing nutrition education. Chapter 3 provides a full description of the characteristics of the pilot sites.

Exhibit 2-4. Characteristics of Pilot Sites

Characteristic	A	B	C	D	E	F	Average for Six Sites (Range)
Number of days per month nutrition education is provided	20	20	22	20	20	20	20.7 (20–22)
Monthly participation (caseload) ^a	1,836	1,355	2,923	5,748	3,268	1,882	2,835 (1,355–5,748)
Number of staff who provide nutrition education ^b	8	3	10	19	12	10	10.3 (3–19)
Participant-to-FTE nutrition education staff ratio ^c	303	542	400	402	491	314	409 (303–542)
Percentage of Spanish-speaking participants at the site ^d	0.9%	3%	15%	12%	<1%	13%	7.5% (0.9–15%)

Source: Phase I 2014 Site Survey; verified in recruitment discussions and POC Initial Interview

^a Participation (caseload) information is an average of 5 months of participation data during the pilot period.

^b Includes all staff who have a role in providing nutrition education including part-time staff, full-time staff, and staff with multiple job roles.

^c The ratio is the number of participants per one full-time equivalent (FTE) nutrition education staff person (comprising full- and part-time staff).

^d These data were provided by the site during recruitment discussions and are the estimated percentage of Spanish-speaking participants for each site (not just the individuals who participated in the evaluation).

FTE = full-time equivalent

2.5 Data Collection and Analysis for the POC Interviews

Interviews with management POCs at each site provided information on key nutrition education features and practices, such as training of nutrition educators at the sites, modes and methods of providing education, number and duration of education contacts, and referrals to health care and community programs. The purpose of these interviews was to develop a comprehensive description of the manner in which nutrition education is delivered in the six pilot sites. The initial interview was conducted in person or by phone. To capture changes in nutrition education design or delivery during the course of the pilot evaluation period, a second brief phone interview occurred at the midpoint (interim interview), and a third occurred at the end of the pilot period (final interview).

2.5.1 Instrument Development for the POC Interviews

The initial interview guide contained selected responses from the Phase I Site Survey for validation or updating as well as additional questions about site operations associated with the Phase II research questions. The interim and final interviews used the same interview guide and repeated a subset of questions (see Appendix A). In addition to using questions from the Site Survey, the interview guides incorporated questions from similar interviews previously conducted with WIC staff that were well understood and successful in eliciting useful responses.

2.5.2 Data Collection for the POC Interviews

A trained interviewer conducted all three interviews with each pilot site during the evaluation period: at the beginning of the pilot, at 6 to 7 months after the initial interview, and at the end of the evaluation period. Respondents included one or two management staff from each site who were knowledgeable about the site's nutrition education practices, and the same respondents participated in all three interviews. The initial interviews were about 45 minutes in length, and the interim and final interviews took about 15 minutes each. Initial interviews for four of the pilot sites were conducted in person during the onsite observation visit, and for the other two sites, they were conducted by phone 1 to 2 weeks before the onsite visit. All interim and final interviews were conducted by phone.

2.5.3 Analysis Approach for the POC Interviews

Information from the POC Interviews was recorded in a Word document template. Selected quantitative data from the interviews were entered into a Microsoft Excel 2013 spreadsheet for analysis and comparison across sites as described below.

- Monthly Participation (Caseload): For consistency in the site caseload number, the interviewer asked each site to provide the number of participants who were issued food packages at the site each month for a 5-month period during the pilot. These numbers were averaged to create each site's "monthly participation," shown in Exhibit 2-4.
- Site FTE Nutrition Education Staff: During the initial interviews, respondents were asked for specifics about nutrition education staff who worked full time and part time and about staff who have multiple roles and conduct nutrition education for only a percentage of their time. The POC responses were summed to determine a total full-time equivalent (FTE) of nutrition education staff per site. The average monthly caseload number and the total nutrition education staff FTE were used to calculate the participant-to-FTE nutrition education staff ratio shown in Exhibit 2-4.
- Hours of Staff Training: Interview responses pertaining to hours of staff training on nutrition education topics within the previous 6-month period were collected during the initial, interim, and final interviews. These three numbers were averaged to create an "average hours of training" number per site. These data are described in Chapter 3.

2.6 Data Collection and Analysis for the Onsite Nutrition Education Observation Visits

To collect objective data regarding delivery of nutrition education and to compare similarities and differences in content and approach to nutrition education across the six sites, a trained study team

member conducted an onsite visit at each site. The site visits also provided an opportunity to validate information collected through the Phase I Site Survey and POC initial interviews.

2.6.1 Instrument Development and Testing for the Observations

The observation data collection forms (Appendix B) were designed to document (1) the mode of education, (2) approach to education (e.g., didactic, participant centered), (3) use of reinforcements and resources, (4) length of educational contacts, and (5) other key features of nutrition education, such as the method(s) for providing education materials and if/how participants are encouraged to set goals. Three observation forms were developed: a form for one-on-one, face-to-face nutrition education; a form for group nutrition education; and a site-level form to record information about the facilities and resources and summarize overall comments on observations. The forms were field-tested in a number of WIC sites to assess the usability of the instruments and to identify necessary adjustments.

2.6.2 Data Collection for the Observations

To ensure consistency of data collection across sites, one study team member with extensive WIC program and data collection experience conducted all of the onsite nutrition education observation visits. Training for these observations covered a description of the onsite visit components, guidance for completing the onsite observation forms, onsite protocols, a sample schedule for the visits, and a sample script for explaining the purpose of the observation visit to site staff. Pilot sites provided a copy of the local agency Nutrition Education Plan, if available, and site calendars and schedules for review before the onsite visit.

Onsite visits took place between July and October 2015. For each visit, the observer was onsite approximately 12 to 16 hours over a period of 2 to 3 days. The number of hours and the number of days varied by site based on the number of staff providing nutrition education, the site's schedule (e.g., days and hours the site is open), and the scheduling process used for nutrition education activities (e.g., specific days or times for group classes and certification appointments). During each onsite visit, all present WIC staff members who provided nutrition education at the site were observed carrying out nutrition education with WIC participants. At the beginning of each onsite visit, the observer introduced herself to the site staff and explained the purpose of the visit and how the observations would be conducted. The observer responded to staff questions about the observations and addressed any concerns they had about the process. For each observation of one-on-one nutrition education, the observer introduced herself to the participant or parent/caregiver, explained the purpose of the observation, and asked for verbal agreement to join them during their session with the WIC staff. All participants or parents/caregivers agreed to have the observer present during the nutrition education session, and none expressed any discomfort or concerns about the observation. For the group observations, the process was similar, and the observer received verbal agreement from all group attendees before observing the group session.

The study team designed the onsite observation forms to simplify data collection, promote consistency, and facilitate analysis of nutrition education features across sites. The forms included space for recording information about the participant (e.g., WIC category, high-risk status), about the type of visit, topics covered, and for several attributes of the nutrition education (e.g., goal setting, use of affirmations, inclusion of reinforcer materials). Each nutrition education attribute had two to three rating descriptors

(e.g., goal not discussed, nutrition educator determined goal, participant determined goal). The observer selected the appropriate descriptor for each attribute during every observation. The observer also recorded overall time spent with the nutrition educator and minutes of nutrition education. Because nutrition education is often integrated with nutrition assessment or other service delivery components during a WIC visit, the observer recorded the education topic and the minutes spent (to the nearest half a minute) each time the educator discussed or shared nutrition or health information with the participant. Some nutrition education discussions were quite short, such as a nutrition educator providing WIC's recommendation to limit juice for children, whereas others were several minutes in length such as discussions about successful strategies for weaning a child from the bottle. At the end of each session, the observer summed the minutes and rounded to the nearest minute.

A total of 37 staff members were observed across the six sites for a total of 90 one-on-one, face-to-face observations and seven group observations. The goal was to observe each nutrition educator at least two times; however, because of scheduling and other challenges, 4 of the 37 staff members were only observed once. **Exhibit 2-5** provides information on the number of observations conducted at each site.

Exhibit 2-5. Observation of Nutrition Education Staff by Site

Number Observed	A	B	C	D	E	F	Total
Number of nutrition education staff at site ^a	6	3	7	11	4	6	37
Number of one-on-one observations	12	11	20	21	12	14	90
Number of group observations ^b	3	0	2	0	0	2	7

^a Number of staff providing nutrition education to participants at the site at the time of the onsite observations.

^b At three of the sites, group education was not observed during onsite visits. Sites B and D reported that the only group education is a monthly breastfeeding group. The POC at Site E reported that participation in group education is waning as more participants choose offsite, Internet education.

2.6.3 Analysis Approach for the Observations

For analysis of observation data, a numeric value was assigned to each rating descriptor for all nutrition education attributes on the form. The analyst abstracted the values for each attribute from the observation forms and recorded them in a Microsoft Excel 2013 file. Data on topics discussed, total minutes, minutes of nutrition education, and characteristics of participants were also abstracted from the forms. Each observation included a code for the site where it occurred. When appropriate, data for types of visits were analyzed independently (e.g., certification or follow-up visits). Observations of nutrition education with participants who were designated as high risk¹⁵ and those who were not designated as high risk were also analyzed independently when appropriate. Details regarding calculations and approach used for key observational data are given below.

- **Percentage of Nutrition Education Time:** To calculate the percentage of time spent on nutrition education per observation, a variable was created by dividing minutes of nutrition education by total time spent with the staff member during the observed visit. The percentage of time spent on nutrition

¹⁵ High-risk status is determined through the nutrition and health assessment process conducted by authorized WIC staff and is based on criteria or guidelines set by the State agency.

education was calculated for each individual observation and then averaged for all observations within the site.

- **Nutrition Education Topics:** Each topic covered during an observation was noted by selecting from a defined list on the observation guide or written on the guide when not included in the list. The analyst calculated the frequency each topic was covered in observations at each site.
- **Nutrition Education Attributes:** To compare attributes of nutrition education, the analyst calculated frequencies using the numeric values assigned to each attribute. For comparison across sites, these numbers were divided by the total number of observations to determine a percentage of observations during which the attribute was observed for each site.

2.7 Data Collection and Analysis Procedures for the Online Nutrition Educator Survey

All staff members who provided nutrition education at each site were asked to complete an online survey. The Nutrition Educator Survey collected information about the experience, education, and training of the staff and about how they provide nutrition education (e.g., educational methods used, primary topics addressed in education, and goal-setting strategies). Survey questions also addressed educators' opinions about effective strategies for supporting participants to make behavioral changes and the challenges associated with motivating participants. Questions related to self-efficacy (e.g., confidence in using skills learned in training sessions) were also included in the survey.

2.7.1 Instrument Development and Testing for the Nutrition Educator Survey

To develop questions for the Nutrition Educator Survey (Appendix C), relevant questions from past surveys on similar topics implemented with WIC staff, including questions from the Phase I Site Survey, were adapted. Additional questions were developed to address specific research questions and interests. The survey was designed to be completed in 20 minutes or less. To pretest the survey questions, three staff members from WIC sites in three different regions completed the survey and participated in a telephone interview to provide feedback. Pretest respondents included a nutritionist, a nutrition paraprofessional, and a site coordinator who all had a role in providing nutrition education to participants. The information gathered through the pretests was used to revise the survey.

2.7.2 Data Collection for the Nutrition Educator Survey

The Nutrition Educator Survey was administered online using the Checkbox Survey Tool, version 5.4.5 from Prezza Technologies Inc. All sites reported having Internet access, eliminating the need for a paper version of the survey. Through the Web link to the survey, respondents were able to print a paper version of the survey, if desired, to review before completing the online survey.

The survey was introduced to eligible staff members during the onsite visits, and each respondent was provided with an information sheet, which provided an explanation of the purpose of the survey, instructions for accessing the survey online, and the name and contact information for a study team member if survey assistance was needed. Staff members not present during the onsite visit received the information via email along with the information sheet either from the study team or the site coordinator, depending on the preference of the site POC. The information sheet included a unique number for each staff respondent to enter when he/she completed the survey to facilitate follow-up with nonresponders as

necessary. Site POCs were asked for their preferences for survey email communications (e.g., survey link, reminders) to their staff. Four of the site POCs requested to have these emails sent to them to forward to their staff members, and two of the site POCs asked for them to be sent directly to staff members. A reminder to complete the survey was sent at 3 weeks, and a second reminder was sent at 5 weeks following the onsite visit for those who had not responded. One hundred percent of the eligible staff nutrition educators in the six sites submitted surveys. **Exhibit 2-6** provides the number of surveys completed by site.

Exhibit 2-6. Nutrition Educator Survey Responses by Site

Survey Response	A	B	C	D	E	F	Total
Number of nutrition educators eligible to complete survey ^a	8	3	10	19	10	10	60
Number of surveys completed	8	3	10	19	10	10	60
Percentage of eligible nutrition educators completing survey	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

^a Eligible nutrition educators include staff members in each site who had a role in providing nutrition education during the time of the onsite observations and Nutrition Educator Survey were conducted. Two clerical staff from Site E who participate in nutrition education for less than 20% of their time did not complete the Nutrition Educator Survey.

2.7.3 Analysis Approach for the Nutrition Educator Survey

Quantitative data from the Nutrition Educator Survey were analyzed using IBM SPSS Statistics 24. To prepare for analysis, survey data were imported into SPSS and responses were checked against expected ranges. All responses fell within the expected ranges. A study team member with knowledge of WIC practices reviewed survey responses entered as text descriptions of “Other” and coded these as one of the response choices when the descriptions entered by the respondent were comparable to a question response option. During analysis, numeric variables were created when they were not generated by the survey software, such as for questions that asked respondents to prioritize frequency of use of nutrition education techniques (e.g., 1 = “least most often,” 2 = “second most often,” 3 = “most often”). Univariate (e.g., single variable descriptive statistics) and bivariate (e.g., tabulations between two variables) frequency distribution tables were used to generate exhibits pertaining to process evaluation research questions for Chapter 3 and Appendix I. Qualitative data from the two open-ended, text response survey questions were analyzed using QSR International NVivo, Version 11 software to identify key themes associated with research questions.

2.8 Focus Groups and Spanish-Language Interviews with Study Participants

Focus groups were conducted with WIC participants who were enrolled in the study to obtain an in-depth understanding of their perception of WIC nutrition education, including their satisfaction with the content, delivery, and frequency of nutrition education. To be eligible to take part in a focus group, study participants had to complete both an initial and interim Participant Survey. For the one site in which 15% of participants spoke Spanish, six one-on-one phone interviews were conducted in Spanish in lieu of a Spanish-language focus group.

2.8.1 Instrument Development and Testing for the Focus Groups and Interviews

A semistructured moderator guide (Appendix D) was developed to conduct the focus groups and to ensure consistency of data collection across groups. The moderator guide was designed for a 90-minute focus group. To pretest the moderator guide, three interviews were conducted with WIC participants in the Southeast Region. Revisions were made to the moderator guide to clarify questions identified as unclear or difficult to understand during the pretest. For the Spanish-language interviews, the final moderator guide (following the pretest) was adapted for one-on-one interviews of approximately 45 to 60 minutes' duration and translated into Spanish (Appendix E).

2.8.2 Recruitment Methods for the Focus Groups and Interviews

Recruitment for focus groups began by mailing a flyer explaining the focus groups to all participants who had completed the initial and interim Participant Surveys. The flyer provided information about the dates, locations, and purpose for the focus groups and included a toll-free phone number and dedicated email address for participants to sign up for a focus group in their area (i.e., vicinity of the WIC site). The flyer also informed participants of a \$50 gift card they would receive for participating in the focus groups. Participants who responded to the flyer were provided with additional information about the focus groups, and those who agreed to participate were scheduled for a group in their area.

As an additional recruitment method, participants who were enrolled in the study but did not respond to the flyer were contacted by phone. These calls yielded approximately 60% more focus group participants. Reminder calls were placed to recruited participants 1 to 2 days before their scheduled group to reiterate the group date, time, and location and confirm their intent to participate.

To recruit participants for the Spanish-language interviews, a list of Participant Survey respondents who reported Spanish as their primary language was used to contact prospective participants. If they agreed to participate, the interview was conducted at the time of the recruitment call or scheduled for another time.

2.8.3 Data Collection for the Focus Groups and Interviews

Two focus groups were conducted with eligible participants in each of the six sites. Focus groups took place near the end of the 12-month evaluation period during June 2016. Each focus group lasted approximately 90 minutes. All focus group attendees signed a consent form when they arrived. Focus groups were recorded using a digital audio recorder and professionally transcribed. A trained interviewer who is a native Spanish speaker conducted the Spanish-language interviews at the end of the study period. Verbal consent was obtained before beginning each interview. The phone interviews were audio recorded, professionally translated, and transcribed. Participants who took part in the focus groups and Spanish-language interviews received a \$50 gift card. **Exhibit 2-7** provides information on the number of participants in each site who took part in the focus groups and the number of participants in each site who took part in the Spanish-language interviews.

Exhibit 2-7. Focus Group Participation ^a and Spanish Language Interviews ^b by Site

Participation	A	B	C	D	E	F	Total
Number of participants recruited for focus groups	20	20	18	20	19	20	117
Number (percentage) of recruited participants attending focus groups	18 (90%)	13 (65%)	10 (55%)	16 (80%)	17 (89%)	16 (80%)	90 (77%)
Number of participants recruited for Spanish-language interviews	—	—	8	—	—	—	8
Number (percentage) of recruited Spanish-language interviews completed	—	—	6 (75%)	—	—	—	6 (75%)

^a Two focus groups were conducted at each site.

^b For one site, Spanish-language interviews were conducted with participants in the study in lieu of a Spanish-language focus group. This site had the highest percentage of Spanish-speaking participants enrolled in the evaluation.

— = not applicable

2.8.4 Analysis Approach for the Focus Groups and Interviews

Transcripts from focus groups and Spanish-language interviews were coded and analyzed using QSR International NVivo, Version 11 software for identification of key themes. An inductive content analysis approach was used (i.e., linking text from the transcripts to codes or themes). A broad top-level coding scheme and nodes (folders to collect references to support themes and subthemes) were developed and applied to each transcript. The analyst then identified and sorted all relevant references from each source document into node folders, which facilitated systematic organization, processing, and summary of information provided by each focus group. Within NVivo, each individual node was identified by site and/or language to facilitate analysis to discern differences across sites and potential themes unique to Spanish-speaking participants who were interviewed. No unique themes were identified from the Spanish-language interviews relative to the themes from participants in focus groups.

2.9 Instrument Development and Testing for the Participant Surveys

The Participant Surveys collected self-reported data on participant outcomes, attitudes, household/respondent characteristics, and information describing the nutrition education received for use in the impact evaluation analyses, including information on number and length of contacts and number of different types of reinforcers and follow-ups. Quantitative data were also collected about participant perceptions of the nutrition education received to augment the description of the six pilot sites for the process evaluation (e.g., the extent to which the participant selected nutrition education topics and set goals). The development of the instruments and the testing procedures to refine the draft instruments are described below.

2.9.1 Instrument Development

The data collection instruments incorporated existing questions with demonstrated psychometric characteristics, when available. Appendix G provides information on the psychometric properties and description of the measures used in the Participant Surveys. The criteria for selecting items for the Participant Surveys included the following: valid and reliable with WIC or other low-income populations,

used in national surveys, used in other WIC studies, or used in other large studies. Also considered were the number of survey items to minimize participant burden. When previous tools/items could not be identified, items were adapted from existing tools or newly created.

There were eight versions of the survey:¹⁶

- Pregnant Women, Initial
- Pregnant Women, Interim
- Postpartum Women, Initial
- Postpartum Women, Interim
- Postpartum Women, Final
- Caregivers with Eligible Child, Initial
- Caregivers with Eligible Child, Interim
- Caregivers with Eligible Child, Final

As shown in **Exhibits 2-8** and **2-9**, the survey that the participant completed at each time period depended on the participant's status at enrollment into the study:

- Pregnant women in their first or second trimester completed the Pregnant, initial version of the survey at enrollment; the Pregnant, interim version of the survey 1 month before their delivery date; and the Postpartum, final version of the survey 6 months postpartum.
- Pregnant women in their third trimester completed the Pregnant, initial version of the survey at enrollment; the Postpartum, interim version of the survey 6 months after enrollment; and the Postpartum, final version of the survey 12 months after enrollment.
- Women who enrolled when they were postpartum completed the Postpartum, initial version of the survey at enrollment; the Postpartum, interim version of the survey 6 months after enrollment; and the Postpartum, final version of the survey 12 months after enrollment.
- Caregivers with an eligible child aged 6 months to 4 years completed the Caregiver/Child, initial version of the survey at enrollment; the Caregiver/Child, interim version of the survey 6 months after enrollment; and the Caregiver/Child, final version of the survey 12 months after enrollment.

¹⁶ There was not a final version of the Pregnant Survey because for the final period women who were pregnant at enrollment completed the final version of the Postpartum Survey.

Exhibit 2-8. Women who were Pregnant or Postpartum at Enrollment: Characteristics and Survey Version by Time Point of Data Collection

Characteristics and Survey Version by Time Point		
Enrollment/Initial	Interim 6 Months after Enrollment ^a	Final 12 Months after Enrollment ^a
Trimester 1 or 2 PREGNANT version	Trimester 3 (~1 month before delivery) PREGNANT version	Postpartum woman BF, receiving WIC Postpartum woman FF, not receiving WIC Infant may or may not be receiving WIC POSTPARTUM version
Trimester 3 PREGNANT version	Infant up to 6 month, woman postpartum BF, receiving WIC Infant up to 6 month, woman postpartum FF, may or may not be receiving WIC POSTPARTUM version	Woman up to 1 year postpartum, may or may not be receiving WIC Child up to 1 year, may or may not be receiving WIC POSTPARTUM version
Up to 6 months postpartum BF POSTPARTUM version	Woman between 6 months and 1 year postpartum BF, receiving WIC Woman between 6 months and 1 year postpartum, may or may not be receiving WIC Infant between 6 months and 1 year, may or may not be receiving WIC POSTPARTUM version	Woman >1 year postpartum, not receiving WIC Child >1 year, may or may not be receiving WIC POSTPARTUM version
Up to 6 months postpartum FF POSTPARTUM version	Woman between 6 months and 1 year postpartum, not receiving WIC Infant between 6 months and 1 year, may or may not be receiving WIC POSTPARTUM version	Woman > 1 year postpartum not receiving WIC Child > 1 year, may or may not be receiving WIC POSTPARTUM version
Infant up to 6 months (mother not receiving WIC, but infant is receiving WIC) POSTPARTUM version	Infant between 6 months and 1 year, may or may not be receiving WIC POSTPARTUM version	Child > 1 year, may or may not be receiving WIC POSTPARTUM version

^a Pregnant women in Trimester 1 or 2 completed the interim survey at ~1 month prior to delivery and the final survey at ~6 months postpartum.

Notes: The first column of the table describes the status of the participant or the infant at enrollment and identifies the survey version (in blue); the second column describes the status of the participant or infant at the interim period and identifies the survey version (in blue); and the third column describes the status of the participant, infant, or child and the identifies the survey version (in blue). BF = breastfeeding, FF = formula feeding

Exhibit 2-9. Mothers and Caregivers of Infant (between 6 months and 1 year) or Child Up to 4 Years Old at Enrollment: Child Age and Survey Version by Time Point

Child Age and Survey Version by Time Point		
Enrollment/Initial	Interim 6 Months after Enrollment	Final 12 Months after Enrollment
Infant between 6 months and 1 year (BF or not) CHILD version with questions on breastfeeding and introduction of solid foods	>1 year, may or may not be receiving WIC CAREGIVER/CHILD version	>1 year, may or may not be receiving WIC CAREGIVER/CHILD version
1–4 years CHILD version	1 year, 6 months–4 years, 6 months, may or may not be receiving WIC CAREGIVER/CHILD version	2 years–5 years, may or may not be receiving WIC CAREGIVER/CHILD version

Notes: The first column of the table describes the status of the participant or the infant at enrollment and identifies the survey version (in blue); the second column describes the status of the participant or infant at the interim period and identifies the survey version (in blue); and the third column describes the status of the participant, infant, or child and the identifies the survey version (in blue). BF = breastfeeding

If a person was eligible for more than one study group at enrollment (e.g., pregnant with one or more children receiving WIC benefits), the electronic screener randomly selected the study group so that the participant completed only one version of the survey. For caregivers of an eligible child, if more than one child received WIC benefits at the time of enrollment, the electronic screener selected the target child using the most recent birthday method. To minimize burden, questions about respondent characteristics that would not change over the evaluation period (e.g., race/ethnicity) were asked only in the initial survey, and selected questions were asked only at the initial and final time points.

Participants who were pregnant or postpartum at enrollment were asked about their own dietary intake, eating behaviors, and physical activity patterns at all three time periods. Mothers or caregivers of children (aged 6 months to 4 years at enrollment) receiving WIC benefits were asked about their child's dietary intake, eating behaviors, and physical activity patterns at all three time periods. For the caregiver-with-eligible-child survey, some questions about maternal behaviors were included (e.g., does the mother/caregiver sit and eat with the child), because maternal modeling is an important predictor of child behavior.

To avoid priming of nutritional information during their appointment, participants were asked to complete the questions on dietary intake, self-efficacy, and readiness to change before their appointment (Part 1 of the initial survey). Following the participant's appointment, the remainder of the survey was completed (Part 2, which included questions on the nutrition education received and demographics). The surveys also included a series of questions to measure participants' exposure to WIC nutrition education for each data collection period (initial, interim, final). This section of the survey began with a question asking about the number of times during the past 6 months in which the participant visited a WIC office and received information on health or healthy eating.¹⁷ If the respondent indicated at least one time, they were asked a series of questions about those visits. These questions asked about the number of visits during the past 6 months by mode, the different types of follow-ups received in between visits, opinions about the information received (e.g., extent to which the information provided was helpful), and exposure to different types of reinforcers (e.g., written brochures or bulletin boards).

For their most recent visit, participants were asked to provide information on the number of minutes of nutrition education received, their perception of how topics were selected, the level of participant and educator interaction, the use of goal setting, the topics discussed (e.g., serving more fruit and vegetables, preparing healthier foods), and whether the participant plans to make a change based on exposure to the topic. This information was collected separately for individual sessions, group sessions, and Internet-based education.

¹⁷ The wording of this question may have prompted those receiving online education or other modes that do not coincide with an in-person visit to answer "none," thus under-reporting the number of nutrition education contacts actually received by participants. Participants who answered "none" were instructed to skip the remaining questions that collected information on the participant's nutrition education experience, including the use of reinforcers and follow-ups, which was problematic for the LCA. Additionally, skip patterns in paper questionnaires can sometimes be problematic for participants. For future evaluations, study designers should not use complex skip patterns if using a paper questionnaire or use electronic data collection (so that skip patterns are not a concern). Also, double-barreled questions should not be used as was done for the pilot (i.e., in the same question asking about receipt of information on health or healthy eating from WIC and visiting a WIC site).

Appendix F provides the final instruments for the Participant Surveys for each of the three enrollment groups and each time period. **Exhibits 2-10a** through **2-10c** show the question topics that were asked at each time period for each version of the survey (pregnant woman, postpartum woman, and caregiver with eligible child).

Exhibit 2-10a. Summary of Survey Questions at Each Time Period: Pregnant Woman Version of Survey ^a

Question/Construct	Initial ^b	Interim
Enjoyment of foods	● (Part 1)	●
Foods ate or drank during past 30 days	● (Part 1)	●
Readiness to change to eat healthy	● (Part 1)	●
Efficacy for breastfeeding/other infant feeding practices	● (Part 1)	●
Efficacy to eat/drink healthy foods or beverages	● (Part 1)	●
Availability of fresh fruit and vegetables	● (Part 2)	
Purchase of WIC foods		●
Food insecurity	● (Part 2)	
Frequency of eating behaviors (e.g., cook homemade dinner)	● (Part 2)	●
Breastfeeding for one month or more	● (Part 2)	
Eating behaviors in a week or day (e.g., number of times eat out)	● (Part 2)	●
Physical and sedentary activity	● (Part 2)	●
Encouragement of friends/family for healthy eating and physical activity	● (Part 2)	
Food acquisition and management (e.g., plan meals)	● (Part 2)	●
Site at which received WIC benefits		●
Who receives WIC benefits		●
Length of time receiving WIC benefits	● (Part 2)	
Number of WIC visits in past 6 months on health/healthy eating, overall and by mode	● (Part 2)	●
Information received on health/healthy eating in between visits (i.e., follow-ups)	● (Part 2)	●
Types of reinforcers received at most recent visit	● (Part 2)	●
Mode for most recent WIC visit on health/healthy eating	● (Part 2)	●
Perceived usefulness of most recent visit	● (Part 2)	●
One-on-one time with WIC staff (length, perceptions, topics, intentions to change behavior)	● (Part 2)	●
Group session at WIC visit (length, perceptions, topics, intentions to change behavior)	● (Part 2)	●
Use of WIC Web site (length, perceptions, topics, intentions to change behavior)	● (Part 2)	●
Use of WIC video/DVD	● (Part 2)	●
Number of individuals in family receiving WIC benefits	● (Part 2)	●
Demographic information ^c	● (Part 2)	
High-risk health conditions	● (Part 2)	
Other assistance received, including food assistance	● (Part 2)	
Use of childcare	● (Part 2)	●
Topics discussed in past 6 months	● (Part 2)	●

^a Pregnant women in their first or second trimester completed the Pregnant version of the survey at enrollment, the Pregnant version of the interim survey 1 month before their delivery date, and the Postpartum version of the final survey 6 months postpartum. Pregnant women in their third trimester completed the Pregnant version of the survey at enrollment and the Postpartum version at the interim (6 months after enrollment) and final time periods (12 months after enrollment). Thus, there was not a Pregnant version of the final survey.

^b When possible, Part 1 of the survey was completed before the participant's appointment and exposure to WIC nutrition education, and Part 2 was completed after the participant's appointment.

^c The initial survey collected information on marital status, race and ethnicity, education, employment, language(s) spoken at home, and household size. Information on gender and age was collected in the screening questionnaire at enrollment. The final survey collected information on marital status, employment, and household size.

Exhibit 2-10b. Summary of Survey Questions at Each Time Period: Postpartum Woman Version of Survey

Question/Construct	Initial ^a	Interim	Final
Enjoyment of foods	● (Part 1)	●	●
Foods ate or drank during past 30 days	● (Part 1)	●	●
Readiness to change to eat healthy	● (Part 1)	●	●
Breastfeeding intentions	● (Part 1)	●	●
Efficacy for breastfeeding/other infant feeding practices	● (Part 1)	●	●
Efficacy to eat/drink healthy foods or beverages	● (Part 1)	●	●
Availability of fresh fruit and vegetables	● (Part 2)		●
Purchase of WIC foods			●
Food insecurity	● (Part 2)		●
Frequency of eating behaviors (e.g., cook homemade dinner)	● (Part 2)	●	●
Infant feeding practices, including breastfeeding	● (Part 2)	●	●
Eating behaviors in a week or day (e.g., number of times eat out)	● (Part 2)	●	●
Physical and sedentary activity	● (Part 2)	●	●
Encouragement of friends/family for healthy eating and physical activity	● (Part 2)		●
Food acquisition and management (e.g., plan meals)	● (Part 2)	●	●
Site at which received WIC benefits		●	●
Who receives WIC benefits		●	●
Length of time receiving WIC benefits	● (Part 2)		
Number of WIC visits in past 6 months on health/healthy eating, overall and by mode	● (Part 2)	●	●
Information received on health/healthy eating in between visits (i.e., follow-ups)	● (Part 2)	●	●
Types of reinforcers received at most recent visit	● (Part 2)	●	●
Mode for most recent WIC visit on health/healthy eating	● (Part 2)	●	●
Perceived usefulness of most recent visit	● (Part 2)	●	●
One-on-one time with WIC staff (length, perceptions, topics, intentions to change behavior)	● (Part 2)	●	●
Group session at WIC visit (length, perceptions, topics, intentions to change behavior)	● (Part 2)	●	●
Use of WIC Web site (length, perceptions, topics, intentions to change behavior)	● (Part 2)	●	●
Use of WIC video/DVD	● (Part 2)	●	●
Number of individuals in family receiving WIC benefits	● (Part 2)	●	●
Demographic information ^b	● (Part 2)		●
High-risk health conditions	● (Part 2)		●
Other assistance received, including food assistance	● (Part 2)		●
Use of childcare	● (Part 2)	●	●
Currently pregnant		●	●
Topics discussed in past 6 months	● (Part 2)	●	●

^a When possible, Part 1 of the survey was completed before the participant's appointment and exposure to WIC nutrition education, and Part 2 was completed after the participant's appointment.

^b The initial survey collected information on marital status, race and ethnicity, education, employment, language(s) spoken at home, and household size. Information on gender and age was collected in the screening questionnaire at enrollment. The final survey collected information on marital status, employment, and household size.

Exhibit 2-10c. Summary of Survey Questions at Each Time Period: Caregiver-with-Eligible-Child Version of Survey

Question/Construct	Initial ^a	Interim	Final
Breastfeeding/infant feeding practices (caregiver)	● (Part 1)	●	
Enjoyment of foods (child)	● (Part 1)	●	●
Foods ate or drank during past 30 days (child)	● (Part 1)	●	●
Readiness to change to serve child healthy foods (caregiver)	● (Part 1)	●	●
Efficacy to serve healthy foods or beverages (caregiver)	● (Part 1)	●	●
Availability of fresh fruit and vegetables	● (Part 2)		●
Purchase of WIC foods			●
Food insecurity	● (Part 2)		●
Eating behavior with meals (child)	● (Part 2)	●	●
Child feeding behavior (caregiver)	● (Part 2)	●	●
Child feeding practices/style (caregiver)	● (Part 2)		●
Eating and physical/sedentary activity behaviors in a week or day (child)	● (Part 2)	●	●
Physical and sedentary activity (caregiver)	● (Part 2)	●	●
Encouragement of friends/family for healthy eating and physical activity (caregiver)	● (Part 2)		●
Food acquisition and management (caregiver)	● (Part 2)	●	●
Site at which received WIC benefits		●	●
Who receives WIC benefits		●	●
Length of time receiving WIC benefits (caregiver and/or child)	● (Part 2)		
Number of WIC visits in past 6 months on health/healthy eating, overall and by mode (caregiver)	● (Part 2)	●	●
Information received on health/healthy eating in between visits (i.e., follow-ups) (caregiver)	● (Part 2)	●	●
Types of reinforcers received at most recent visit (caregiver)	● (Part 2)	●	●
Most recent WIC visit on health/healthy eating (caregiver)	● (Part 2)	●	●
Perceived usefulness of most recent visit	● (Part 2)	●	●
One-on-one time with WIC staff (caregiver) (length, perceptions, topics, intentions to change behavior)	● (Part 2)	●	●
Group session at WIC visit (caregiver) (length, perceptions, topics, intentions to change behavior)	● (Part 2)	●	●
Use of WIC Web site (caregiver) (length, perceptions, topics, intentions to change behavior)	● (Part 2)	●	●
Use of WIC video/DVD (caregiver)	● (Part 2)	●	●
Number of individuals in family receiving WIC benefits	● (Part 2)	●	●
Demographic information (caregiver)	● (Part 2)		● ^b
High-risk health conditions (child)	● (Part 2)		●
Other assistance received, including food assistance	● (Part 2)		●
Use of childcare	● (Part 2)	●	●
Topics discussed in past 6 months	● (Part 2)	●	●

^a When possible, Part 1 of the survey was completed before the participant's appointment and exposure to WIC nutrition education, and Part 2 was completed after the participant's appointment.

^b The initial survey collected information on marital status, race and ethnicity, education, employment, language(s) spoken at home, and household size. Information on gender and age of respondent and the target child was collected in the screening questionnaire at enrollment. The final survey collected information on marital status, employment, and household size.

2.9.2 Instrument Testing

Nine one-on-one cognitive interviews were conducted with WIC participants in two locations to test the instruments for the Participant Surveys. Changes made based on the pretest included adding more descriptive text, eliminating questions and response options that were found to be duplicative, and reformatting some questions to increase respondent understanding. Based on the pretest interviews, the estimated burden for each survey was 20 minutes for English and 30 minutes for the Spanish-translated survey (burden was the same for each time period and enrollment group).

2.10 Data Collection Methods for the Participant Surveys

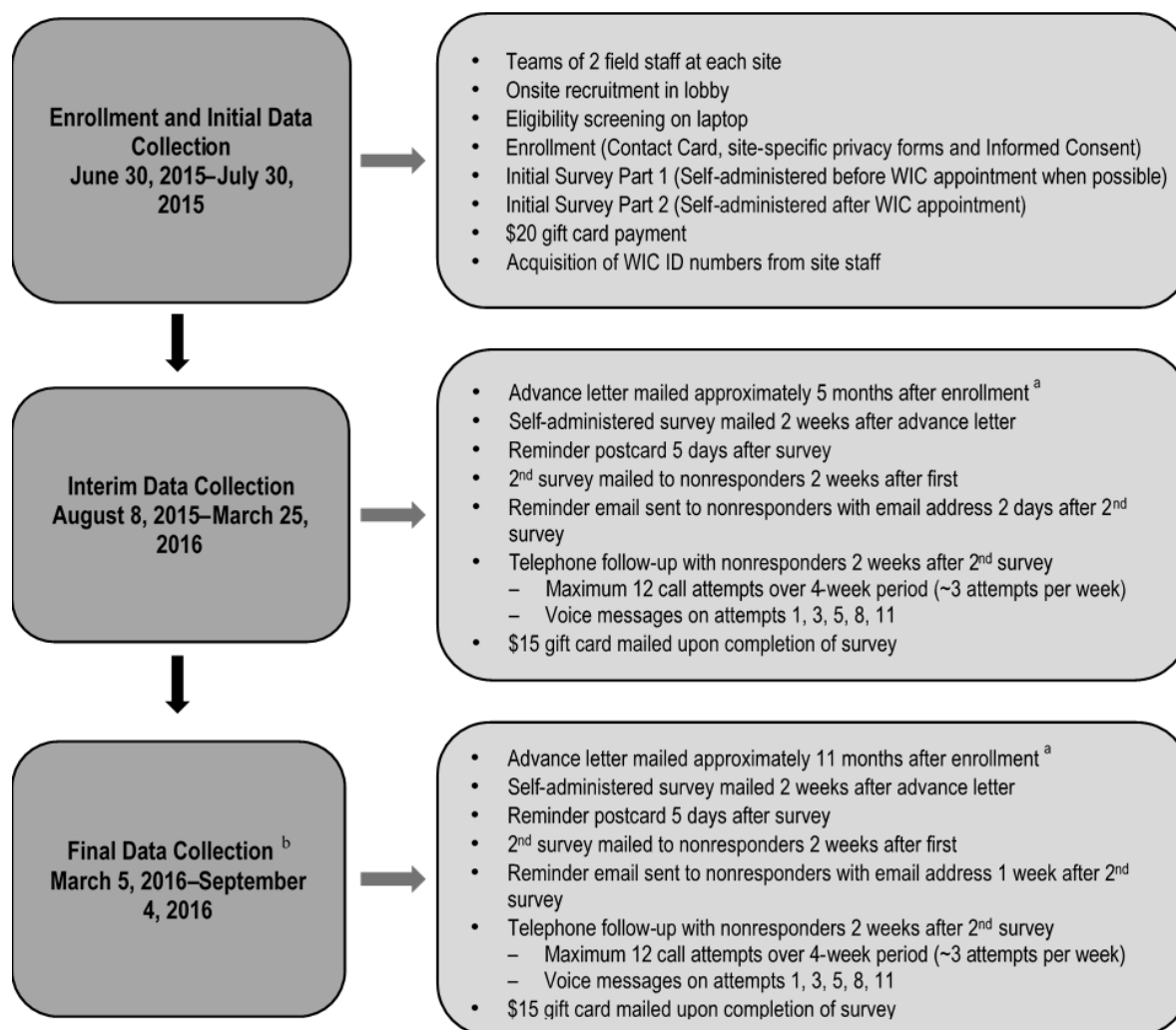
This section provides an overview of the data collection methods for the Participant Surveys; describes the study recruitment and enrollment procedures; and describes the data collection procedures for the initial, interim, and final periods.¹⁸ Information on the cooperation rate for each enrollment group at each time period is provided. Appendix H provides more detailed information on the data collection procedures.

2.10.1 Overview

Exhibit 2-11 summarizes the data collection flow and procedures for the Participant Surveys. Study participants were recruited from the six WIC sites selected for the pilot. Working closely with the WIC site, field representatives (employed by the study contractor) stationed in the waiting room of each site facilitated informed consent and collection of contact information and completion of the initial survey using a self-administered questionnaire during that visit. Eligible enrolled study participants completed an interim survey and a final survey using a mailed questionnaire with telephone follow-up of nonrespondents. Participation in the interim survey was not a consideration for eligibility for the final survey. Gift cards were provided as a thank you for participation: \$20 at enrollment/initial, \$15 at interim, and \$15 at final; thus, participants received \$50 if they completed all three surveys.

The expected cooperation rate for the initial survey was 80% (i.e., the percentage of eligible women approached to participate in the study and who agreed to participate in the study). The expected response or cooperation rate (considers attrition from WIC and the evaluation study) between the initial and the interim surveys was 80%, and the expected cooperation rate between the initial and the final surveys was 75%. Thus, the target number of completed surveys was 800 at enrollment (initial survey), 640 at interim, and 600 for the final survey. The actual number of completed surveys was 842 for the initial survey (84% cooperation rate), 550 for the interim survey (67%), and 453 for the final survey (53%). The number of initial surveys exceeded the target; however, cooperation for the interim and final surveys was lower than anticipated such that these targets were not met.

¹⁸ All protocols were reviewed and approved by RTI's IRB. In addition, some sites also required their local IRB approval. RTI and its IRB worked with the local IRBs to obtain the needed approvals.

Exhibit 2-11. Flow of Data Collection for the Participant Surveys

^a Data collection was conducted on a flow basis so that the interim data collection started 5 months after the date the individual was enrolled into the study, starting with the mailing of the advance letter and the mailing of the first questionnaire 2 weeks later so that the survey was completed approximately 6 months after enrollment. Thus, participants who enrolled on the first day of data collection and participants who enrolled on the last day of data collection all had approximately 5 months in between the date of enrollment and the date the advance letter was mailed. A similar procedure was followed for the final data collection, with the advance letter mailed approximately 11 months after enrollment. Women who enrolled in their first or second trimester ($n = 95$) received the interim and final surveys relative to their delivery date (which was provided as part of the enrollment process). Thus, these women were scheduled for the interim data collection 1 month before their delivery date (completed the Pregnant Survey) and were scheduled for the final data collection 6 months postpartum (completed the Postpartum Survey).

^b Participation in the interim survey was not a consideration for eligibility for the final survey.

Exhibit 2-12 provides information on the number of completed surveys and cooperation rates by site and enrollment group. Across all waves of data collection and for both the mail and telephone follow-ups, Site F had higher cooperation rates than the other sites, and lower cooperation rates were consistently observed for Sites C and E. It is not known why cooperation varied by site. Additionally, cooperation varied by the three enrollment groups and wave of data collection, with the caregiver-with-child group having the highest overall cooperation rate compared with the pregnant-at-enrollment and the postpartum-at-enrollment groups. The postpartum-at-enrollment group had the lowest cooperation rate for the interim survey, and the pregnant-at-enrollment group had the lowest cooperation rate for the final survey (these women were about 6 months postpartum at the time of the final survey). These findings suggest that women who recently had a baby may have lower cooperation rates than other women. Study planners should consider the differences in cooperation rates when designing future evaluations, in particular, making assumptions about study retention so that a sufficient number of participants are enrolled into the study.

Section 4.3.2 describes the attrition analysis and the effect attrition (i.e., loss to follow-up) may have on the generalizability of the study findings. The extent to which attrition from the study was associated with exit from WIC or reasons related to survey nonresponse is not known. The cooperation rate may have been lower than anticipated because the survey was too long (expected 20 minutes for the English version based on pretests but could take up to 37 minutes [includes surveys conducted in Spanish] if completed by phone), participants did not find it convenient to complete the survey, or a working phone number or correct address was not available. For future evaluations, study planners should prioritize the outcome measures to minimize participant burden, use electronic data collection methods that were not readily available when the study was designed (e.g., texting to remind participants to complete the survey and completion of a Web-based survey on a smartphone), and assess whether the incentive structure should be modified to encourage response. Additional lessons learned and their implications for future evaluations are discussed in Section 2.12 and summarized in Chapter 6.

2.10.2 Study Recruitment and Enrollment

Study recruitment, enrollment, and completion of the initial survey took place from June 30 through July 30, 2015. Each of the six sites was consulted with respect to schedule and coordination of recruitment and data collection. The aim was to meet the needs of each site and to understand the need for and develop alternative, mutually acceptable recruitment approaches if sites expressed concern about the planned approach.

Prior to onsite recruitment, sites were provided study “advertisement” materials to inform participants about the upcoming study. Materials included a flyer and suggested script to be used over a 4-week period starting 3 months before data collection began. Staff were asked to post the flyers about the study and provide WIC participants with a study fact sheet. Those interested in participating were asked to arrive 20 minutes early for their next appointment. No information was collected to indicate how many participants saw the signs and arrived early for their next appointment to enroll in the research; thus, data are not available to assess whether these activities were effective.

Exhibit 2-12. Cooperation Rates for Participant Surveys by Site and Enrollment Group

Site	Enrollment Group	Completed INITIAL	Total Completes INTERIM	Cooperation Rate ^a INTERIM	Total Completes FINAL	Cooperation Rate ^a FINAL
A	Pregnant	25	17	68.0%	12	48.0%
	Postpartum	42	25	59.5%	21	50.0%
	Caregiver with child	78	45	57.7%	42	53.8%
	A Totals	145	87	60.0%	75	51.7%
B	Pregnant	28	17	60.7%	8	28.6%
	Postpartum	33	20	60.6%	16	48.5%
	Caregiver with child	75	54	72.0%	50	66.7%
	B Totals	136	91	66.9%	74	54.4%
C	Pregnant	31	19	61.3%	11	35.5%
	Postpartum	27	18	66.7%	14	51.9%
	Caregiver with child	83	54	65.1%	43	51.8%
	C Totals	141	91	64.5%	68	48.2%
D	Pregnant	19	14	73.7%	9	47.4%
	Postpartum	20	9	45.0%	9	45.0%
	Caregiver with child	96	68	70.8%	54	56.2%
	D Totals	135	91	67.4%	72	53.3%
E	Pregnant	25	14	56.0%	14	56.0%
	Postpartum	40	25	62.5%	17	42.5%
	Caregiver with child	75	42	56.0%	36	48.0%
	E Totals	140	81	57.9%	67	47.9%
F	Pregnant	26	21	80.8%	15	57.7%
	Postpartum	20	13	65.0%	12	60.0%
	Caregiver with child	99	75	75.8%	70	70.7%
	F Totals	145	109	75.2%	97	66.9%
Pregnant Total		154	102	66.2%	69	44.8%
Postpartum Total		182	110	60.4%	89	48.9%
Caregiver with Child Total		506	338	66.8%	295	58.3%
Grand Total		842	550	65.3%	453	53.8%

^a Cooperation rate = Total completes/Completed initial

Study recruitment was designed to minimize impact on normal site operations and the delivery of uninterrupted WIC services. As expected, program operations varied by site (e.g., how appointments are scheduled), and study procedures were customized to accommodate each site. Above all, recruiting procedures were designed to reflect the constraint that study enrollment and survey administration had to cease when the participant was called to her appointment. The remainder of this section describes the recruiting and enrollment protocol and provides a step-by-step description of the procedures for study enrollment.

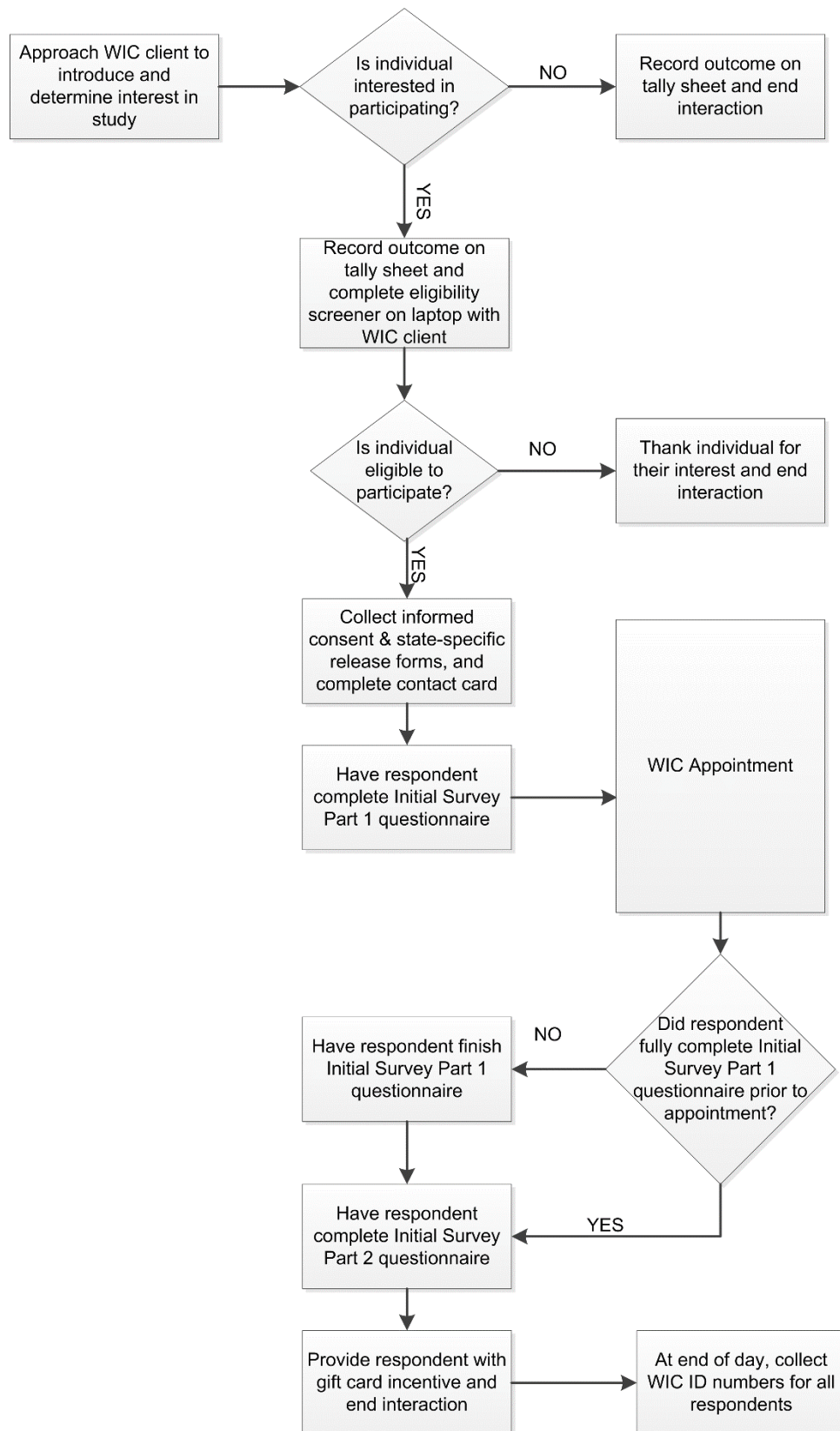
A team of two trained and certified field representatives was stationed in the lobby or reception area of each site, including a bilingual field representative for sites with a high percentage of Hispanic women. The length of the data collection period was expected to be 4 to 6 weeks; however, because of the higher than anticipated eligibility and cooperation rates, enrollment activities were completed at most sites in about 2 to 3 weeks.

Field representatives were trained to be respectful of the WIC site's needs when talking to prospective participants. Depending on the preferences of the WIC site, field representatives either approached WIC clients after they signed in for their appointment or waited until the receptionist directed individuals to the field representative upon check-in. Field representatives explained the study and its purpose using a script and gave a participant fact sheet to potential participants.

Exhibit 2-13 illustrates the flow of the recruitment and enrollment activities at the site. Individuals interested in participating in the study were asked to complete a brief eligibility screener that was administered in a private area using a laptop. Those who were deemed eligible to participate were invited to complete the remaining steps for study enrollment and, ultimately, the initial survey. During the screening process, eligible individuals were assigned to one of the three study groups based on their status at that time—pregnant, postpartum, or caregiver of an eligible child.

Informed consent was obtained before asking the participant to complete the initial survey. The field representative reviewed the consent form with participants and allowed time for any questions regarding the study before having them sign and date the informed consent form. Study participants were assured that their responses to the survey would be kept private and would not be shared with the WIC staff, and that their decision on whether to participate would not affect their WIC eligibility or level of benefits. Once consent was obtained, field representatives asked participants to provide contact information using the Contact Card, including the name and phone number of a friend or relative who would know how to reach them should the study team lose contact over the course of the follow-up efforts.

Exhibit 2-13. Flow of Recruitment and Enrollment Activities



Cooperation for Study Enrollment

Most WIC clients who were approached in the site's waiting area were interested and eager to participate. Based on feedback from field representatives, the \$20 gift card was a strong motivator for enrolling into the study and completing the initial survey, and data collectors did not experience much difficulty in obtaining cooperation. Screening completion rates varied depending on the number of appointments scheduled and how many data collection staff were available onsite to conduct enrollment activities (see **Exhibit 2-14**). On average, 84% of those who were approached agreed to be screened for the study, which exceeded the target rate of 80%. The screening completion rate was highest at Site C (91%). The rate was lowest at Site D (80%) because enrollment and survey activities could only be conducted after the WIC appointment as a result of the site's same-day open-access scheduling system,¹⁹ thereby requiring participants to stay an additional 20 to 25 minutes after their appointment concluded to complete the study activities.

Exhibit 2-14. Screening Cooperation Rates and Eligibility Outcomes by Site

Approached for Screening	A	B	C	D	E	F	Total
Agreed to be screened	168	153	148	145	154	150	918
Refused to be screened	36	30	15	36	30	24	171
Total	204	183	163	181	184	174	1,089
Cooperation Rate: Agreed/Total	82.4%	83.6%	90.8%	80.1%	83.7%	86.2%	84.3%

Of those who agreed to be screened (n = 918), 878 were eligible, 27 were ineligible, 7 refused to complete the screener, and status is unknown for the remaining 6 people. For the 27 ineligibles, 12 were ineligible because of their age (under age 18), 11 were not receiving WIC benefits, and 4 provided care for an eligible WIC child but were not the person who would bring the child to WIC visits for the next 12 months.

2.10.3 Initial Data Collection

Study participants who completed the survey onsite did so using a self-administered paper-and-pencil questionnaire but had the option of field representatives administering the questionnaire, if preferred. A small number of participants (n = 13) opted to take Part 2 of the questionnaire with them and return it to the site or by mail if they were unable to stay and complete it. Reminder phone calls were made to these participants with the option to complete the survey by phone (no participants requested or completed the survey during the reminder calls). Three of the 13 participants (23%) completed and returned Part 2 by mail. Because few participants chose to take the survey home to complete it and most who did so did not return it, it may not be cost-effective to offer this option in future evaluations given the resources required to follow up with these participants.

¹⁹ Same-day scheduling is a type of open-access schedule in which the intent is to not schedule appointments far in advance of when the WIC participant needs to come into the WIC office. With same-day scheduling, the participant calls and makes an appointment the same day the appointment is needed. With this approach, participants are told to call for an appointment when their benefits are about to expire.

As shown in **Exhibit 2-15**, the overall survey completion rate for completing both Parts 1 and 2 of the survey was 96% (842/878). As previously noted, field representatives recorded the stopping point of the interview process at the time the participant was called for her WIC appointment. The results were mixed; in 51% of cases, data collectors were able to administer the first part of the survey before the participant's appointment. Appendix H includes more detail about the timing of stopping points at each site.

Exhibit 2-15. Status Report for Initial Survey by Site

Status	A	B	C	D	E	F	Total
<i>Completed Full Survey (Parts 1 and 2) ^a</i>							
Pregnant	25	28	31	19	25	26	154
Postpartum	42	33	27	20	40	20	182
Caregiver with child	78	75	83	96	75	99	506
Total Completed Initial Surveys	145	136	141	135	140	145	842
<i>Did Not Complete Full Survey (Nonresponse)</i>							
Completed Part 1 but did not complete Part 2	5	0	2	3	0	0	10
Invalid cases because the data collector made an error when entering the data for these cases	1	4	2	4	1	0	12
Partial cases not considered completes	2	0	1	0	2	1	6
Refused to complete survey	0	2	1	1	4	0	8
Total Nonresponse Initial Surveys	8	6	6	8	7	1	36
Grand Total	153	142	147	143	147	146	878
Completion Rate: Completed Parts 1 and 2/Total	94.8%	95.8%	95.9%	94.4%	95.2%	99.3%	95.9%

^a Includes three participants who completed Part 2 of the survey at home and returned it by mail.

The total estimated burden for study enrollment and completing the initial survey was 30 minutes (for English-speaking respondents). Although records were not kept to accurately measure the actual time, based on debriefings with field representatives, the estimated actual burden was 40 minutes.

Generally, the procedures for recruitment, enrollment, and data collection for the initial survey worked well. A number of valuable lessons were learned with respect to the materials, procedures, and instrument for designing future evaluations, for example, spending upfront time to work with the sites to customize the enrollment and recruitment procedures is critical and should be replicated. The pilot study also identified procedures to modify; Section 2.12 presents and discusses lessons learned and recommendations for future evaluations.

2.10.4 Interim Data Collection

Data collection was conducted on a rolling basis and scheduled so that the interim survey was completed about 6 months after study enrollment, with the exception of the early pregnancy group (i.e., enrolled in first or second trimester), for whom it was conducted 1 month before their delivery date. The interim data collection spanned approximately 7 months, with the 95 cases from the early pregnancy group (i.e., enrolled in first or second trimester) receiving the advance letter for the interim survey from August to

December 2015. The majority of data collection for the remaining sample occurred between December 2015 and March 2016.

Procedures for the interim and final surveys were based on best practices for mail and mixed-mode surveys, as recommended by Dillman, Smyth, and Christian (2008). Multiple contacts were made for the interim survey using various modes to maximize retention in the study and survey response. “Batch” tracing, a process whereby an electronic file of all participants’ address and phone number information is updated using the USPS National Change of Address file and other databases, was done before sending the advance letter. Despite the batch tracing, at least 6% of the interim surveys were undeliverable.

The procedures for the interim survey were previously summarized in Exhibit 2-9. Throughout the data collection period for the interim and final surveys, a toll-free helpline was operated and a project email address was available so participants had options for providing updated contact information, requesting assistance completing the survey, or asking any other questions. About 25 calls were made to the helpline and 35 emails received during the data collection period.

Participants were contacted by phone if the completed survey was not received by the target completion date.²⁰ Interactive tracing efforts were conducted in an attempt to contact sample members who were unlocatable (i.e., those who were nonrespondents to the mailed survey and for whom a valid phone number was not available to reach them during computer-assisted telephone interviewing [CATI] call attempts). Contacting the WIC office to obtain updated contact information was not part of the study procedures.

Of the 840 eligible sample members,²¹ 550 completed the interim survey. The overall cooperation rate was 65% and varied by site (58 to 75%) and by enrollment group (60 to 67%), short of the target for an 80% cooperation rate. Of the 550 completed surveys, 457 (83%) were completed by mail and 93 (17%) were completed by telephone. Exhibit H-5 in Appendix H provides an overview of the final outcome of interim cases by data collection mode (mail versus CATI) within each site and enrollment group and the cooperation rates. Most of the surveys were mailed during the Christmas holiday season when many people are busy, which may have contributed to the lower than anticipated cooperation rate. Section 2.12 offers suggestions to improve cooperation rates for future evaluation studies.

2.10.5 Final Data Collection

Final data collection spanned approximately 6 months, with a small number of cases from the early pregnancy group receiving the advance letter for the final survey from March through June 2016 (these women were surveyed approximately 6 months postpartum). The majority of data collection occurred for the remaining sample June through August 2016 (with a few cases extending into early September 2016) so that these participants completed the final survey approximately 12 months after study enrollment.

²⁰ Target completion dates were set based on the protocol schedule for each enrollment group: women who were pregnant and in their first or second trimester at initial had a target completion date of 1 month before their expected due date, and remaining sample members had a target completion date of 6 months after initial.

²¹ To be eligible for the interim survey, sample members had to provide either a mailing address or a telephone number during enrollment. Of the 842 respondents who enrolled and completed the initial survey, two respondents did not provide contact information, so 840 cases were eligible for the interim survey.

Contacting and data collection procedures for the final survey were essentially the same as for the interim survey.

As noted previously, participation in the interim survey was not a consideration for eligibility for the final survey. Therefore, the same 840 cases (out of the total of 842 initial respondents) were eligible for the final survey. Of the 840 sample members eligible for the final survey, 453 completed the survey. Of these, 81% of the surveys (n = 365) were completed by mail and 19% (n = 88) were completed by telephone. Exhibit H-9 in Appendix H provides an overview of the outcome of final cases by data collection mode (mail versus CATI) within each site and enrollment group and the cooperation rates.

The overall cooperation rate for the final survey was 54%, short of the target of 75%, and varied by site, ranging from 48 to 67%. The cooperation rate for the caregiver-with-child group was the highest (58%) compared with the cooperation rates for the pregnant (45%) and postpartum (49%) enrollment groups.

Data are not readily available to discern, of the 389 nonrespondents for the final survey, how many of these individuals stopped receiving WIC benefits during the study period, how many never received a mail survey or phone call because they had moved or changed phone numbers, and how many of these individuals received the survey but chose to not complete it for other reasons (e.g., not interested, perceived as too burdensome). At least 5% of the final surveys were undeliverable. Based on responses to a question asked in the final survey, at least 40 of the 842 participants stopped receiving WIC benefits during the study period; this information is not available for participants who did not complete the survey.²²

Exhibit 2-16 provides a summary of the number of participants by wave of data collection and shows the number and percentage of participants who completed all three surveys.

Exhibit 2-16. Summary of Number of Participants by Wave of Data Collection

Status	Pregnant at Enrollment	Postpartum at Enrollment	Caregiver with Eligible Child	All Participants
Completed initial survey	154	182	506	842
Completed initial and interim survey	102	110	337 ^a	549
Completed initial and final survey, may or may not have completed interim survey (% of participants for initial survey)	69 (44.8%)	89 (48.9%)	295 (58.3%)	453 (53.8%)
Completed initial, interim, and final surveys (% of participants for initial survey)	61 (39.6%)	76 (41.8%)	251 (49.6%)	388 (46.1%)

^a When preparing the analysis dataset, it was discovered that one participant completed the interim survey twice, so the data associated with the second survey response were not used in the analysis.

²² Of these 40, 5 were in the pregnant woman enrollment group, 8 in the postpartum woman enrollment group, and 27 in the caregiver with eligible child enrollment group. As described in Section 4, participants who were no longer receiving WIC benefits (the mother or her child) were excluded from the impact evaluation analyses.

2.11 Administrative Data Collection

Administrative data were collected to compare with self-reported information from the Participant Surveys on number of nutrition education contacts and whether participants were considered to be high risk. The following data were requested: (1) the date of each WIC visit between January 1, 2015, and August 30, 2016; (2) whether the participant received nutrition education at the visit; and (3) whether the participant was high risk or had nutrition risks requiring special attention during the study period (yes/no indicator, did not specify the type of risk).

To minimize burden on the sites, these data were requested for a sample of study participants. Data were requested from the six sites for a randomly selected subset of 35 participants in the three enrollment groups: pregnant women ($n = 5$), postpartum women ($n = 5$), and caregivers of an eligible child ($n = 25$). The 35 participants for each site were selected by stratified random sampling.

Exhibit 2-17 provides a summary of the time spent by each site preparing the administrative data and the response time, measured by the number of calendar days from the date of the initial request to the date when the data were received. The average amount of time spent preparing the requested data was 3.5 hours (one site was unable to provide information on estimated burden). The OMB package indicated that it would take sites an average of two respondents, 1.4 hours each, to provide the data for a total burden of 2.8 hours. Thus, the actual burden estimate of 3.5 hours was slightly higher. It is not known how the burden would change if the number of cases for which data were requested increased. The six sites did not express any concerns about the request, and all sites provided their data within the requested time period.

Exhibit 2-17. Administrative Data Request Preparation and Response Time

Site	Time Spent Preparing Data	Response Time (from date of request to receipt of data)
A	8 hours ^a	3 days
B	1.5 hours	6 days
C	n/a ^b	28 days
D	4 hours	31 days
E	2 hours	9 days
F	2 hours	10 days
Average (for five sites)	3.5 hours	—

^a The site had to manually look up some of the data (instead of electronically); thus, it took this site relatively longer to prepare the data compared with the other sites.

^b Request was sent to State Information Technology department; thus, the amount of time to prepare the administrative data is unknown.

Two of the six sites (Sites C and B) did not indicate whether nutrition education was received at each visit but instead indicated nutrition education was received for all of the participant's visits during the evaluation period, which was considered when comparing the administrative data with the Participant Survey responses. All six sites provided information on whether the participants were considered high risk.

Appendix L presents the results of the analysis comparing the number of nutrition education contacts by risk status recorded in the administrative data with self-reported information from the Participant Surveys. The results of this analysis suggest that there were inconsistencies between the two data sources. This analysis also provides a comparison of the high-risk status of the participant as noted by the administrative data versus self-reported information from the Participant Survey on conditions that may make a person high risk.

2.12 Lessons Learned from the Participant Surveys and Implications for Future Evaluations

This section describes the experiences conducting the Participant Surveys, identifies lessons learned, and offers recommendations for study planners to consider when designing future evaluations of WIC nutrition education. Section 3.11 discusses the experiences conducting the site interviews and surveys, onsite observations, and participant focus groups and interviews and recommendations for future evaluations following the presentation of the results of the data collection. Additional information on lessons learned and recommendations for future evaluations of WIC nutrition education is also provided in the report's conclusion (Chapter 6).

Secure buy-in from WIC staff for study enrollment. Securing buy-in from WIC staff was extremely helpful in facilitating the enrollment effort and increasing efficiency. WIC staff are very busy, and their involvement and contributions to the study were critical for helping to ensure the success of the study. Upfront planning and logistic calls and visits with WIC site staff were extremely useful in helping data collectors better strategize for effective and efficient data collection.

Modify eligibility screener. During data collection, several issues were encountered regarding the electronic eligibility screener, including the need to establish an approach for selecting the target child when the mother has twins of the same gender and handling foster parents and stepparents consistently.

Consider whether it is necessary to split the initial survey into two parts. Analyses conducted for a limited number of outcomes suggest that completing Part 1 of the survey after the participant's appointment did not appear to influence the initial value (see Section 4.7). Given the increased logistical challenges and the fact that in some sites (e.g., sites that conduct same-day scheduling) it may not be feasible, planners for future evaluation may want to consider whether it is necessary to split the initial survey into two parts (before and after the participant's appointment).

Do not offer the option to complete Part 2 of the initial survey offsite. The option to take Part 2 of the initial survey home to complete was not effective. Only 13 respondents chose this option, and of these, only 3 returned the completed questionnaire. Eliminating this option will simplify the logistics of survey administration and reduce the cost of data collection.

Use electronic data collection. A self-administered computerized survey is likely to improve data quality and increase the survey cooperation rate relative to paper questionnaires or phone interviews. About three-quarters of Americans (77%) now own a smartphone, with ownership among lower-income Americans and those aged 50 or older increasing between 2015 and 2016, according to a Pew Research Center survey (Smith, 2017). About 64% of Americans in households earning less than \$30,000 per year own a smartphone. Thus, many WIC participants are likely to have a smartphone.

The use of electronic data collection would improve data quality through the use of programmatic logic (to ensure skip patterns are followed correctly) and range and error checks (so responses are limited to valid response options). For the initial survey, participants could self-administer the questionnaire using a tablet or laptop. For the follow-up surveys, participants could complete the surveys using Web-based data collection, for example, by sending participants an email or text message with a URL to the survey to complete online (optimized for use on smartphone) or providing an application (app) that can be accessed on a smartphone or other electronic device. Completing the survey on a smartphone or other device also enhances the convenience of completing the survey, thus encouraging response. A Web-based version of the survey would also be less burdensome than a telephone survey because it would take less time to complete as a self-administered survey. Text messages may be useful for reminding participants to complete the follow-up surveys in a timely manner.

Additionally, electronic data collection could be used for real-time data collection in which the participant provides information on their nutrition education experiences immediately following their appointment, thus improving participant recall and data quality. This data collection could take place at the site (using an electronic device at the site) or remotely (using the participant's device) at specified time points during the evaluation period.

Consider an alternative incentive structure. For the pilot study, participants received a \$20 gift card for completing the initial survey, a \$15 gift card for the interim survey, and a \$15 gift card for the final survey. Participants were very pleased with the \$20 gift card for completing the initial survey, and all data collectors reported that they felt this amount was sufficient to encourage response and an appropriate amount relative to the burden of participation.

For future evaluations of WIC nutrition education, an alternative incentive structure (e.g., offering the same or higher amount at follow-up) might help increase the cooperation rate for the interim and final surveys. Laurie and Lynn (2008) explored the use of respondent incentives on longitudinal surveys and concluded that the effects of changing the incentive amount or type of incentive (e.g., cash versus lottery) over time are unknown; however, their review did not focus on low-income populations. Thus, more research is needed to determine the most effective approach for using incentives to maximize the response rate for longitudinal surveys.

Offering a higher incentive for completing the survey by a specified due date and a slightly lower incentive for completing after that date (i.e., participants receive a bonus for completing the survey "early") is an option to consider. For the pilot, study participants may have been very responsive to the study enrollment and initial survey because they received the gift card "on the spot"; thus, offering a Web survey option and an electronic gift card (instead of waiting for the gift card to come in the mail) may appeal to people's immediate gratification and help increase the cooperation rate.

Modify procedures to address attrition from WIC and from the evaluation study. WIC participants are a fairly mobile population; thus, study planners for future evaluations may want to include procedures to work with the sites to obtain updated contact information for participants, although this would increase the burden on sites. For the pilot, several steps were taken to ensure that the most current sample contact information was available for the interim and final surveys and should be replicated for future

evaluations. Calls were made to an alternate contact, if provided, to obtain updated contact information. Batch tracing was also conducted with at least 10% of those participants with an updated address at final also having an updated (different) address at interim.

Reduce respondent burden for the interim survey. For future evaluations, it may not be necessary to collect data on outcomes at an interim time period, thus reducing respondent burden. Instead of a single interim data collection, real-time data collection at the sites or through the use of an app on a smartphone may provide better information. This data collection could be focused on collecting information on exposure and other features of the nutrition education received (e.g., content, perceived usefulness of the information received). With this approach, participants would only provide detailed information on outcomes at two time periods (initial and final).

Other considerations. The study's Advisory Panel offered several suggestions for enhancing participant retention and cooperation rates. They suggested conceptualizing participants as partners, whereby they give and receive feedback, an idea that might be very appealing to some people and thus may motivate response. For example, the initial and follow-up surveys could be designed to collect information on customer satisfaction with WIC, similar to some of the questions included in the participant focus groups.

3. Characterization of WIC Nutrition Education in the Six Pilot Sites

This chapter integrates data collected from staff at the six pilot sites through interviews and a survey, observations of nutrition education, and surveys and focus groups/interviews with study participants to characterize the delivery of nutrition education in the six pilot sites and address the study's research questions (listed in Exhibit 1-3). As described in Section 2.4, the six sites were purposively selected to provide diversity in terms of geography and caseload size and to include at least one rural site and one site that has Spanish-speaking participants. Additionally, sites were selected that varied in characteristics that may influence the impact of WIC nutrition education on participant behaviors such as mode, number and length of contacts, and use of Value Enhanced Nutrition Assessment (VENA) or participant-centered practices. Two sites were selected that rated high for most of these characteristics, two sites were selected that rated medium for most of these characteristics, and two sites were selected that rated low for most of these characteristics.

This chapter provides a rich description of the six sites using data from multiple respondent types and from observations of nutrition education delivery, thereby providing perspectives beyond the Phase I Site Surveys that were completed by one or two respondents per site. It is important to note that the information presented in this chapter is not representative of all WIC sites or of all models for delivering nutrition education, and it cannot be generalized to all WIC sites. For context, data from the Phase I Site Survey (USDA, FNS, 2015), a nationally representative survey, are provided in some exhibits.

Chapter 3 is organized as follows:

- Section 3.1 provides an overview of the six pilot sites.
- Section 3.2 describes the nutrition education modes used and participants' exposure to nutrition education.
- Section 3.3 summarizes the qualifications, experience, and training of nutrition education staff.
- Section 3.4 characterizes features of one-on-one nutrition education sessions.
- Section 3.5 characterizes features of group sessions and technology-based nutrition education.
- Section 3.6 describes nutrition education reinforcers.
- Section 3.7 provides information on referrals.
- Section 3.8 discusses cultural and language considerations.
- Section 3.9 provides information on other site characteristics.
- Section 3.10 describes participant satisfaction and participants' suggestions for improving the delivery of WIC nutrition education.
- Section 3.11 concludes this chapter with a discussion of lessons learned from conducting the data collection at the six sites and implications for the design of future evaluations and nutrition education practice.

The impact of certain site-level characteristics collected during Phase II on participant behaviors is explored in Chapter 5 using statistical modeling. Using data collected in Phase II, the following independent variables were coded and included in site-level models: characteristics of the nutrition

educator (e.g., credentials, years of experience, and training), characteristics of the site (caseload and nutrition educator full-time equivalent [FTE]-to-client ratio), the extent to which VENA/participant-centered practices were followed during one-on-one sessions, the percentage of participants receiving group education, and the percentage of participants receiving technology-based education. When discussing these characteristics, whether the independent variable influenced the participant behaviors included in the impact analyses is noted, and the reader is referred to the relevant exhibit in Chapter 5 for more information.

3.1 Overview of the Six Sites

Exhibit 3-1 provides a summary of the characteristics of the six pilot sites, including several features of nutrition education delivery. One of the important findings from the process evaluation is that in some cases information about nutrition education provided in the Phase I Site Survey was limited or had changed during the 8-month period between the survey and the Phase II data collection. For example, all of the selected sites indicated on the survey that they offered group education, and three also reported having Internet education available. At the time of the Phase II data collection, use of group education was very limited in three of the sites because participants increasingly chose Internet education. This example highlights the dynamic nature of nutrition education and the variation in participants' experiences both within and across sites. Also, because the Phase II data collection was more in-depth and collected in person by study team members, these data provided a more comprehensive description of delivery of nutrition education than could be captured in the Phase I Site Survey.

The analysis of data collected in the six pilot sites revealed some similarities, while confirming key differences in delivery mode, nutrition educator characteristics, participants' exposure to nutrition education techniques used by nutrition educators, and other features. All sites have degreed nutritionists as nutrition educators, and Sites B and D use them exclusively. In addition to degreed nutritionists, Sites C and F use nutrition paraprofessionals, Site A uses nutrition paraprofessionals and nurses, and Site E uses breastfeeding peer counselors and clerical staff to provide nutrition education to some participant categories. All participants in the six sites take part in one-on-one nutrition education, but only participants in Sites A and C are frequently involved in group education, and sizable percentages in Sites A and E receive some of their nutrition education via the Internet. The number of nutrition education contacts offered to participants in different categories is similar across most sites with the exception that Sites B and D offer more than the average number of contacts for multiple participant categories. In Sites A and D, the number of minutes of one-on-one nutrition education during certification visits is higher than in other sites. In Sites D and F, nutrition educators used more VENA/participant-centered practices during observed one-on-one sessions.

For two features of nutrition education—length of nutrition education contacts and use of VENA/participant-centered practices in one-on-one sessions, a rating of low, medium, or high was assigned as described in the footnotes to Exhibit 3-1. For three of the six sites (Sites C, D, and E), the rating is the same for both features, while it is different for the remaining sites, suggesting that these two characteristics may not always be aligned. In particular, Site A rated high for length of nutrition education contacts but low for use of VENA/participant-centered practices.

Exhibit 3-1. Characteristics of the Six Pilot Sites

Characteristic	A	B	C	D	E	F
Monthly participation ^a	1,836	1,355	2,923	5,748	3,268	1,882
Electronic benefits transfer for food benefit delivery	•		•		•	
Qualifications of Nutrition Educators ^b						
Professional	•	•	•	•	•	•
Paraprofessional/Other	•		•		•	•
Secondary Education Modes (other than one-on-one, face-to-face) ^c						
% group	40%	<10% ^d	20%	<10% ^d	10%	10% ^d
% technology-based	40%		5%		40%	
% other					25% ^e	70% ^f
Number and Length of Nutrition Education Contacts						
Nutrition education contacts above average for certification period ^g		•		•		
Average number of minutes of nutrition education for certification, not high-risk visits based on observations	12	6	7	9	4	6
Average number of minutes of nutrition education for secondary education, not high-risk visits based on observations	6	3	6	7	4	7
Rating for length of nutrition education contacts based on observations ^h	High	Low	Medium	High	Low	Medium
Use of VENA/Participant Centered Practices in One-on-One Sessions						
Rating based on observations of one-on-one sessions ⁱ	Low	Medium	Medium	High	Low	High

Sources: Phase I 2014 Site Survey and verified in POC initial interview, onsite observations, and Nutrition Educator Survey

• = Applicable to the site

^a Participation (caseload) information is an average of 5 months participation data during the pilot period and was calculated using data obtained in the POC initial interviews.

^b Qualifications of nutrition educator staff were obtained in the Nutrition Educator Survey. Professional includes degreed nutritionists (with or without Registered Dietitian credential) and nurses.

^c The percentage of secondary education/follow-up visits using this mode of nutrition education as reported in the Phase I Site Survey and verified in the POC initial interviews. The mode was considered frequently used if used for 40% or more of the visits.

^d Breastfeeding groups only

^e Phone education

^f Nutrition fairs

^g Number of contacts per certification period (reported during pilot) exceeds average of all sites for 10 participant categories as reported in the POC initial interviews.

^h Assigned rating of low, medium, or high based on sum of average number of minutes of nutrition education for certification and secondary education visits for not-high-risk participants. The two sites with the lowest number of minutes were assigned a rating of low, the two sites with the highest number of minutes were assigned a rating of high, and the remaining two sites were assigned a rating of medium.

ⁱ Assigned rating of low, medium, or high based on an index (0–100) that was calculated by summing the percentage of observations in which the following were observed and then dividing by four: participants spoke 40% or more of the time, educator used open-ended questions frequently, educator provided general or specific affirmations, and participant's needs and interests determined focus of discussion. The two sites with the lowest values for the index were assigned a rating of low, the two sites with the highest values for the index were assigned a rating of high, and the remaining two sites were assigned a rating of medium.

For several of the areas explored in the pilot study, the results from the different data sources were consistent. For example, data on experiences with nutrition education reported by participants in Participant Surveys and focus groups were consistent with practices observed at the sites where they received WIC services, and responses about some methods used on the Nutrition Educator Survey aligned with observations of these staff providing education to participants. Observation data pertaining to attributes of nutrition education associated with VENA or participant-centered education were often consistent within a site. Additionally, multiple counseling attributes or strategies associated with VENA or participant-centered education were frequently observed being used by the same nutrition educator. For example, nutrition educators who frequently use open-ended questions also use more affirmations of positive behaviors and individualized the education to the needs and interests of participants.

In the sections that follow, the similarities and differences in nutrition education among the six sites are described and consistency or inconsistency in results from different data sources noted by feature of nutrition education. At the beginning of each section, a text box summarizes the key points for that topic.

3.2 Modes and Exposure to Nutrition Education

Nutrition educators used a mix of modes to provide nutrition education during the pilot study period, and the number of contacts and length of the contacts participants received varied across the six sites. Sources for both modes and exposure to nutrition education are the interviews with the site contacts (Point-of-Contact [POC] Interviews); observation during onsite visits (observations); and responses from the Participant Surveys, focus groups, and Spanish-language interviews (interviews). Consistent with Phase I, descriptions of modes and exposure are provided for five types of WIC visits (see sidebar).

Types of WIC Visits and Definitions

- Certification visit—enrollment, recertification
- Mid-certification visit—infant/child mid-certification, breastfeeding mid-certification
- Secondary education/follow-up visit—group classes, food benefit issuance education, breastfeeding follow-up, low-risk follow-up
- High-risk follow-up visit—nutritionist visit, nutrition counseling visit, high-risk group classes
- Other visit—breastfeeding services, food package/formula changes

3.2.1 Modes of Nutrition Education

Nutrition Education Modes

- Nutrition education modes offered by three or more sites included 1) one-on-one, face-to-face counseling; 2) group education; and 3) technology based (Internet education).
- All sites use one-on-one, face-to-face counseling as the primary mode of nutrition education during certification and mid-certification visits.
- The greatest variation in modes is for secondary/follow-up visits with a mix of group, technology based (Internet), and telephone (Site E is located in a rural location).
- Although all sites use group education, only Site A uses it for 40% or more of their secondary education/follow-up visits and high-risk visits, while three other sites offer only group sessions on breastfeeding.

The three sites that offer offsite technology-based (Internet) education also use EBT for food benefit delivery. Each of the six pilot sites uses two or more modes to provide nutrition education, and one-on-one, face-to-face counseling is the predominant method used in all sites. This finding is consistent with the Phase I Site Survey findings where nearly all sites reported providing one-on-one, face-to-face counseling.

Exhibit 3-2 shows the nutrition education modes used frequently (defined as 40% or more of the visits) during five types of WIC visits at the pilot sites and the weighted percentage of sites that reported using these modes for any percentage of the participant visits on the Phase I Site Survey.

Exhibit 3-2. Nutrition Education Modes Used Frequently ^a by Type of WIC Visit, by Pilot Site (RQ10)

Type of Visit/Mode	A	B	C	D	E	F	Weighted % of Sites from Phase I Site Survey ^a
Certification Visits							
One-on-one counseling: face-to-face	•	•	•	•	•	•	99.9%
Mid-certification Visits							
One-on-one counseling: face-to-face	•	•	•	•	•	•	99.5%
Secondary Education/Follow-Up Visits							
One-on-one counseling: face-to-face		•	•	•			92.6%
Group education sessions	•						44.3%
Offsite technology based	•				•		44.2%
Other nutrition education activities ^b						•	43.5%
High-Risk Follow-Up Visits							
One-on-one counseling: face-to-face		•	•	•	•	•	99.5%
Group education sessions	•						9.5%
Other Types of Visits							
One-on-one counseling: face-to-face	—	—	•	—	•	—	72.9%

Source: Phase I 2014 Site Survey and verified in POC initial interview. The weighted percentage of sites using each mode for each type of visit is from the Phase I 2014 Site Survey. This represents modes used for any percentage of the specified visit types.

^a The Site Survey collected information on seven modes: face-to-face for one-on-one counseling, telephone for one-on-one counseling, videoconferencing for one-on-one counseling, group education sessions, onsite technology based, offsite technology based, and other nutrition education activities. Only the modes frequently used by one or more sites are shown in this exhibit. The mode is considered to be used frequently for the visit type if the POC initial interview verified it is used "Sometimes (40%–59%)," "Often (60%–89%)," or "Almost Always (≥90%)" for each visit type.

^b Other nutrition education activities were described in the Site Survey and POC initial interview as "monthly topics, worksheets, videos, and self-study modules." The POC initial interview respondent for Site F described the "other secondary education/follow-up visits" as "nutrition fairs."

• = mode used frequently (40% or more of the visits); no dot indicates the mode was not offered frequently (less than 40% of the visits).

— = type of visit is not applicable for the site

The only mode of nutrition education used frequently (for 40% or more of the visits) by the pilot sites for certification and mid-certification visits is one-on-one, face-to-face counseling. This approach is also the most frequently used mode for secondary education/follow-up and high-risk follow-up visits for Sites B, C, and D. Only Site A reported using group education frequently (40%) for follow-up visits, including both secondary education and high-risk follow-up visits. The other five sites reported limited use of group education (less than 40% of visits); Sites B, D, and F offer only group sessions on the topic of breastfeeding for women participants during secondary education/follow-up visits. Sites A and E reported offsite, technology-based education (Internet education) as a frequently used mode for secondary education/follow-up. In addition to these sites, Site C offers Internet education, but it is used less frequently by participants. The three sites that offer this mode are also using EBT for food benefit delivery, while the other three sites did not have EBT during the pilot. Site-level models were estimated to examine the effect of mode of nutrition education on participant behaviors. Modes of nutrition education offered (characterized as the percentage of participants taking part in group sessions or the percentage of participants using offsite technology-based education) had no effect on participant

behaviors for the six pilot sites²³ (see Exhibit 5-22 in Chapter 5). Having only six sites in these analyses may have limited the ability to detect any association.

During the POC initial interviews, most respondents provided additional detail about the modes of education used at their site. Some of the unique features shared included:

- Site A reported that, because of a high rate of iron-deficiency anemia in their population, they offer group education facilitated by an RD for many participants designated as high risk. This was unique because all other sites reported one-on-one counseling as the primary mode for high-risk follow-up visits.
- Nutrition educators in Site B use short PowerPoint presentations for low-risk participants during one-on-one, secondary/follow-up visits. These presentations are done face-to-face and cover a general nutrition or physical activity topic with different topics every 2 months.
- While Site C uses one-on-one, face-to-face counseling for approximately 75% of their secondary education/follow-up visits, they also offer group education and recently added offsite Internet education. This site POC noted that the use of Internet education is small (5 to 10%) but increasing.
- Site E reported that the primary mode for secondary/follow-up education recently shifted to offsite Internet education since they implemented EBT for food benefit delivery with 40% of participants choosing this mode. Group education, once widely used at the site, has declined to approximately 10% of the secondary education/follow-up visits. About 25% of the site's secondary education/follow-ups are via telephone to address the transportation challenges participants experience in this rural location.
- Site F uses a unique mode of delivery for their secondary education/follow-up visits. Approximately two times a month, they have a nutrition fair for participants in the lobby of the WIC site with education displays, resources, and activities. Each fair has a different theme, and nutrition educators are available to interact with participants, engaging them in discussions about the material and answering their questions. Those who miss the scheduled nutrition fairs either complete a paper-based module or receive one-on-one, face-to-face counseling. The majority of participants from this site who took part in focus groups indicated they enjoy the nutrition fairs because of the flexibility they have in selecting information that is relevant to them and in the amount of time they spend for their WIC visit.

²³ This analysis was limited to a subset of measures as listed and described in Section 4.6.

3.2.2 Exposure to Nutrition Education

Several factors influence the exposure to nutrition education, including the number of education contacts offered to participants in different categories, how many contacts the participant receives, how often participants engage in offsite Internet education, and the amount of time spent on nutrition education during visits.

Number of Nutrition Education Contacts Offered. The pilot sites reported on the number of nutrition education contacts offered to different categories of participants on the Phase I Site Survey and confirmed or updated it during Phase II POC initial interviews. Although the number of contacts offered varies across sites (see **Exhibit 3-3**), the number offered by all sites is consistent with the Federal WIC requirement to offer a minimum of two nutrition education contacts per 6-month certification period or four contacts per 12-month certification period (*Federal Register*, 2016). It is important to note that Exhibit 3-3 shows each site's plan for offering contacts at the time of the POC initial interview; however, all of the interviewees reported that the frequency of contacts offered is tailored to address individual participants' needs. Most sites' planned number of contacts exceeded the minimum requirement for one or more participant categories with Sites B and D reporting more contacts than the average across all sites for 10 participant categories. The average number of contacts offered across all six sites is also consistent, although slightly higher for some participant categories, with the weighted number shown from the Phase I Site Survey.

Nutrition Education Exposure

- Sites B and D provide more contacts than other sites, especially for the infant and prenatal women participant categories.
- Sites A and D spend more time on nutrition education during one-on-one certification visits compared with other sites.
- In four of the sites, participants identified as high risk spend more time with nutrition staff during certification visits compared with participants who are not high risk.
- There is no apparent association between scheduling methods and attendance rates for nutrition education.

Three of the sites (Sites B, D, and E) reported that participants who are designated as high risk²⁴ based on health and nutrition needs are offered more contacts than participants who are not high risk, although the higher number of contacts is for certain categories of high-risk participants. In the POC initial interviews, Site B reported offering very frequent contacts for high-risk infants during the first 6 months of life, and Site D described offering more visits for high-risk prenatal women than other sites. All site POCs reported that participants receive additional contacts if recommended by the nutrition educator. When asked about the percentage of participants in each category who receive the number of contacts offered, the POCs provided estimates ranging from a low of 33% to a high of 100% (see Appendix I, Exhibits I-1 and I-2). The variety of factors that drive the number of nutrition education contacts offered and received underscores the challenge of assessing the effect of nutrition education exposure on participant behaviors, as further discussed in Chapter 5.

²⁴ High-risk status is determined through the nutrition and health assessment process conducted by authorized WIC staff and is based on criteria or guidelines set by the State agency.

Exhibit 3-3. Number of Nutrition Education Contacts Offered During Certification Period by Participant Category, by Pilot Site (RQ10)

Category, Certification Period	A	B	C	D	E	F	Mean (Range)	Weighted Number from Phase I Site Survey
Participants Who Are <u>Not</u> High Risk								
Prenatal woman, enrolling in 1st trimester (9 mos. certification) ^a	4	5	4	4	3	3	3.8 (3–5)	3.5
Prenatal woman, enrolling in 2nd trimester (6 mos. certification)	3	4	3	3	3	2	3.0 (2–4)	2.7
Prenatal woman, enrolling in 3rd trimester (3 mos. certification)	2	2	2	2	2	2	2.0 (2–2)	1.8
Breastfeeding woman, 12-month certification	4	5	5	5	4	4	4.5 (4–5)	4.3
Postpartum woman, not breastfeeding, 6-month certification	2	3	2	3	2	2	2.3 (2–3)	2.2
Infant, 12-month certification period	5	6	4	5	5	4	4.8 (4–6)	4.3
Child, 6-month certification	—	—	—	—	3	2	2.5 (2–3)	2.1
Child, 12-month certification	4	4	4	4	—	—	4.0 (—)	4.0
Participants Who Are High Risk								
Prenatal woman, enrolling in 1st trimester (9 mos. certification) ^a	4	6	4	8	4	3	4.8 (3–8)	3.8
Prenatal woman, enrolling in 2nd trimester (6 mos. certification)	3	5	3	4	3	2	3.3 (2–5)	3.0
Prenatal woman, enrolling in 3rd trimester (3 mos. certification)	2	3	2	2	2	2	2.2 (2–3)	2.1
Breastfeeding woman, 12-month certification	4	— ^b	5	5	4	4	4.4 (4–5)	4.6
Postpartum woman, not breastfeeding, 6-month certification	2	—	2	3	2	2	2.2 (2–3)	2.4
Infant, 12-month certification period	5	8	4	6	5	4	5.3 (4–8)	4.8
Child, 6-month certification	—	—	—	—	3	2	2.5 (2–3)	2.7
Child, 12-month certification	4	5	4	5	—	—	4.5 (4–5)	4.5

Source: Phase I 2014 Site Survey and verified in POC initial interview. Weighted number of contacts offered by pilot site is from the Phase I 2014 Site Survey.

^a Prenatal certification periods begin at enrollment and end at 6 weeks postpartum.

^b At Site B, only teenage breastfeeding and postpartum women are identified as high risk with the number of contacts individualized.

— = certification period is not applicable for the site

Participant Self-Reported Data on Number of Nutrition Education Contacts. The Participant Surveys collected self-reported data on the number of visits to the WIC site during the previous 6-month period during which the participant received information on health or healthy eating. **Exhibit 3-4** provides the overall results for the six sites by enrollment group (refers to status of participant at enrollment into the study, not certification status), and Appendix I, Exhibit I-3 provides information at the site level. These responses are subject to limitations because participant recall may not have been accurate, some participants may not have understood the question and failed to answer it correctly, and underreporting may have occurred because the question did not take into account Web- or phone-based nutrition education.

Exhibit 3-4. Self-Reported Number of Nutrition Education Contacts Received at the Site for Study Participants (RQ10a)

Time Period/ Enrollment Group	6-Month Period before Initial Survey	6-Month Period before Interim Survey	6-Month Period before Final Survey
Average number of visits (mean, range)			
Pregnant at enrollment	2.7 (1, 5)	2.2 (0, 6)	1.8 (0, 6)
Postpartum at enrollment (infant up to 6 months)	2.4 (1, 6)	2.0 (0, 6)	1.3 (0, 6)
Parent or caregiver of child	2.3 (1, 6)	1.5 (0, 6)	1.2 (0, 6)
Number and percentage of participants that reported no visits			
Pregnant at enrollment	—	14 14.1%	17 25.0%
Postpartum at enrollment (infant up to 6 months)	—	15 13.8%	31 36.5%
Parent or caregiver of child	—	84 25.7%	106 37.3%
Number of respondents	811	535	437
Number of nonrespondents	31	14	16

Source: Participant Surveys: Initial, Interim, and Final.

Notes: Participants were asked the following question at the initial, interim, and final time periods: "In the past 6 months, how many times did you visit a WIC office and get information on health or healthy eating? Include the day you signed up for this study. Do not include visits for other reasons such as picking up a food instrument or voucher or taking a friend to her appointment." For the initial survey, the following additional instructions were provided: "Mark 'Once' if the day you signed up for this study was your first visit to a WIC office." The response options were "none," "once," "2 times," "3 times," "4 times," "5 times," and "6 or more times." For the initial survey only, if a respondent answered "none," a value of "1" was assigned to calculate a mean because the respondent should have answered "Once" because they had to have visited a WIC office for an appointment to enroll in the study. A value of "6" was assigned to calculate a mean if a respondent answered 6 or more times.

Pregnant women who were in their first or second trimester completed the interim survey approximately 1 month prior to their due date and completed the final survey approximately 6 months postpartum. Pregnant women who were in their third trimester, women who were postpartum at enrollment, and parents or caregivers of a child completed the interim survey approximately 6 months after the initial survey and completed the final survey approximately 12 months after the initial survey.

— = not applicable

Participants in the three enrollment groups reported an overall average of about two WIC visits where health or healthy eating was discussed for the 6-month time period before the initial survey. Women who were pregnant or postpartum at enrollment into the study reported two of these, on average, for the 6-month period before the interim survey. The average number reported for parents/caregivers of children for the 6-month period before the interim survey and for the three enrollment groups before the final survey was fewer than 2 (range of 1.2 to 1.8). Over the evaluation period, there was an increase in parents/caregivers of children and women reporting no WIC visits during the prior 6 months where health or healthy eating topics were discussed, with the largest number reporting this on the final survey. This finding is consistent with comments from participant focus groups and interviews at the end of the evaluation period where participants recalled WIC visits when they did not receive health or healthy eating information. For the women respondents, the higher percentage of women reporting no nutrition education (25% pregnant and 36.5% postpartum) and associated lower average number of contacts for women during the 6 months before the final survey may be because their WIC eligibility ended before or during this period.²⁵

To supplement and validate the Participant Survey responses, each site provided WIC administrative data for about 30 to 35 participants enrolled in the pilot, including the dates when nutrition education contacts occurred. A comparison of the administrative and Participant Survey data is presented in Appendix L. Compared with the self-reported Participant Survey data, the mean number of visits recorded in the sample of administrative data is about one visit or less and is lower at each time period (initial, interim,

²⁵ Women who were postpartum when they enrolled in the study would have been eligible for WIC up until 6 months after delivery, and many of the women who were pregnant when they enrolled in the study would have given birth and been eligible for WIC up to 6 months postpartum unless they were breastfeeding their infants for more than 6 months.

and final). In about 21 to 27% of cases, the administrative data reported no nutrition education contacts during the evaluation period, whereas the participant reported one or more nutrition education contacts. These findings suggest that the reported number of nutrition education contacts received differs between the two data sources. Real-time data collection may provide a more accurate reflection of participants' experience with nutrition education than Participant Surveys. Further details are provided in Chapter 5.

Scheduling Practices and Attendance. During the POC initial interviews, respondents described their practices for scheduling appointments for participants and their perceptions about attendance rates for nutrition education visits. There are no obvious associations between the method of scheduling and the perceived attendance rates. Of the five site POCs who provided an estimate of the attendance rates for nutrition education appointments, the range is between 65% and 93%. Methods used to schedule and/or remind participants of appointments for WIC visits vary. Sites A, B, and C reported they schedule the next appointment during the current visit and use an automated phone system to remind participants of the appointment. Site D uses same-day scheduling, and Site E recently transitioned to open “walk-in” appointments. Site F mails an initial notification and follows up with a call, text, or email reminder depending on the participant’s preference.

Information about appointment attendance was also gathered in participant focus groups and interviews. In general, participants like receiving text message reminders of their appointments and having multiple options for scheduling visits. While some participants want to schedule an appointment instead of walking in, others prefer walking in rather than scheduling an appointment. Many working parents/caregivers disliked the same-day scheduling system used by Site D, saying it is difficult to call at a certain time or arrange to get time off from work with little notice. Some participants at pilot sites that assign appointment times reported that they would prefer choosing an appointment time that works best for them. Comments from participants about WIC appointments demonstrate these preferences.

- *“And then for people who do work, I mean you have to be able to schedule that time because they’re only open for a certain amount of time. If you work, it’s like I need advanced notice, I can’t just tell my job I need to leave at 12 noon today for two hours because I’ve got to go do this WIC appointment.” – WIC Participant, Site D*
- *“And if when they make the appointment, if they would ask “oh, do you have anything planned for this day, do you have another appointment set” instead of “oh, here’s your appointment”... Have them give you an option.” – WIC Participant, Site A*

Several participants, particularly from Site A where no evening or weekend appointments are offered, suggested offering WIC appointments on evenings or Saturdays as a way to improve WIC services. For the remaining sites, all five offer evening appointments at least two times per month, and one site also offers Saturday hours two times per month.

Other Services Offered in Conjunction with WIC Visits. Four of the six sites have medical, dental, and/or other services available for WIC participants to access at the site location (see **Exhibit 3-5**). Sites B and D offer several other services in conjunction with WIC on an ongoing basis. In two other sites, staff from partnering agencies come to the WIC site to offer services to participants during specific times each month (Site F) or year (Site C). As previously noted for scheduling practices, there is no apparent association between availability of other services at the WIC site and POC estimates of attendance at WIC visits.

Exhibit 3-5. Other Services Offered in Conjunction with WIC by Pilot Site (RQ10c)

Service	A	B	C	D	E	F
Children's health care				•		
Lead screening		•				
Family planning services		•				
Medicaid registration				•		
Dental services				•		•
Environmental health/screening				•		
Prevention and screening services		•		•		
Sexually transmitted disease services		•		•		
Smoking cessation		•		•		
Other ^a		•	•			
No other co-located services	•				•	

Source: POC initial interview. Services co-located with WIC at the site.

Note: None of the sites offer the following services: prenatal care, Head Start, maternal/prenatal health care, Supplemental Nutrition Assistance Program (SNAP) registration, parenting support.

^a Other services include the following for specific sites: Site B, prenatal case management and Site C, Summer Child Feeding Program.

• = service offered; no dot indicates that the service was not offered.

Time Spent on Nutrition Education. The participant's exposure to nutrition education is affected by both the number of contacts offered and the amount of time spent on nutrition education during WIC visits. Several factors influence the time spent on nutrition education such as site-level policies about providing certain information to every participant, nutrition educator style, and level of participant interest and engagement in the discussion. To measure time spent on nutrition education, the observer recorded the education topic and the minutes spent (to the nearest half a minute) for each nutrition education topic discussed during the visit. At the end of each visit, the observer summed the minutes and rounded to the nearest minute. Examples of interactions the observer included as time spent on nutrition education are (1) providing information (e.g., the nutrients or benefits of a certain food), (2) making suggestions (e.g., tips for weaning a child off the bottle), (3) sharing guidance (e.g., WIC's recommendation for mixing formula), and (4) eliciting ideas from the participant about strategies and plans to achieve goals. **Exhibit 3-6** shows the time spent on nutrition education during onsite observations of certification visits using one-on-one, face-to-face counseling for participants designated as not high risk and those who are high risk. The amount of time spent on nutrition education was generally consistent within sites and was related to the overall time spent with the nutrition educators and the number of nutrition education topics covered.

Exhibit 3-6. Average Time Spent with Nutrition Staff During Observed Certification Visits by Pilot Site (RQ10b)

Results	A	B	C	D	E	F	Mean
One-on-One, Face-to-Face Certification, Participants Not High Risk							
Average total minutes with nutrition staff (range) ^a	25 (9–41)	14 (11–18)	22 (17–35)	27 (26–30)	18 (10–25)	19 (16–21)	20.8
Percentage of time spent on nutrition education ^b	45.5%	40.1%	29.7%	31.6%	20.7%	34.0%	33.6%
Average minutes of nutrition education	12	6	7	9	4	6	7.3
Number of observations	6	4	4	3	5	5	4.5
One-on-One, Face-to-Face Certification, High-Risk Participants							
Average total minutes with nutrition staff (range) ^a	30 (25–35)	26 —	18 —	38 (28–50)	18 (9–24)	26 (16–37)	26.0
Percentage of time spent on nutrition education ^b	41.6%	19.2%	44.4%	24.1%	22.9%	32.1%	30.7%
Average minutes of nutrition education	13	5	8	9	4	8	7.8
Number of observations	3	1	1	6	4	4	3.2

Source: Onsite observations

^a Includes total time participant spent with nutrition staff for assessment, education, and other activities.^b Percentages were calculated for each observation and then averaged.

— = only one observation, so range not provided

For participants not designated as high risk, the highest average total minutes with the nutrition staff ranged from 27 minutes (Site D) to 14 minutes (Site B). It is interesting to note that while Site B has the shortest appointments, they also reported having more frequent contacts for certain categories (see Exhibit 3-3). Isolating time spent during certification visits on nutrition education, Site A has the highest percentage of time (45.5%) and the highest average minutes (12) of nutrition education, and Site E has the lowest percentage (20.7%) and lowest average minutes (4). As might be expected, the average total minutes spent with nutrition staff is greater for participants identified as high risk in four of the six sites, and the minutes of nutrition education are also slightly higher in three of these sites. The percentage of the total minutes spent on nutrition education, however, is lower for high-risk participants than for those not designated as high risk in four of the six sites. During observations of visits with high-risk participants, nutrition staff often spent more time on components of the visit other than nutrition education, including the health and nutrition assessment (e.g., asking questions about health and dietary practices) and food package tailoring (e.g., changing type of infant formula in the packages).

During the POC initial interviews, respondents reviewed and updated information on length of contacts from their Site Surveys (see Appendix I, Exhibit I-4). The POCs' estimates for Sites A, B, and F for minutes spent on nutrition education during certification visits aligned with the observation data shown in Exhibit 3-6, while estimates for Sites C, D, and E were higher than what was actually observed. These overestimations may be because nutrition education usually takes place at the same time as other components of the visit, making it difficult to isolate time spent on it. These findings suggest that observations are a more accurate method of collecting these data.

For one-on-one, face-to-face counseling observed during secondary education/follow-up visits (see **Exhibit 3-7**), Site F has the largest percentage of time spent on nutrition education (40.0%), and Site E has the smallest (24.8%). Site B has the lowest number of minutes of nutrition education on average (3 minutes) and Sites D and F have the highest (both 7 minutes). On average, time spent on nutrition education is greater for certification visits (7.3 minutes/not high risk; 7.8 minutes/high risk) than for secondary education/follow-up visits (5.5 minutes).

Exhibit 3-7. Average Time Spent with Nutrition Staff During Observed Secondary Education/Follow-Up Visits by Pilot Site (RQ10c)

Results	A	B	C	D	E	F	Mean ^a
One-on-One, Face-to-Face							
Average total minutes with nutrition staff (range) ^b	15 (12–17)	9 (5–15)	18 (4–38)	20 (6–34)	12 (5–17)	18 (6–29)	15
Percentage of time spent on nutrition education ^c	37.4%	38.6%	32.2%	34.3%	24.8%	40.0%	34.6%
Average minutes of nutrition education	6	3	6	7	4	7	5.5
Number of observations	3	6	15	12	3	5	7.3
Group Education							
Average total minutes with nutrition staff (average, range) ^b	25 (17–31)	—	6 (4–9)	—	—	61 (60–62)	—
Average minutes in didactic presentation	19	—	2	—	—	34	—
Percentage of time spent in interactive discussion ^c	24.7%	—	76.4%	—	—	44.6%	—
Number of observations	3	0	2	0	0	2	—

Source: Onsite observations

^a Means and ranges across all six sites calculated for one-on-one, face-to-face only.

^b Includes total time participant spent with nutrition staff for assessment, education, and other activities.

^c Percentages were calculated for each observation and then averaged.

— = no observations of group education at this site

Because only a small number of group sessions occurred during the observation visits in three of the pilot sites, the description of group nutrition education is very limited. Time spent in group education (see Exhibit 3-7) varies greatly across the three sites where group education was observed, ranging from 6 minutes (Site C) to 61 minutes (Site F). Site C has the highest percentage of interactive discussion time, although this was related to the overall short length of group education sessions at that site. For example, one group session at Site C was only 4 minutes long, but because the nutrition educator spent 3 minutes asking the participants about their interests related to physical activity, 75% of the time was interactive.

As described for certification visits, sites reviewed and updated the Phase I Site Survey responses for estimates of the range of minutes spent on nutrition education during secondary education/follow-up visits offered as one-on-one counseling or group sessions. The estimates shown in Appendix I, Exhibit I-4 are aligned with the observation data for Sites C, D, and F, while for Sites A, B, and E, the site POC's estimates are higher than the time actually observed.

As described in Chapter 5, information from the Participant Surveys on number and length of nutrition education contacts, as well as number of different types of reinforcers and follow-ups, was used in a latent class analysis model to classify study participants into low- and high-exposure categories. The actual differences between the two exposure groups was quite modest (17 minutes of contact), suggesting that using a measure of exposure to characterize impact may not be very useful (see Exhibit 5-3).

3.3 Credentials and Training of Nutrition Education Staff

Nutrition Education Staff

- For Sites A and D, 50% or more of nutrition educators have an RD credential, while other sites have fewer RD staff.
- With the exception of Site A, the sites have staff with a breastfeeding credential.
- All six sites reported staff training in a variety of topics including VENA or participant- or learner-centered education skills.

While the qualifications of nutrition educators were not considered in selecting the pilot sites, there was variation in the education, credentials, and experience of the educators across the six sites (see **Exhibit 3-8**). Nutrition educators with college degrees range from 50% for Site F to 100% for Site B. Site D has the highest percentage who reported having an RD credential (57.9%), while Site B had no nutrition educators with an RD credential at the time of the Nutrition Educator Survey. Site A has the highest percentage of staff members who reported having a licensed dietitian/nutritionist (LD/LN) credential. Five of the six pilot sites have one or more staff members with a breastfeeding credential (International-scale Board Certified Lactation Consultant [IBCLC] or Certified Lactation Consultant [CLC]).

All six sites have staff member(s) with more than 20 years of experience, and five sites have staff with less than 1 year of WIC experience. The most frequent response for years of WIC experience across all sites is “more than 20 years,” selected by 22% (13) of survey respondents. Compared with the weighted percentages from the Phase I Site Survey, the overall percentage of nutrition educators with college degrees in the pilot sites is higher and more of them have RD or LD/LN credentials.

Site-level models were estimated to examine the effect on participant behaviors of mean age of nutrition educators, percentage of nutrition educators who are an RD or an LD/LN, percentage of nutrition education staff who have a bachelor’s degree or college degree, and mean number of years of WIC experience. These features were significantly different across sites (see Exhibit I-17 in Appendix I). However, the results of the site-level analysis found no effect on participant behaviors (see Exhibit 5-20 in Chapter 5); having only six sites in these analyses may have limited the ability to detect any association.

Exhibit 3-8. Education, Credentials, and Experience Reported by Nutrition Educators by Pilot Site (RQ11f)

Educator Characteristic	A	B	C	D	E	F	Overall	Weighted % from Phase I Site Survey
Have college degree (n, %) ^a	5 62.5%	3 100.0%	8 88.9%	16 84.2%	6 60.0%	5 50.0%	43 72.9%	60.6%
Have RD credential (n, %)	4 50.0%	0 0.0%	2 22.2%	11 57.9%	1 10.0%	3 30.0%	21 35.6%	24.2%
Have LD/LN credential (n, %)	4 50.0%	0 0.0%	3 33.3%	7 36.8%	3 30.0%	2 20.0%	19 32.2%	12.0%
Have IBCLC credential (n, %)	0 0.0%	1 33.3%	0 0.0%	1 5.3%	2 20.0%	0 0.0%	4 6.8%	6.0%
Have CLE/CLC credential (n, %)	0 0.0%	0 0.0%	2 22.2%	5 26.3%	1 10.0%	1 10.0%	9 15.2%	23.8%
Range of years of WIC experience	< 1 to >20 years	11 to >20 years	< 1 to >20 years	< 1 to >20 years	< 1 to >20 years	< 1 to >20 years	< 1 to >20 years	11–20 years
Mode of years of experience ^b	1–3 years, 1–6 years	11–20 years	11–20 years	7–10 years, >20 years	1–3 years	1–3 years	>20 years	—
Number of respondents	8	3	9	19	10	10	59	
Number of nonrespondents	0	0	1	0	0	0	1	

Source: Nutrition Educator Survey. Weighted percentage of nutrition educators with the characteristics is from the Phase I 2014 Site Survey.

^a BA/BS, master's degree, or above.

^b Sites A and D have bimodal distributions.

RD = Registered Dietitian, LD = Licensed Dietitian, LN = Licensed Nutritionist, IBCLC = International Board Certified Lactation Consultant, CLE = Certified Lactation Educator, CLC = Certified Lactation Consultant.

— = not reported

Site POCs described the training for nutrition educators, including the training topics covered in training during the evaluation period (see **Exhibit 3-9**). All six sites reported addressing the following topics in staff training: VENA skills, participant- or learner-centered education skills, breastfeeding, infant nutrition, and weight and growth issues. Site POCs also reported on the total hours of training on nutrition topics and/or nutrition education skills provided to nutrition educators during the 6 months before each interview (initial, interim, and final). Appendix I, Exhibit I-5 shows the average of the three time periods across all sites. The wide range from 11 to 66 hours per 6-month period may reflect differences in site size and/or availability of funds for training. This range may also reflect differences in how sites define or report training. It is important to note that the training numbers represent total hours for training, regardless of whether one nutrition educator or the entire staff attended the session and, therefore, do not represent average hours of training received per nutrition educator. Sites C, D, and F reported the highest 6-month averages for hours of training overall, and Sites A, B, and E reported the lowest.

Exhibit 3-9. Topics Included in Staff Training by Pilot Site (RQ10g)

Topics	A	B	C	D	E	F
Group facilitation skills	•		•		•	
Motivational interviewing	•		•	•	•	•
Communication skills	•	•	•		•	
Goal setting	•	•	•	•		•
Emotion-based counseling	•		•	•	•	
VENA skills	•	•	•	•	•	•
Participant- or learner-centered education skills	•	•	•	•	•	•
Breastfeeding	•	•	•	•	•	•
Prenatal nutrition	•	•	•	•	•	
Infant nutrition	•	•	•	•	•	•
Child nutrition	•	•	•	•		
Weight and growth issues	•	•	•	•	•	•
Choosing lower-fat milk	•	•			•	
Fruit and vegetables	•				•	
Physical activity	•			•	•	
Whole grains	•					
Other ^a			•			

Source: Phase II Point-of-Contact (POC) Interviews. Training topics covered during the 6 months before the evaluation period were reported in the POC initial interviews.

Training topics covered during the 12-month evaluation period were reported in the POC interim and final interviews.

^a Other topics reported by Site C: eating disorders, immunizations, food allergies, pediatric gastrointestinal diseases, infant behaviors

• = training provided; no dot indicates that training was not provided for that topic.

VENA = Value Enhanced Nutrition Assessment

When asked about training received during the past 12 months, Nutrition Educator Survey respondents most often selected four training topics: breastfeeding (94.8%), infant nutrition (84.5%), child nutrition (77.6%), and prenatal nutrition (69.0%) (see Appendix I, Exhibit I-6). Nutrition educators also reported receiving training on communication and counseling skills such as participant- or learner-centered education (53.4%) and motivational interviewing (51.7%). When asked which training topics are the most useful in providing nutrition education, survey respondents' most frequently selected breastfeeding, followed by infant and child feeding. Most respondents receive training through the following methods: training provided during staff meetings (73.3%), online training modules or courses (66.7%), in-person training session provided at the site/agency (58.3%), and National/State/regional conferences or workshops (56.7%) (see Appendix I, Exhibit I-7).

Site-level models were estimated to examine the effect on participant behaviors of the percentage of nutrition educators who have received training in group facilitation in the past 12 months and percentage of nutrition educators who have received training in VENA, participant-centered practices, or related skills in the past 12 months. Although these features were significantly different across sites (see Appendix I, Exhibit I-17), the results of the site-level analysis found no effect on participant behaviors

(see Exhibit 5-20 in Chapter 5); having only six sites in these analyses may have limited the ability to detect any association.

3.4 Nutrition Education Methods: One-on-One Counseling Sessions

Several research questions focused on attributes or methods of nutrition education used in the pilot sites. Data collected from the Nutrition Educator Survey and through observation of one-on-one counseling sessions describe the type and number of topics covered and the methods for determining topics, selected counseling attributes, and goal-setting strategies used by nutrition educators.

3.4.1 Topics

Respondents to the Nutrition Educator Survey selected the top seven topics they discuss most often with each category of participants. Because there was little variation across sites in topics frequently discussed, the responses are summarized across all sites (see **Exhibit 3-10**). Breastfeeding is the most commonly discussed topic for both prenatal and breastfeeding participants, and infant feeding is the most common topic for postpartum women who were not breastfeeding. For participants with infants, the topics selected by most nutrition educators were formula preparation/feeding (89.8%), infant feeding practices (88.1%), and introduction of solid foods (86.4%). For participants with children, the three most frequently selected topics were child growth and development (78.3%), “picky eaters” (73.3%), and child feeding practices (70.0%). The diversity of other topics discussed with participants in different categories is an indication of efforts to individualize WIC nutrition education.

One-on-One Nutrition Education Methods

- Across all sites, the most common topics in one-on-one sessions are breastfeeding, prenatal nutrition, vitamin/mineral supplements, formula preparation/feeding, infant feeding, introduction of solid foods, child growth and development, “picky eaters,” and child feeding.
- Across all sites, the participant goals set are also similar. The most common goals involve breastfeeding, increasing fruit and vegetable intake, and changing beverage intake (caregivers of children).
- Based on responses to the Nutrition Educator Survey and the observations, participant goals are set in most or all one-on-one sessions.
- In Sites B, D, and F, participants primarily selected the goals in observed sessions. Educators in two of these sites (D and F) also incorporate more VENA or participant-centered attributes than educators in other sites.
- Focus group participants shared they are more likely to take action on goals they set themselves.

During onsite visits, the observer recorded topics discussed in one-on-one, face-to-face certification and secondary education/follow-up visits. Because there was little variation across sites in topics frequently discussed, the responses are summarized across all sites (see **Exhibit 3-11**). Many topics are consistent with those identified as frequent topics in the Nutrition Educator Survey. Vitamin and mineral supplements was the most frequently observed topic during certification visits, possibly influenced by recent developments in vitamin D guidance. Milk choices/consumption, child feeding practices, weaning from the bottle, and breastfeeding were among the other topics frequently discussed during the observed counseling sessions for certification visits. These same topics were also frequently discussed during observed secondary education/follow-up visits, with introduction of solid foods, infant feeding practices, and fruit and vegetables as other common topics.

Exhibit 3-10. Topics Most Often Discussed in One-on-One Sessions Reported by Nutrition Educators across All Six Pilot Sites (RQ11f)

Prenatal Women (n = 58)	Breastfeeding Women (n = 58)	Postpartum Women (n = 57)	Parents/Caregivers of Infants (n = 59)	Parents/Caregivers of Children (n = 60)
Breastfeeding (56, 96.6%)	Breastfeeding (57, 100.0%)	Infant feeding (44, 75.9%)	Formula preparation/feeding (53, 89.8%)	Child growth and development (47, 78.3%)
Prenatal nutrition diet (43, 74.1%)	Vitamin and mineral supplements (40, 70.2%)	Vitamin and mineral supplements (41, 70.7%)	Infant feeding practices (52, 88.1%)	Picky eaters (44, 73.3%)
Weight gain during pregnancy (37, 63.8%)	Infant feeding (37, 64.9%)	Postpartum weight loss (39, 62.7%)	Introduction of solid foods (51, 86.4%)	Child feeding practices (42, 70.0%)
Nausea, vomiting or constipation (37, 63.8%)	Water consumption (31, 54.4%)	Postpartum depression/self-care (26, 44.8%)	Infant growth and development (45, 76.3%)	Fruit and vegetables (34, 56.7%)
Food safety/foods to avoid (37, 63.8%)	Postpartum weight loss (30, 52.6%)	Having enough to eat (25, 43.1%)	Breastfeeding (44, 74.6%)	Healthy weight for a child (30, 50.0%)
Vitamin and mineral supplements (33, 56.9%)	Postpartum depression/self-care (27, 47.4%)	Healthy snacking (25, 43.1%)	Weaning from bottle (29, 49.2%)	Dental health (30, 50.0%)
Iron/anemia (24, 41.4%)	Having enough to eat (23, 40.4%)	Physical activity (24, 41.4%)	Constipation or vomiting (25, 42.4%)	Family meals (25, 41.7%)
		Iron/anemia (24, 41.4%)		

Source: Nutrition Educator Survey. Question: Which topics do you discuss most often? Respondents were instructed to select up to seven topics. The seven topics selected most often by survey respondents across all sites are shown in order from highest to lowest along with the number and percentage of respondents who selected the topic.

Nonrespondents: n = 2 for prenatal and postpartum women; n = 3 for breastfeeding women; n = 1 for parents/caregivers of infants.

Exhibit 3-11. Topics Most Often Observed in One-on-One Sessions across All Six Pilot Sites (RQ11f)

Certification Visits ^a	Secondary Education/Follow-Up Visits ^a
Vitamin and mineral supplements (23, 50.0%)	Infant feeding practices (21, 47.7%)
Milk choices/consumption (16, 34.8%)	Weaning from bottle (13, 29.5%)
Child feeding practices (16, 34.8%)	Fruit and vegetables (11, 25.0%)
Weaning from the bottle (12, 26.1%)	Vitamin and mineral supplements (9, 20.5%)
Breastfeeding (12, 26.1%)	Protein intake (9, 20.5%)
Introduction of solid foods (11, 23.9%)	Breastfeeding (8, 18.2%)
Healthy weight for a child (11, 23.9%)	Iron/anemia (8, 18.2%)
Fruit and vegetables (11, 23.9%)	Medical issues (8, 18.2%)
Healthy snacking (10, 21.7%)	Milk choices/consumption (8, 18.2%)
Iron/anemia (10, 21.7%)	Water consumption (8, 18.2%)
Introduction of solid foods (21, 47.7%)	

Source: Onsite observations. The topics discussed during observations are shown in order from highest to lowest along with the number and percentage of observations in which the topic was discussed.

^a Certification visits observed n = 46; secondary education/follow-up visits observed n = 44.

Respondents to the Participants Surveys were asked to recall topics they discussed with WIC staff (see Appendix I, Exhibits I-8a through I-8c). The most frequent response selected from a list of specific topics was “eating more fruit and vegetables.” This is consistent with responses from nutrition educators with over half (56.7%) identifying it as often discussed with parents/caregivers of children, and it was also observed to be a topic during about 25% of one-on-one certification and secondary education/follow-up

visits. In addition, increasing intake of fruit and vegetables is often mentioned within several other topics commonly discussed, such as prenatal nutrition, infant feeding, weight loss, healthy snacking, and health issues such as constipation. Because many participants are exposed to this topic during WIC visits, it is not surprising they recall having discussed eating more fruit and vegetables.

Participants in focus groups and interviews mentioned a variety of topics discussed at their most recent WIC visit, and several participants recalled topics related to the child's stage of development or other issues identified during the visit that might affect nutritional status.

- *“Well the last time I came we talked about my son was moving on to more solid foods, so we just talked about how we would transition from pureed to chunky and to full whole foods.” – WIC Participant, Site C*
- *“I have a very picky eater and [we talked about] how to encourage her to try new foods and how to keep myself calm instead of being like ‘just eat it.’” – WIC Participant, Site E*

Number of Topics. The onsite observer recorded the number of different topics discussed during one-on-one, face-to-face counseling (see **Exhibit 3-12**). The number varied across sites and among types of visits within sites with a range of 3 to 6 (average of 4.5) topics for certification visits. Site A averages the highest number of topics for certification visits (6 topics), and this site also has the largest percentage of time and the highest number of minutes spent on nutrition education during certification visits (see Exhibit 3-6). The range for secondary education/follow-up visits is 3 to 5 topics (average of 3.8), and Site F has the highest number (5 topics) for this type of visit. Site F also has the largest percentage of time spent on nutrition education during secondary education/follow-up visits (see Exhibit 3-7).

Exhibit 3-12. Average Number of Topics Discussed in Observed One-on-One, Face-to-Face Sessions by Pilot Site (RQ11f)

Type of Visit	A	B	C	D	E	F	Mean (Range)
Certification visits	6	3	5	5	3	5	4.5 (3–6)
Secondary education/follow-up visits	4	3	4	4	3	5	3.8 (3–5)

Source: Onsite observations

Topic Selection. Respondents to the Nutrition Educator Survey ranked the methods they use to determine topics for one-on-one counseling sessions. The method used most often by nutrition educators across all sites is “The participant chooses the topic(s) she wants to talk about” (48.1% ranked this method as used most often) followed by “The participant and I choose the topic together” (33.3%) (see **Exhibit 3-13**). Nutrition educators in two sites had responses that differed from the overall top choice. For Site B, the method ranked as used most often is “The participant and I choose the topic(s) together” (66.7%). For educators in Site E, the response “I choose the most appropriate topic(s)” was selected equally as often as the choice “The participant chooses the topic(s) she wants to talk about” (37.5% for each).

Exhibit 3-13. Method Used to Determine Topics for One-on-One Sessions Reported by Nutrition Educators by Pilot Site (RQ11f)

Method (n, % of respondents) ^a	A	B	C	D	E	F	Overall
The participant chooses the topic(s) she wants to talk about	4 50.0%	0 0.0%	4 44.4%	11 61.1%	3 37.5%	4 50.0%	26 48.1%
The participant and I [educator] choose the topic(s) together	2 25.0%	2 66.7%	3 33.3%	6 33.3%	2 25.0%	3 37.5%	18 33.3%
I [educator] choose the most appropriate topic(s)	1 12.5%	1 33.3%	2 22.2%	1 5.6%	3 37.5%	1 12.5%	9 16.7%
Other ^b	1 12.5%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 1.9%
Number of respondents	8	3	9	18	8	8	54
Number of nonrespondents ^c	0	0	1	1	2	2	6

Source: Nutrition Educator Survey. Question: How are discussion topics determined for most of your one-on-one counseling sessions?

^a Number and percentage of respondents who ranked the method as "1 = used most often."

^b The respondent did not describe the other method.

^c Five individuals did not choose a number 1 ranked response.

Respondents to the Nutrition Educator Survey shared in text responses any special activities or approaches they use with WIC participants. One theme that emerged from the responses, consistent with VENA and participant-centered principles, is that nutrition educators tailor the topics to the participants' needs and interests.

- *"I usually try to find a topic that participants are interested in/care about and use this as a way to connect with them."* – Nutrition Educator, Site C
- *"Building trust through relationship building and allowing participant to lead the session."* – Nutrition Educator, Site F

The Participant Surveys asked respondents about their perception of who chose the topic for their most recent one-on-one session (see Appendix I, Exhibit I-9). The study participants selected from response choices of "The WIC staff person chose what we talked about," "I chose what we talked about," and "The WIC staff person and I together chose what we talked about." In all sites, the most common participant response was "The WIC staff person and I together chose what we talked about," indicating a collaborative process.

Participants in focus groups and interviews discussed how topics are selected for nutrition education sessions. Feedback within each of the pilot sites was mixed; some participants said the staff person chooses the topics, others said that the topic is selected collaboratively, and several said they choose the topic. Some participants shared that the approach depends on the nutrition educator and that it varies among the staff at the site. The observer also noted variation in approach among staff in the same site during onsite observations. One theme that emerged from most focus groups and interviews was that participants appreciate when they have input regarding the topics discussed.

- *"I like that you can talk about one specific issue, they won't say, well, we're going to talk about iron today; today we're talking about broccoli. They will go on the topic that you want, which I think is excellent."* – WIC Participant, Site B
- *"I feel like they make an effort for it to be a mutual conversation where we're both being allowed to say what's important or what we feel, not just one-sided. It's not like a lecture."* – WIC Participant, Site F

3.4.2 Selected Attributes of One-on-One Nutrition Education

Information about attributes or features of nutrition education in one-on-one counseling sessions was collected during observations and from Participant Surveys. **Exhibit 3-14** shows the data for attributes observed during one-on-one, face-to-face sessions for each pilot site. These attributes are commonly described as key features of VENA or participant-centered nutrition education.

Exhibit 3-14. Attributes Observed During One-on-One, Face-to-Face Sessions, by Pilot Site (RQ11f)

Attribute (n, % of observations)	A	B	C	D	E	F	Overall
Participants spoke 40% or more of the time	3 25.0%	7 63.6%	5 25.0%	16 76.2%	1 8.3%	14 100.0%	46 51.1%
Educator used open-ended questions frequently	2 16.7%	8 72.7%	12 60.0%	21 100.0%	0 0.0%	14 100.0%	57 63.3%
Educator provided affirmations (general or specific)	4 33.3%	5 45.5%	11 55.0%	21 100.0%	1 8.3%	14 100.0%	56 62.2%
Educator provided specific affirmations (tied to behavior)	1 8.3%	2 18.2%	5 25.0%	17 81.0%	0 0.0%	11 78.6%	36 40.0%
Participant's needs and interests determined the focus of discussion	2 16.7%	7 63.6%	15 75.0%	21 100.0%	3 25.0%	14 100.0%	62 68.9%
Index ^a	22.9	61.4	53.8	94.1	10.4	100.0	
Number of observations	12	11	20	21	12	14	90

Source: Onsite observations

^a Index calculated by summing the percentage of observations in which the following were observed and then dividing by four: participants spoke 40% or more of the time, educator used open-ended questions frequently, educator provided general or specific affirmations, and participant's needs and interests determined focus of discussion.

An index was created to describe the extent to which features of VENA or participant-centered practices were followed in one-on-one, face-to-face sessions. The index included the following attributes: participants spoke 40% or more of the time, educator used open-ended questions frequently, educator provided general or specific affirmations, and participant's needs and interests determined focus of discussion. For each site, the percentages for the four attributes (i.e., percentage of observations in which the attribute was observed) were summed and then divided by four to create an index ranging from 0 to 100. This index was significantly different across sites ($p = .0120$) (see Exhibit I-17, Appendix I). A site-level model was estimated to examine the effect of use of VENA or participant-centered features on participant behaviors which found no effect on participant behaviors (see Exhibit 5-22 in Chapter 5). The small number of sites ($n = 6$) may have limited the ability to detect any association.

Talk Distribution. One attribute recorded during observations was “talk distribution” or the estimated percentage of time the participant speaks during the counseling session. A core concept of VENA or participant-centered nutrition education is that the more engaged participants are in the conversation, the more likely they are to act on the information discussed. Sites D and F have the highest percentage of sessions where the participant spoke 40% or more of the time (76.2% and 100.0%, respectively), and Site E has the lowest percentage (8.3%).

The use of open-ended questions engages participants and encourages them to share their concerns and interests as well as what they already know. During nutrition education sessions, the observer recorded the frequency of open-ended questions used by the nutrition educator. In nearly two-thirds (63.3%) of sessions observed, the educator frequently used open-ended questions; however, there were large

differences among sites. For Sites D and F, nutrition educators used open-ended questions frequently in all of the one-on-one sessions observed, while in Site E, nutrition educators did not use open-ended questions frequently in the sessions observed. Because open-ended questions help elicit participant input, this attribute should be associated with the attribute of participants speaking 40% or more of the time. As expected, these two attributes were both observed in a large percentage of sessions for Sites B, D, and F and, conversely, were both observed in lower percentages of observed sessions for Sites A, C, and E.

Study participants were asked in the Participant Surveys about their perception of “talk-distribution” during one-on-one sessions with WIC staff by rating their level of agreement with the statement “The WIC staff person talked most of the time.” Across all sites, the most commonly selected response was “agree a little” (Appendix I, Exhibit I-10, part a). This response is consistent with the observation finding that in a little over half (51.1%) of observations across all sites, the participant spoke 40% or more of the time, and in just under half, the nutrition educator did most of the talking. Participants at Site C were most likely to “agree a lot” with the statement about the staff person speaking most of the time, followed by participants at Site E. These sites had a lower percentage of observations during which the participant spoke 40% or more of the time (i.e., more observations where the staff person did most of the talking). When asked in focus groups and interviews who did the majority of the talking, the most common response was “both talk evenly” followed by “the staff person talked more.” Similar to comments related to selecting topics, a few participants reported that it depends on the nutrition educator.

Affirmations. Offering affirmations or acknowledgements is another feature of VENA or participant-centered nutrition education used to encourage positive nutrition-related behaviors, boost participant self-confidence, and build rapport and trust during nutrition education sessions. The observer recorded when the nutrition educator used any type of affirmation and also when the educator provided specific affirmations tied to a behavior, strength, or effort made by the participant. Examples of general affirmations heard during observations include “you’re doing real good” and “wonderful.” Examples of specific affirmations heard during observations include:

- *“She’ll have great iron from all that meat.” – Nutrition Educator, Site B*
- *“Great. When kids eat with everyone else, they eat better.” – Nutrition Educator, Site D*

Sites D and F have the highest percentages of observed sessions where the educator offered any affirmations (100%), while Sites A and E have the lowest percentages (33.3% and 8.3%, respectively) (see Exhibit 3-14). Comments regarding affirmations also emerged through the Nutrition Educator Survey and participant focus groups and interviews.

- *“I use a lot of affirmations and a lot of reflective listening.” – Nutrition Educator, Site D*
- *“The woman congratulated me and said that it was beneficial for the baby and me.” – WIC Participant, Spanish-Language Interview, Site C*

Focus of Discussion. For Sites D and F, all observed sessions were focused on the participants’ needs and interests; Sites A and E had the fewest observed sessions focused on the participants’ needs and interests (see Exhibit 3-14). Related to this attribute, most participants across all sites agreed with the statement “The WIC staff person listened to me and understood my concerns,” when responding to the Participant

Surveys (see Appendix I, Exhibit I-10, part b). Similarly, in focus groups and interviews, most participants indicated that WIC staff are responsive to their questions.

- *“I’d say, yes, that they’re very good about answering questions and giving you whatever information they can and/or listening to you.” – WIC Participant, Site F*
- *“That I have the opportunity to ask the person that is helping me anything, any question that I have about – about nutrition, overall. And that it makes you feel at ease, because it’s private ... and so, I do listen a lot, because they know a lot and they can help us.” – WIC Participant, Spanish-Language Interview, Site C*

Although most participants reported that staff were open to questions, there was some variation across sites as shown in the following comments.

- *“She did not ask hardly any questions like how he was doing or if I needed any advice ... he is a very picky eater so I really did want to talk to them about that, but she just wanted to tell me about the next appointment and how to go on the computer and go on the website and that was it. So, I felt like I was being rushed out.” – WIC Participant, Site E*
- *“When you go in there they seem so busy, they just want to rush you in and rush you out, so you don’t feel like you can ask your questions, kind of like a doctor’s office.” – WIC Participant, Site B*

3.4.3 Goal Setting in One-on-One Nutrition Education

As described in WIC Nutrition Education Guidance,²⁶ goal setting is an important attribute of WIC nutrition education to help participants make healthy behavior changes. To explore research questions pertaining to goal setting, data were collected on frequency and approach to selecting goals, types of goals set by different participant categories, facilitators and barriers to achieving goals, and follow-up on goals.

Frequency of Goal Setting. Respondents to the Nutrition Educator Survey reported the frequency of goal setting within their one-on-one sessions (see **Exhibit 3-15a**). “Almost always” was the most frequently cited response across all six sites. Site A has the highest percentage: 100% of respondents selected “Almost always,” followed by Site F with 90% of respondents selecting this response choice. Site E has the smallest percentage of staff who selected “Almost always” (40%) and the highest percentage of staff who selected “Rarely” or “Goal setting not done” (20%). Comparing the overall response for the six pilot sites with the weighted percentages from the Phase I Site Survey suggests that the pilot sites are similar in goal-setting practices to all WIC sites.

Goal-Setting Methods. Nutrition Educator Survey respondents who engage in goal setting ranked the methods used to select goals during counseling sessions from most to least often. The overall response across all six pilot sites is similar to the weighted percentage from the Phase I Site Survey, but pilot sites’ responses vary (see **Exhibit 3-15b**). Sites E and F have the highest percentages of respondents who ranked “The participant usually identifies the goal(s)” as the method used most often (66.7% and 75.0%, respectively). Site A respondents ranked “The participant and I usually select the goal(s) together” as the method used most often (62.5%), and Site B ranked “I usually suggest the goal(s)” as the main method for goal setting (66.7%). Site C respondents have the greatest variation in responses among the nutrition educators at the site: approximately one-third ranked each choice as the one used most often.

²⁶ https://wicworks.fns.usda.gov/wicworks/Learning_Center/ntredguidance.pdf

Exhibit 3-15a. Frequency of Goal Setting for One-on-One Sessions Reported by Nutrition Educators by Pilot Site (RQ11a)

Frequency (n, % of respondents)	A	B	C	D	E	F	Overall ^a	Weighted % from Phase I Site Survey
Almost always	8 100.0%	2 66.7%	5 50.0%	8 42.1%	4 40.0%	9 90.0%	36 60.0%	54%
Often	0 0.0%	1 33.3%	4 40.0%	8 42.1%	1 10.0%	1 10.0%	15 25.0%	26%
Sometimes	0 0.0%	0 0.0%	0 0.0%	3 15.8%	1 10.0%	0 0.0%	4 6.7%	12%
Occasionally	0 0.0%	0 0.0%	0 0.0%	0 0.0%	2 20.0%	0 0.0%	2 3.3%	5%
Rarely	0 0.0%	0 0.0%	1 10.0%	0 0.0%	1 10.0%	0 0.0%	2 3.3%	2%
Goal setting not done	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 10.0%	0 0.0%	1 1.7%	2%
Number of respondents	8	3	10	19	10	10	60	
Number of nonrespondents	0	0	0	0	0	0	0	

Source: Nutrition Educator Survey. Question: During your one-on-one counseling sessions, how often are participant behavioral goals set? Weighted percentage of sites reporting frequency of goal setting is from the Phase I 2014 Site Survey.

^a Overall n and % across all six sites.

Exhibit 3-15b. Method Used to Select Goals for One-on-One Sessions Reported by Nutrition Educators by Pilot Site (RQ11a)

Method (n, %) ^a	A	B	C	D	E	F	Overall ^b	Weighted % from Phase I Site Survey
The participant usually identifies the goal(s)	3 37.5%	0 0.0%	2 28.6%	10 52.6%	4 66.7%	6 75.0%	25 49.0%	49%
I [educator] usually suggest the goal(s)	0 0.0%	2 66.7%	2 28.6%	1 5.3%	1 16.7%	0 0.0%	6 11.8%	13%
The participant and I [educator] usually select the goal(s) together	5 62.5%	1 33.3%	3 33.3%	8 42.9%	1 16.7%	2 25.0%	20 39.2%	38%
Other	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	—
Number of respondents ^c	8	3	7	19	6	8	51	—
Number of nonrespondents ^d	0	0	2	0	2	2	6	—

Source: Nutrition Educator Survey. Question: How are participant goals selected for most of your one-on-one counseling sessions? Weighted percentage of sites reporting each method used to select goals is from the Phase I 2014 Site Survey.

^a Number and percentage of respondents who ranked the method as "1 = used most often."

^b Overall n and % across all six sites.

^c Three survey respondents who indicated goals are not set or rarely set during one-on-one sessions were instructed to skip the question (eligible respondents n = 57).

^d Six individuals did not choose a number 1 ranked response.

— = not reported

In a related survey question, nutrition educators who indicated they engage in goal setting reported how much input the participant has in the goal-setting process. A principle of VENA and participant-centered education holds that the more engaged participants are in setting goals, the more likely they are to follow through on those goals. In all sites, the most frequently cited response was “a lot,” although in Sites C and E, more than 40% of respondents selected either “some” or “a little” (see **Exhibit 3-16**).

Exhibit 3-16. Participant Input into the Goal-Setting Process for One-on-One Sessions Reported by Nutrition Educators by Pilot Site (RQ11b)

Amount of Input by Participants (n, %)	A	B	C	D	E	F	Overall
A little	0 0.0%	0 0.0%	1 11.1%	0 0.0%	1 14.3%	0 0.0%	2 3.6%
Some	1 14.3%	1 33.3%	3 33.3%	3 15.8%	2 28.6%	2 20.0%	12 21.8%
A lot	6 85.7%	2 66.7%	5 55.6%	16 84.2%	4 57.1%	8 80.0%	41 74.5%
Number of respondents ^a	7	3	9	19	7	10	55
Number of nonrespondents	1	0	0	0	1	0	2

Source: Nutrition Educator Survey. Question: How much input do participants have in setting their goal(s)?

^a Three survey respondents who indicated goals are not set or rarely set during one-on-one sessions were instructed to skip the question (eligible respondents n = 57).

During observations of one-on-one nutrition education, the observer recorded whether goals are set and who is responsible for setting the goal—the nutrition educator or the participant. Goals were set in 85% of the sessions observed across all sites, with goals set in 100% of the sessions in Sites A, B, C, and F (see **Exhibit 3-17**). Site E has the smallest percentage of sessions where goals were set (44.4%). When goals were set, there was variation across sites with respect to who selected the goal. In Sites A, C, and E, the nutrition educator primarily selected the goals, and in Sites B, D, and F, the participant selected the goals for the majority of the sessions observed.

Exhibit 3-17. Goal Setting During Observed One-on-One, Face-to-Face Certification Visits by Pilot Site (RQ11a)

Results	A	B	C	D	E	F	Overall
Observations where goals were set (n, %)	9 100%	5 100%	5 100%	7 77.8%	4 44.4%	9 100%	39 84.8%
Observations where goals were set by nutrition educator (n, %)	7 77.8%	2 40.0%	4 80.0%	1 11.1%	3 33.3%	1 11.1%	18 39.1%
Observations where goals were set by participant (n, %)	2 22.2%	3 60.0%	1 20.0%	6 66.7%	1 11.1%	8 88.9%	21 45.7%
Total number of certification visit observations	9	5	5	9	9	9	46

Source: Onsite observations

Study participants also described their perceptions of the goal-setting process. The Participant Surveys asked respondents to choose the response that most closely matched their experience with goal setting. The response options were “WIC staff person worked with me to set health goals for me or my child,” “WIC staff person talked about health goals, but I did not set any,” or “WIC staff person did not talk about setting goals” (see **Exhibit 3-18**). The most frequently selected response was “WIC staff person worked with me to set health goals for me or my child”: over 50% of participants from Sites A, C, D, and F selected this response in both the initial and final surveys. These participant responses are consistent with the observations described above. However, for all sites, the percentage of participants selecting this response choice declined between the initial and final surveys.

Exhibit 3-18. Participants’ Perception of Goal-Setting Process for One-on-One Sessions by Pilot Site ^a (RQ11b)

Response	A	B	C	D	E	F	Overall
Initial Survey (n, %)							
WIC staff person worked with me [participant] to set health goals for me or my child	103 81.1%	56 55.4%	83 68.0%	66 58.4%	73 60.3%	102 78.5%	483 67.6%
WIC staff person talked about health goals, but I [participant] did not set any	10 7.9%	17 16.8%	14 11.5%	17 15.0%	23 19.0%	18 13.8%	99 13.9%
WIC staff person did not talk about setting health goals	14 11.0%	28 27.7%	25 20.5%	30 26.5%	25 20.7%	10 7.7%	132 18.5%
Number of respondents	127	101	122	113	121	130	714
Number of nonrespondents	2	4	7	7	2	3	25
Final Survey (n, %)							
WIC staff person worked with me [participant] to set health goals for me or my child	29 76.3%	13 37.1%	27 69.2%	20 52.6%	14 42.4%	38 65.5%	141 58.5%
WIC staff person talked about health goals, but I [participant] did not set any	5 13.2%	8 22.9%	5 12.8%	3 7.9%	5 15.2%	9 15.5%	35 14.5%
WIC staff person did not talk about setting health goals	4 10.5%	14 40.0%	7 17.9%	15 39.5%	14 42.4%	11 19.0%	65 27.0%
Number of respondents	38	35	39	38	33	58	241
Number of nonrespondents	3	2	2	0	3	1	11

Source: Participant Surveys, Initial and Final

^a Participants were asked to select the approach that happened most often.

Participants in focus groups and interviews responded to several questions about their experience with setting goals. When asked whether they had set goals at WIC visits, some participants from every site reported they had; however, there are differences across sites. In Sites B and E, more participants reported not setting goals than reported setting goals. Participants in Site C offered mixed responses to this question, while most participants in Sites A, D, and F reported they set goals. Examples of comments from participants who reported setting goals included:

- *All my years I’ve been there she’s asked me that and it was like ‘what are your goals for next time?’ Every time.”*
— WIC Participant, Site F
- *“They were concerned about her iron, but I kind of set that goal and what I need to do and she kind of jot it down, so we can revisit it.”* — WIC Participant, Site D

Participants who recalled setting a goal were asked about who primarily selected the goal. Responses from participants from all sites varied. Of those participants who reported setting goals, the most common response was that the nutrition educator was the one to suggest the goal for the participant. This response differed from the Nutrition Educator Survey responses where 75% of respondents reported that participants have “a lot” of input into the goal-setting process and only 12% of respondents reported that “the educator usually sets the goal.” This response also differs from the observations; in observations where goal setting took place, slightly more than half (54%) of goals were set with input from the participant. Comments from participants that indicated the nutrition educator most often set goals included:

- *“With the goals why try to do them if they don’t really care. They set them up, but honestly I don’t remember any of the goals that were set.” – WIC Participant, Site A*
- *“It was her, because she was asking me whether my daughter ate meat, a lot of meat. I told her that she barely ate meat, so she told me to increase the amount of meat per week, so she asked me to improve that and I told her that it was fine, that I would improve on that.” – WIC Participant, Spanish-Language Interview, Site C*

Some participants, however, reported that they set their own goals:

- *“For me it was like she put out the idea of let’s set a goal and then let me set it. We did the thing about the whole grains ... so that was our goal and I think I came up with the idea but she was like ‘what would you like to work on?’” – WIC Participant, Site F*
- *“She gave me the option ... she said I’m the one who needs to choose the correct goal.” – WIC Participant, Spanish-Language Interview, Site C*

Several participants shared that goal setting was a collaborative process:

- *“I think it was a combination, like I told them what I wanted to work on and then they kind of formed it into a goal like ... ‘well let’s try at least one serving of vegetables a day’ or, you know, they made it more like goal-worthy; so it was a combination.” – WIC Participant, Site D*

One theme that emerged from across the focus groups and interviews is that participants may be more likely to achieve their goals when they set them. Participants also shared that if the goal is related to something that is important to them, they will be more motivated to follow through on the goal.

- *“If it’s something that I set, I’m more likely to follow through on it; something they suggest, like your sippy cup example, if I don’t think it’s important, then I wouldn’t do it.” – WIC Participant, Site D*
- *“I think it would be really important to have the parent on board with it because it also demonstrates understanding of the parent of why it’s important. You know, like I truly believe that this is something that’s going to help my child.” – WIC Participant, Site C*

Types of Goals. The Nutrition Educator Survey collected information on the types of goals set most often by participant category. Because there was little variation in nutrition educator responses, the goals are shown across all six sites (see **Exhibit 3-19**). The most common goals for the women categories are breastfeeding, increasing fruit and vegetable intake, and achieving or maintaining a healthy weight. For parents/caregivers of infants, the goals set most often are breastfeeding duration, introducing solid foods, and weaning from the bottle, and for sessions with children, the most commonly reported goals are changing beverage intake, increasing fruit and vegetable intake, and choosing healthy snacks.

Exhibit 3-19. Participant Goals Set Most Often in One-on-One Sessions Reported by Nutrition Educators across All Six Pilot Sites (RQ11a)

Prenatal, Postpartum, and Breastfeeding Women (n = 56)	Parents/Caregivers of Infants (n = 56)	Parents/Caregivers of Children (n = 57)
Breastfeeding initiation or duration (41, 73.2%)	Breastfeeding duration (44, 78.6%)	Changing beverage intake (45, 78.9%)
Increasing fruit and vegetable intake (33, 58.9%)	Introducing solid foods (39, 69.6%)	Increasing fruit and vegetable intake (35, 61.4%)
Achieving or maintaining healthy weight (32, 57.1%)	Weaning from bottle (29, 51.8%)	Choosing healthy snacks (23, 40.4%)
Changing beverage intake (24, 42.8%)	Feeding appropriate amount of formula (22, 39.9%)	Achieving or maintaining healthy growth/weight (22, 38.6%)
Increasing physical activity (15, 26.8%)	Transitioning to table foods (18, 32.1%)	Switching from whole milk to lower fat milk (16, 28.1%)

Source: Nutrition Educator Survey. Question: In your one-on-one counseling sessions with participants, what three goals are set most often?

Notes: Three survey respondents who indicated goals are not set or rarely set during one-on-one sessions were instructed to skip the question (eligible respondents n = 57). Respondents were instructed to select the three most frequently set goals from the list of goals provided (nine goals for women, seven for infants, and eight for children). The five most frequently selected goals are listed for each participant category in order from lowest to highest along with the number and percentage of respondents.

Support for Achieving Goals. During focus groups and interviews, participants were asked if WIC staff help them with ideas and strategies for reaching their goals. This question generated a range of responses. Some participants reported that WIC staff help them with ideas to reach their goal.

- *“They did help with recipes, making it into bread like zucchini bread or pumpkin bread and kind of trick him that way. There’s different ways to try to get vegetables in there for him.” – WIC Participant, Site D*
- *I’ve had the nutritionist give me so many ideas and “have you ever tried this and this” or “have you tried that and that” and I write it down and try it and generally it works so it’s kind of nice and it’s not expensive options. – WIC Participant, Site F*

Slightly fewer participants reported there is little strategy sharing or brainstorming of ideas to reach goals.

- *“They don’t help with trying to wean they just say “this is what you need to do, this is what you’re not supposed to do” and I’m like, this is my situation how do I fix it, how do I get to where I need to be?” – WIC Participant, Site A*
- *“There is never really a communication portion. They will just tell you, this is what you’ll get and get out the door.” – WIC Participant, Site E*

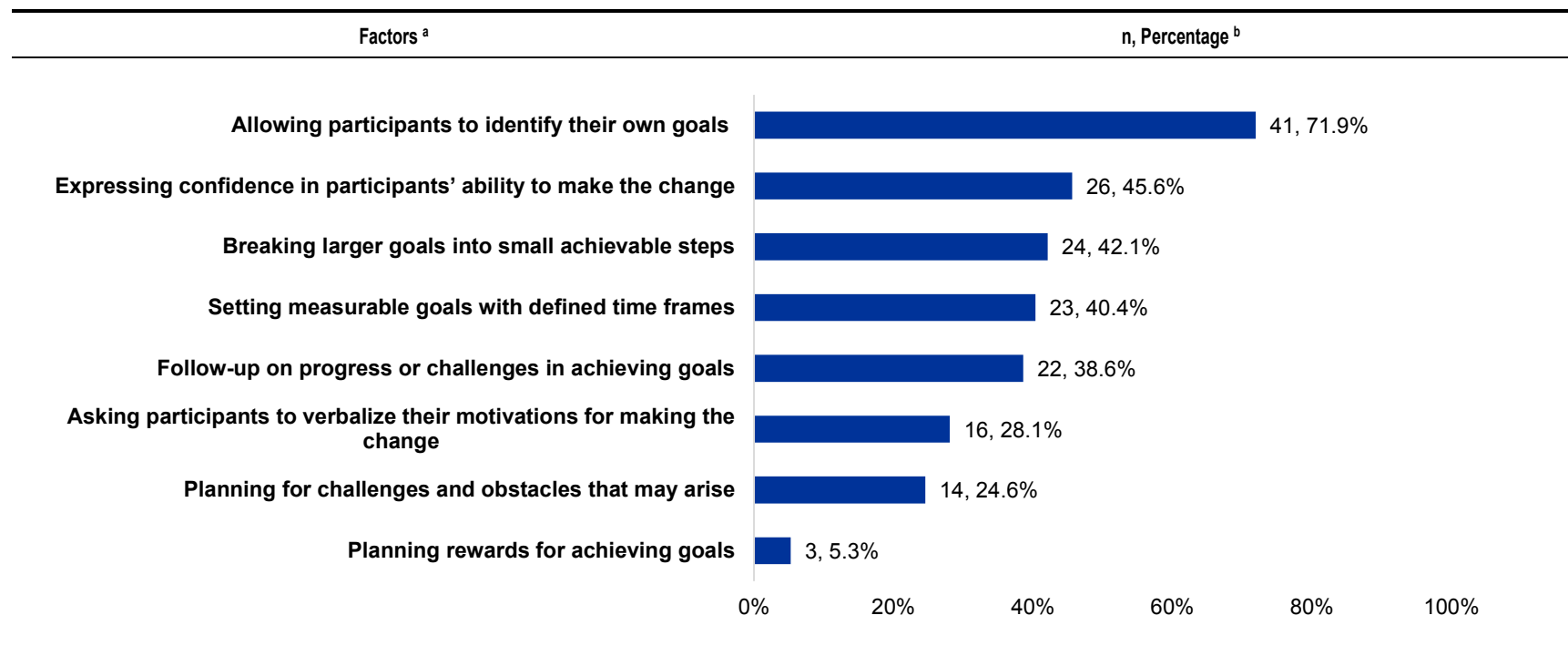
The range in participant comments regarding receiving help with ideas and tips to reach their goals was consistent with observations of goal setting in the one-on-one certification visits. During the observations at three sites, nutrition educators engaged participants in discussion about ideas and strategies to achieve goals for all or most of the observations: Site F (100%), Site C (80%), and Site D (78%). Engaging participants in discussion about ideas and strategies occurred in 40% or fewer of the observations in the other three sites, as shown in Appendix I, Exhibit I-11. On the Nutrition Educator Survey, several respondents described how they share information and strategies such as asking participants what they already know about a topic and giving them tips and suggestions from other WIC participants.

Participants in focus groups and interviews also had mixed responses when discussing if WIC staff follow up on goals at subsequent WIC visits. Some participants reported that nutrition educators address the goal at the next visit with specific examples of checking in with them about how they are doing with meeting the goal. However, several respondents reported that nutrition educators do not revisit goals with them

and instead just set another goal. During observations, follow-up on previous goals was noted when it occurred. Site F has the largest percentage of observed one-on-one secondary education/follow-up visits where previous goals were mentioned (80%) (see Appendix I, Exhibit I-12). For other sites, the percentages are lower and/or there are few observations of this type of visit.

Facilitators and Barriers to Setting and Achieving Goals. Respondents to the Nutrition Educator Survey provided their opinions regarding the primary WIC-related factors that help participants set and achieve goals. The most helpful factor in goal setting, selected by 71.9% of nutrition educators, is allowing participants to set their own goals (see **Exhibit 3-20**). The next two most frequently selected factors are expressing confidence in the participant's ability to make the change and breaking larger goals into smaller achievable steps. Nutrition educators were also asked about societal or environmental factors that create barriers to participants achieving goals. The factor most frequently selected by nutrition staff is lack of support from family, friends, or community followed by financial constraints and lack of motivation (see **Exhibit 3-21**).

Exhibit 3-20. Nutrition Educators' Opinions on Primary Factors in Helping Participants Set and Achieve Their Goals for One-on-One Sessions (across All Six Sites) (RQ12)



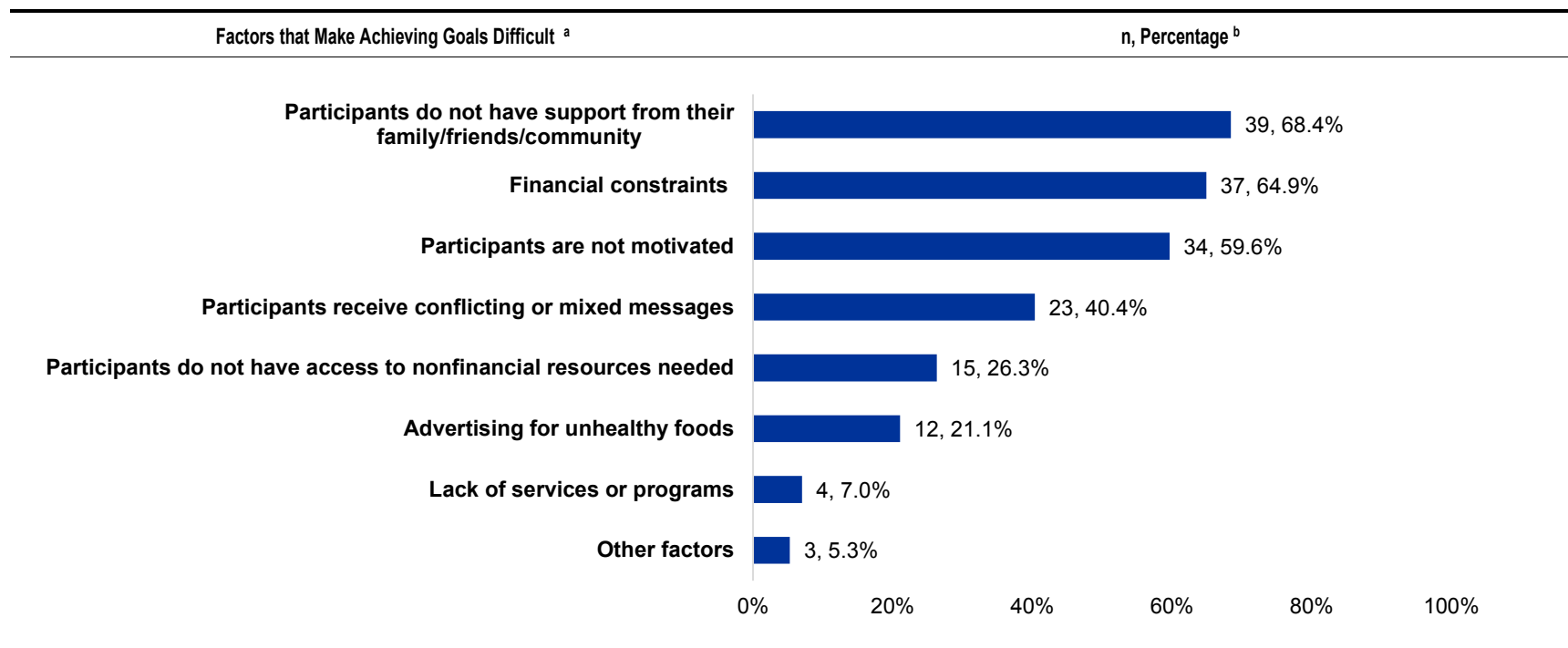
Source: Nutrition Educator Survey. Question: In your opinion, what are the three most important factors in helping participants set and achieve their goals?

Note: Three survey respondents who indicated goals are not set or rarely set during one-on-one sessions were instructed to skip the question (eligible respondents n = 57)

^a Respondents were instructed to select up to three factors from a list of eight factors.

^b Number and percentage of respondents that selected the factor.

Exhibit 3-21. Nutrition Educators' Opinions on the Primary Societal or Environmental Factors that Create Barriers to Participants Achieving Goals (across All Six Sites) (RQ12)



Source: Nutrition Educator Survey. Question: In your opinion, what societal or environmental factors make it difficult for participants to achieve their goals?

Notes: Three survey respondents who indicated goals are not set or rarely set during one-on-one sessions were instructed to skip the question (eligible respondents n = 57). Other factors responses (n = 3): (1) Participants have too many other basic and urgent needs/goals to work on (needs lower on Maslow's Hierarchy); they may care about nutrition/health to an extent, it is just too many things are first on their priority list; (2) There are other stressors in life that take priority over paying attention to nutrition such as transportation difficulties, living with family or friends, financial difficulties, a lot of work hours with little time with children; (3) Families that experience generational poverty typically are dealing with more pressing issues than nutrition: addiction, broken families, financial constraints, parent(s) working nontraditional hours, incarceration, etc. Overcoming the day-to-day barriers brought about by these circumstances leaves little opportunity to focus on health by way of nutrition.

^a Respondents were instructed to select up to three factors from a list of eight factors.

^b Number and percentage of respondents that selected the factor.

3.5 Nutrition Education Methods: Group and Technology-Based Education Modes

Group and Technology-Based Nutrition Education

- In four sites, the topics for group education are specific for participant categories, for example, breastfeeding for women categories; while topics for groups in the other two sites vary based on participant interest or a planned schedule for specific topics.
- Most frequently used resources for group education are educational props, informational charts or displays, videos/DVDs, and ice breaker/warm-up activities.
- Focus groups participants' comments about group education were positive and focused on the benefit of parents and caregivers sharing ideas and strategies.
- The three pilot sites that use EBT for food benefit delivery offer technology-based education for secondary/follow-up nutrition education. Two of these sites noted that group session attendance has been declining since this option was offered.

Group Education Sessions. Although the use of group education sessions was limited among the six pilot sites, participants who took part in group education viewed this mode favorably. As noted previously, although all six of the sites reported that they offer group education, three of them only offer a limited number of breastfeeding classes for prenatal women. In two sites, POCs reported that participation in group education is waning as more participants choose offsite, Internet education.

Respondents to the POC Interviews identified the topics covered during group education (see **Exhibit 3-22**). Breastfeeding is the most frequent topic followed by infant feeding practices and fruit and vegetables. Site A, which uses group education for 40% or more of their secondary education/follow-up visits, reported covering the largest variety of topics. Site C shared that their groups are often participant led and may cover any nutrition- or health-related topic that is of interest to the group.

When asked on the Nutrition Educator Survey how session topics are selected, the most common response across all pilot sites was “There are specific topics for participant categories.” However, the majority of Site C respondents selected “Topics are determined based on participants’ interests during each group,” and the most common response for Site F was “Each day, week, month or quarter has a specific topic” (see Appendix I, Exhibit I-13).

On the Nutrition Educator Survey, respondents who facilitate group education reported on how often they use specified activities or resources for group education. **Exhibit 3-23** shows the activities/resources used “sometimes,” “often,” or “almost always.” Activities/resources used by more than 50% of staff across all six sites include educational props (94.7%), informational charts or displays (75.0%), videos/DVDs (55.3%), and ice breakers/warm-up activities (54.1%). These are also the responses selected most frequently in the Phase I Site Survey. Nearly all respondents for each of the sites reported using educational props.

Exhibit 3-22. Common Topics for Group Education Sessions Reported by Pilot Site (RQ11e)

Topics	A	B	C	D	E	F	% of Sites Offering the Topic	Weighted % from Phase I Site Survey
Breastfeeding	•	•	•	•	•	•	100%	82%
Infant feeding practices	•			•	•	•	67%	45%
Fruit and vegetables	•		•		•		50%	41%
Child feeding practices	•				•		33%	38%
Healthy snacks	•		•		•		50%	32%
Introduction of solid foods	•				•		33%	27%
Inappropriate/sometimes foods	•				•		33%	—
Sugar-sweetened beverages	•		•			•	50%	—
Other ^a	•		•				33%	—

Source: POC Interviews. Topics selected by two or more sites. Weighted percentage of sites covering the topic is from the Phase I 2014 Site Survey. The percentages for the top 10 topics most often discussed during group education sessions are shown.

^a Other topics: Site A, shopping with eWIC, Site C, farmers' market, other participant-led topics

• = topic discussed; no dot indicates the topic is not included in group education.

— = not reported

Exhibit 3-23. Activities or Resources Used Frequently ^a in Group Education Sessions Reported by Nutrition Educators by Pilot Site (RQ11e)

Activity or Resource (n, %)	A	B	C	D	E	F	Overall (n/total)	Weighted % from Phase I Site Survey
Icebreakers/warm-up activities	4 80.0%	0 0.0%	3 42.9%	5 45.5%	4 66.7%	4 66.7%	20/37 54.1%	67.3%
Discussions between pairs of WIC participants	4 80.0%	0 0.0%	4 57.1%	2 18.2%	4 66.7%	7 57.1%	18/38 47.4%	43.1%
Educational props (e.g., dolls, food containers)	5 100.0%	2 100.0%	7 100.0%	11 100.0%	5 83.3%	6 85.7%	36/38 94.7%	75.7%
Informational charts or displays	5 100.0%	1 50.0%	4 57.1%	7 63.6%	5 71.4%	8 100.0%	30/40 75.0%	70.0%
Food sampling/ demonstrations	0 0.0%	0 0.0%	1 14.3%	1 9.1%	2 33.3%	1 12.5%	5/39 12.8%	24.5%
Hands-on activity or game	2 40.0%	0 0.0%	1 14.3%	1 9.1%	1 16.7%	5 62.5%	10/39 25.6%	33.6%
Physical activity	0 0.0%	0 0.0%	1 14.3%	0 0.0%	0 0.0%	2 28.6%	3/38 7.9%	9.5%
PowerPoint presentation	0 0.0%	2 100.0%	1 14.3%	0 0.0%	0 0.0%	5 71.4%	8/38 21.1%	24.0%
Video/DVD	4 80.0%	0 0.0%	3 42.9%	7 63.6%	0 0.0%	7 100.0%	21/38 55.3%	44.9%
Number of respondents ^b	5	2	7	11	7	8	40	
Number of nonrespondents	0	0	1	0	0	0	1	

Source: Nutrition Educator Survey. Question: How often do nutrition educators at the site use the following activities or resources during group education sessions? Weighted percentage of sites that reported using each activity or resource frequently is from the Phase I 2014 Site Survey.

^a The activity or resource was considered to be used frequently if the respondent selected "sometimes" (40%–59%), "often" (60%–89%), or "almost always" (≥90%).

^b Nineteen survey respondents who selected "Never" for a prior question about the frequency they facilitate group education were instructed to skip this question (eligible respondents n = 41). Of the 40 respondents, 3 respondents did not select a response for all activities/resources (Site E = 1, Site F = 2). Percentage calculations reflect the number of responses for each particular activity or resource.

During onsite observations, group sessions were scheduled in Sites A, C, and F; however, because of the small number of group sessions offered in these sites, the observer was limited to viewing seven groups and only five nutrition educators facilitating them. With so few observations, there is little to describe or compare among the three sites. Most participant comments in focus groups and interviews were positive and focused on the benefit of sharing ideas and strategies with other parents and caregivers during group sessions.

- *“There are a lot of times you just kind of feel like ‘oh, am I doing something wrong?’ So to hear other people have that same experience really helps. Another thing is to just get ideas from people who have been in the program for way different amounts of time.” – WIC Participant, Site A*
- *“It’s also gaining different perspectives, you know I may learn something that I didn’t know by these four women right here, and I can incorporate that in my life and that could be beneficial. That’s definitely way better than reading sent-home material or going on the computer, because you’re having this interaction.” – WIC Participant, Site C*

Participants offered suggestions for improving WIC nutrition education during focus groups and interviews, and increasing group education opportunities was commonly recommended. Some participants shared that they would like a selection of group education topics to choose from and flexibility to take part in groups with topics of interest to them.

- *“If there were group sessions where you could choose what to do. I’ve heard the theme of picky eaters coming up or if you wanted a class on certain foods, how to cook the variety of beans that WIC provides or where you have a choice to what type of group you’re going to. But when it’s just assigned to you and you’re like, ‘okay, I have to sit around with a bunch of people’.” – WIC Participant, Site F*
- *“Different topics so everybody can get everybody else’s feedback, you learn more from other people, you get more educated, you learn from other people’s experiences and stuff like that.” – WIC Participant, Site C*

Technology-Based Education. Three of the pilot sites use technology-based education for secondary/follow-up nutrition education. Sites A and E reported using offsite Internet education for approximately 40% of their secondary education/follow-up contacts. Site C began offering Internet education for their participants shortly before the study began and reported that utilization is approximately 5 to 10% of their secondary/follow-up contacts but growing. Because these sites implemented EBT within 6 to 24 months before the study began, there may be a tendency for participants to increase use of technology for nutrition education as they grow accustomed to using technology for their food benefits.

Several participants in focus group and interviews who are part of the three pilot sites that use Internet education described their experiences. Positive themes involved the ease of use and not having to travel to WIC sites.

- *“It’s really nice if that is available because I live 45 minutes away so it is way more convenient for me just to hop online and do whatever I need to do instead of having to get my son ready, put him in the car, bring him down here. I don’t have to make that haul.” – WIC Participant, Site E*
- *“It takes about five minutes, you login, you pick the class you need to go to and you read the questions and answer them and then you’re done.” – WIC Participant, Site A*

Negative themes involved the lack of variety or selection of topics available for nutrition education modules and that the information is too basic.

- *“I guess my thing is if they’re going to make that mandatory I feel like it should teach more or have something rather than just a quick go through and then forget it five minutes after you do it. It’s like if it is going to take my time to do that I want it to be something that I can learn from so that I can get information on and something that applies to me and honestly I tried to find something but most topics don’t apply to me at all.” – WIC Participant, Site A*
- *“The information seems a little bit condescending because it is so simple and basic you don’t really stand to learn anything from it that’s just my personal opinion.” – WIC Participant, Site E*

3.6 Nutrition Education Reinforcers

Nutrition Education Reinforcers

- All sites reported reinforcing nutrition education with brochures or written materials, bulletin boards with nutrition information, and educational props.
- Written materials are often used in one-on-one, face-to-face sessions.
- Follow-up with participants about whether they use a particular reinforcer is limited.
- Most participants shared that reinforcement materials are valuable, and many reported using the materials at home.

Nutrition educators often use materials or resources to reinforce the nutrition messages they provide in one-on-one and group education. Examples include nutrition education handouts, posters, exhibits, props, and cooking demonstrations. Some reinforcers are incorporated into the education sessions, while others are “passive items” displayed or available in waiting rooms or offices. There are also methods of providing reinforcement outside of the WIC site via technology or other means such as DVDs, electronic newsletters, and social media. During the POC initial interview, all of the pilot sites reported using nutrition education reinforcers with WIC participants (see **Exhibit 3-24**). Reinforcers all sites reported using include brochures or written materials, bulletin boards with nutrition information, and educational props. These are also the most frequently used reinforcers reported on the Phase I Site Survey.

Five of the pilot sites show nutrition DVDs/videos to participants during WIC visits. Site POCs reported less use of offsite reinforcers, with Site E using three offsite methods (grocery store tours, DVDs sent home, and text messages with nutrition content), Site A using two methods (newsletters and technology-based resources), and the other sites using one method.

During the onsite observations, the observer noted the number of sessions in which nutrition educators used reinforcers during one-on-one, face-to-face education sessions and during group sessions (see **Exhibit 3-25**). All sites incorporated written materials in more than 50% of one-on-one, face-to-face sessions. Site A has the highest percentage of one-on-one sessions in which written education materials were provided (100.0%), followed by Site C (75.0%) and Site F (64.3%). Site C has the highest percentage of sessions involving other reinforcers and the largest diversity of reinforcers observed, including infant spoons and sippy cups, books, toothbrushes, portion plates, and beach balls to encourage physical activity. Written materials and other reinforcers are incorporated during classes at each of the three sites where group education was observed.

Exhibit 3-24. Use of Onsite and Offsite Reinforcement Methods by Pilot Site (RQ10e)

Method	A	B	C	D	E	F	Overall % of Sites	Weighted % from Phase I Site Survey
Onsite Methods								
Brochures or written materials	●	●	●	●	●	●	100%	100%
Bulletin boards with nutrition information	●	●	●	●	●	●	100%	89%
Computer, kiosk, or tablet computer at site						●	17%	16%
Cooking demonstrations							0%	22%
Display exhibits with nutrition information			●		●	●	50%	48%
Educational props	●	●	●	●	●	●	100%	78%
Food tasting					●		17%	26%
Nutrition education DVDs/videos viewed at site	●	●		●	●	●	83%	52%
Support groups	●	●	●			●	67%	43%
Other ^a		●					17%	2%
Offsite Methods								
Email messages with nutrition education content							0%	2%
Grocery store tours					●		17%	7%
Monthly or quarterly nutrition newsletter sent home	●						17%	15%
Nutrition education DVDs/videos sent home				●	●		33%	23%
Social media		●					17%	25%
Technology-based education used outside of site ^b	●						17%	39%
Telephone calls with nutrition education content							0%	21%
Text messages with nutrition education content					●	●	33%	7%
Other							0%	4%

Source: POC Interviews. Weighted percentage of onsite and offsite methods is from the 2014 Site Survey.

^a Other includes Site B, PowerPoints with nutrition topics used by nutrition educators with low-risk participants. Topics change every 2 months.

^b Technology-based education includes State or local Web sites with nutrition information and other online resources.

● = method used; no dot indicates the method was not used.

During interviews with nutrition educators in Phase I of the study, one prevalent theme was that discussing nutrition education materials with participants increases the likelihood that participants will take and use the information at home. At all six sites, materials were offered and incorporated into the discussion for more than 50% of the observed one-on-one sessions, with Site A having the highest percentage of observations where this occurred (see **Exhibit 3-26**); Site A also ranked high for average number of minutes of nutrition education (as shown in Exhibit 3-1).

Participant Survey responses regarding the use of reinforcement materials are consistent with information collected in the POC Interviews and observations (see **Exhibit 3-27**). Participants most frequently reported using brochures, handouts, or papers with information during WIC visits, with the highest percentages at initial and final from participants in Site A. Participants from Site C reported receiving the highest amount of “Other items (e.g., measuring cups).” Only a small number of participants reported experiencing a tasting or cooking demonstration or an activity or game. About one-third of participants from Site B reported receiving none of the listed reinforcement items.

Exhibit 3-25. Number of Reinforcers Used During Observed One-on-One and Group Education Sessions by Pilot Site (RQ10e)

Reinforcers	A	B	C	D	E	F	Overall
One-on-One, Face-to-Face Education Sessions							
Number of observations when written educational materials (e.g., brochures) were used (n, %)	12 100.0%	6 54.5%	15 75.0%	12 57.1%	7 58.3%	9 64.3%	61 67.8%
Number of sessions incorporating other reinforcers ^a (n, %)	0 0.0%	0 0.0%	13 65.0%	8 38.1%	0 0.0%	4 28.6%	25 27.8%
Number of sessions observed	12	11	20	21	12	14	90
Group Education Sessions							
Number of observations when written educational materials (e.g., brochures) were used (n, %)	3 100.0%	—	2 100.0%	—	—	2 100.0%	7 100.0%
Number of sessions incorporating other reinforcers ^a (n, %)	1 33.3%	—	2 100.0%	—	—	2 100.0%	5 71.4%
Number of sessions observed	3	0	2	0	0	2	7

Source: Onsite observations

^a Other reinforcers include bulletin board/poster, circle charts, computer/tablet/kiosk, display table, educational props, food models, self-study sheet/module, and video/DVD.

— = not applicable

Exhibit 3-26. Use of Nutrition Education Materials During Observed One-on-One, Face-to-Face Sessions by Pilot Site (RQ10e)

Use of Materials	A	B	C	D	E	F	Overall
Education materials not offered (n, %)	0 0.0%	5 45.5%	5 25.0%	9 42.9%	5 41.7%	5 35.7%	29 32.2%
Education materials offered but not incorporated into discussion (n, %)	2 16.7%	0 0.0%	4 20.0%	0 0.0%	1 8.3%	0 0.0%	7 7.8%
Education materials offered and incorporated into discussion (n, %)	10 83.3%	6 54.5%	11 55.0%	12 57.1%	6 50.0%	9 64.3%	54 60.0%
Number of observations	12	11	20	21	12	14	90

Source: Onsite observations

Exhibit 3-27. Participants' Reported Use of Onsite Reinforcement Methods During Nutrition Education Sessions by Pilot Site (RQ10e)

Method	A	B	C	D	E	F	Overall
Initial Survey (n, %) ^a							
Brochure, handout, or paper with information	130 90.9%	80 61.1%	98 72.6%	114 86.4%	112 80.6%	108 76.1%	642 78.1%
Bulletin board or poster	12 8.4%	12 9.2%	12 8.9%	12 9.1%	13 9.4%	16 11.3%	77 9.4%
Video/DVD	11 7.7%	2 1.5%	3 2.2%	2 1.5%	5 3.6%	5 3.5%	28 3.4%
Tasting or cooking demonstration	1 0.7%	0 0.0%	1 0.7%	2 1.5%	0 0.0%	2 1.4%	6 0.7%
Activity or game	4 2.8%	1 0.8%	1 0.7%	2 1.5%	2 1.4%	2 1.4%	12 1.5%
Other items to pass around (e.g., measuring cups)	6 4.2%	2 1.5%	20 14.8%	11 8.3%	9 6.5%	3 2.1%	51 6.2%
None of the above	5 3.5%	45 34.4%	20 14.8%	15 11.4%	19 13.7%	25 17.6%	129 15.7%
Other ^b	4 2.8%	2 1.5%	8 5.9%	2 1.5%	3 2.2%	9 6.3%	28 3.4%
Number of respondents	143	131	135	132	139	142	822
Number of nonrespondents	2	5	6	3	1	3	20
Final Survey (n, %) ^b							
Brochure, handout, or paper with information	37 78.7%	25 61.0%	32 65.3%	27 65.9%	26 61.9%	50 75.8%	197 68.9%
Bulletin board or poster	10 21.3%	3 7.3%	7 14.3%	5 12.2%	4 9.5%	15 22.7%	44 15.4%
Video/DVD	6 12.8%	1 2.4%	3 6.1%	0 0.0%	0 0.0%	1 1.5%	11 3.8%
Tasting or cooking demonstration	4 8.5%	0 0.0%	3 6.1%	0 0.0%	0 0.0%	1 1.5%	8 2.8%
Activity or game	4 8.5%	0 0.0%	1 2.0%	0 0.0%	0 0.0%	2 3.0%	7 2.4%
Other items to pass around (e.g., measuring cups)	7 14.9%	3 7.3%	12 24.5%	3 7.3%	0 0.0%	2 3.0%	27 9.4%
None of the above	4 8.5%	15 36.6%	13 26.5%	11 26.8%	14 33.3%	13 19.7%	70 24.5%
Other ^b	3 6.4%	0 0.0%	2 4.1%	2 4.9%	1 2.4%	4 6.1%	12 4.2%
Number of respondents	47	41	49	41	42	66	286
Number of nonrespondents	7	0	2	1	1	2	13

Source: Participant Surveys, Initial and Final

^a Respondents could select multiple responses.^b Other includes referral to Web site with recipes, use of baby doll for demonstration purposes, app on phone, chart on computer, and other sources.

Participants in focus groups and interviews described the reinforcers they receive. Most participants reported receiving reinforcement materials and said that the materials are valuable; many participants reported using the materials at home.

- *“So she gave me a snacking pamphlet on how they should be eating lots of times a day because their stomachs can’t hold out that long. And that’s something I never even thought of, so I’m really glad for that and the pamphlet was real pretty and I wanted to keep it.” – WIC Participant, Site B*
- *“They gave me something right after my daughter was born that was really helpful, I actually still have it on the fridge. It goes by the ages 0–3 months, 3–6 and so on, and it tells you how much they should be eating typically, but after age one how much milk and how much food and the different types of food and I thought that was kind of cool.” – WIC Participant, Site F*

Participants also discussed reinforcers other than written education materials and explained how these materials help them. Several participants had positive comments about use of reinforcers within the WIC office as well as reinforcement items they take home.

- *“The other thing that helped at my last visit was that she had little cups filled with say juice and I could see how much ... so that was helpful and I could kind of quantify it for her.” – WIC Participant, Site C*
- *“I have been to the WIC office before where they had a bulletin board set up and it showed different drinks and then it had just a sandwich bag with the amount of granulated sugar that would be equivalent to what’s in the drink and to me that stuck with me.” – WIC Participant, Site E*

When asked about types of reinforcement materials they would like to receive from WIC, participants’ most common response is information about the foods in the WIC package. Suggestions from participants included ways to use the WIC foods and recipes that incorporate the WIC foods, including “kid-friendly” recipes.

- *“I wish that the recipes were more catered to what WIC will allow you to get on a WIC check. Of course fruits and vegetables work. I think they give you pasta but there is not sauce or anything that goes along with it, so if you’re going to give me a recipe I would prefer it to be for something I actually receive from you.” – WIC Participant, Site A*
- *“Kid-friendly recipes because kids tend to visually look at their food before even thinking, is it going to taste good? ... so making it look more visually appealing to them, things like that.” – WIC Participant, Site C*

Respondents to the POC initial interview were asked to describe how nutrition educators follow up with participants regarding use of reinforcers. POCs for all sites said there is very little follow-up with participants about whether they use a particular reinforcer. This finding was confirmed during observations when, across all six sites, only one nutrition educator asked the participant if she had watched a DVD provided at the previous visit.

3.7 Referrals

Along with supplemental foods, nutrition education, and breastfeeding support, WIC provides referrals. Because referrals are an integral part of WIC services, they were the focus of a research question. During the POC initial interviews, respondents described programs or organizations to which participants are often referred. These include

- health care/medical providers;
- Medicaid;
- early intervention and home visiting programs;
- childcare resources and Head Start;
- dental services;
- food pantries, food assistance programs and the Supplemental Nutrition Assistance Program (SNAP); and
- breastfeeding and parenting hotlines, resources, and support groups.

Referrals

- The frequency of referrals provided during the observations was correlated with nutrition educators' beliefs about having the necessary referral information available.

Nutrition Educator Survey respondents reported their level of agreement with the statement “I have the necessary referral information for other programs and resources that are available to assist participants to achieve their nutrition, breastfeeding, physical activity and other behavioral goals” (see **Exhibit 3-28**). The most frequent response across all sites is “agree” (62.1% of respondents). Site C has the highest percentage of nutrition educators who “strongly agree” with that statement (66.7%), while Site E has the only “disagree” responses (22.2%).

Exhibit 3-28. Availability of Necessary Referral Information Reported by Nutrition Educators by Pilot Site (RQ11h)

Agreement Level ^a (n, %)	A	B	C	D	E	F	Overall
Strongly agree	3 37.5%	0 0.0%	6 66.7%	7 36.8%	1 11.1%	3 30.0%	20 34.5%
Agree	5 62.5%	3 100.0%	3 33.3%	12 63.2%	6 66.7%	7 70.0%	36 62.1%
Disagree	0 0.0%	0 0.0%	0 0.0%	0 0.0%	2 22.2%	0 0.0%	2 3.4%
Strongly disagree	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%
Number of respondents	8	3	9	19	9	10	58
Number of nonrespondents	0	0	1	0	1	0	2

Source: Nutrition Educator Survey

^a Agreement with statement “I have the necessary referral information for other programs and resources that are available to assist participants in their nutrition, breastfeeding, physical activity, and other behavioral goals.”

The observer noted the number and types of referrals offered during one-on-one, face-to-face observations and whether a referral was not made when it appeared to be needed (see **Exhibit 3-29**). Site C has the highest percentage of observed sessions during which nutrition educators provided a referral (55.0%), which is consistent with the nutrition educators' confidence level in having the necessary referral information to assist participants. Site A has the second highest level of referrals provided (50.0%), and this site also has the second highest percentage of nutrition educators who agreed with the survey statement about having the necessary referral resources. For all six pilot sites, the observer noted only one "missed opportunity" when a referral was needed but was not provided.

Exhibit 3-29. Participant Referrals Provided During Observed One-on-One Counseling Sessions by Pilot Site (RQ11h)

Referrals	A	B	C	D	E	F	Overall
Referral provided (n, %)	6 50.0%	3 27.3%	11 55.0%	8 38.1%	0 0.0%	3 21.4%	31 34.4%
Referral not needed (n, %)	6 50.0%	8 72.7%	9 45.0%	12 57.1%	12 100.0%	11 78.6%	58 64.4%
Referral needed, but not provided (n, %)	0 0.0%	0 0.0%	0 0.0%	1 4.8%	0 0.0%	0 0.0%	1 1.1%
Number of observations	12	11	20	21	12	14	90

Source: Onsite observations

The Nutrition Educator Survey asked respondents how frequently they provide referrals to WIC participants (see Appendix I, Exhibit I-14) with response options of "never," "rarely," "sometimes," and "often." In all sites except Site E, the majority of staff responded they provide referrals "often." Consistent with the other survey responses and observations, Sites A, C, and F have the highest percentage of respondents who selected this response (87.5%, 77.8%, and 80.0%, respectively). Site E has the largest percentage of nutrition educators who selected "sometimes" (60.0%) or "rarely" (10.0%). During the onsite visit at Site E, no referrals were observed, although there were also no sessions observed where referrals appeared to be needed but not provided. Several participants in focus groups and interviews suggested that it would be helpful for WIC to have a list of available resources and emphasized that this list should be updated frequently.

3.8 Cultural and Language Considerations

To explore environmental or contextual factors that support or challenge the delivery of nutrition education, staff and participants in the pilot sites responded to questions about culture and language.

Respondents to the Nutrition Educator Survey rated their level of confidence in providing nutrition education to participants whose language differs from their own (see **Exhibit 3-30**).

Overall, the most frequently selected response across all sites was "somewhat confident" (49.1%), closely followed by "very confident" (47.4%). The two sites with the highest percentage that selected "very confident" are Site C (80.0%) and Site D (68.4%). Site C is also the site with the highest percentage of Spanish-speaking participants.

Cultural/Language Considerations

- Most nutrition educators across all sites feel "somewhat confident" or "very confident" providing nutrition education to participants whose language differs from their own.
- Methods for communicating with people who spoke languages other than English vary across sites.

Exhibit 3-30. Nutrition Educator Confidence Providing Nutrition Education to Participants whose Language Differs from Their Own, by Pilot Site (RQ12)

Confidence Level (n, %)	A	B	C	D	E	F	Overall
Very confident	1 12.5%	0 0.0%	8 80.0%	13 68.4%	3 30.0%	2 28.6%	27 47.4%
Somewhat confident	6 75.0%	3 100.0%	1 10.0%	6 31.6%	7 70.0%	5 71.4%	28 49.1%
Not at all confident	1 12.5%	0 0.0%	1 10.0%	0 0.0%	0 0.0%	0 0.0%	2 3.5%
Number of respondents ^a	8	3	10	19	10	7	57
Number of nonrespondents	0	0	0	0	0	0	0

Source: Nutrition Educator Survey

^a Three respondents from Site F did not answer this question because they responded to the question "How do you provide nutrition education to participants who do not speak English?" with only "I speak the same language as most of our non-English speaking participants" (eligible respondents n = 57).

The Nutrition Educator Survey also collected information on the methods used to provide nutrition education to participants who do not speak English (see Appendix I, Exhibit I-15). Responses selected by 50% or more of respondents were "language line/phone interpreter services," "participants bring a family member or friend to interpret," "a bilingual WIC staff member translates," or "interpreter available at site." Site F, which has the second highest percentage of Spanish-speaking participants, has the highest percentage of staff who selected "the educator speaks the same language as most non-English Speaking participants."

During onsite visits, appointments conducted through interpreters were observed in Sites C and D. At Site C, clerical staff served as interpreters for nutrition staff who did not speak Spanish. Site D has a professional interpreter service that offers same-day scheduling (interpreters can be requested on the day they are needed) for participants who do not speak English. Interpreters in both sites appeared well trained. Two participants from Site C who took part in Spanish-language interviews spoke positively about working through interpreters at WIC visits.

— *"There was a translator with us but [the nutritionist] paid attention to me, she looked at me the entire time, she wasn't distracted, she wasn't talking on the phone, she just looked at me." – WIC Participant, Spanish-Language Interview, Site C*

There were a few occasions observed when language considerations were not addressed appropriately. For group sessions, the observer noted two instances when a participant was apparently unable to understand the information. In one example, a Spanish-speaking participant was placed in an English group without a translator. In another group session, a deaf participant attended the session with her mother who attempted to communicate the information via sign language; however, the pace of the information was too fast, and the mother stopped signing part way through the session. The observer noted that both participants appeared engaged and interested at the start of the session but lost interest when they were unable to understand the information. In a third observation, the participant spoke minimally with one-word responses; it was unclear whether an interpreter was needed or whether the participant understood enough English to have a productive appointment.

Several participants shared comments pertaining to cultural issues during focus groups and interviews with some of them commenting that WIC does not assess or address cultural food practices appropriately.

- *“And I think one thing important for WIC is to also understand other cultures and how other cultures eat ... culture plays a big part in what you eat on your own. And a lot of the foods aren’t on their [WIC] topics ... so if they were more aware of other cultures and their traditions, of the types of food they always eat.... because Hispanics eat a lot of rice, where other cultures might not eat a lot of rice.” – WIC Participant, Site C*
- *“Teaching them about cultural differences, saying you know, there are different cultures, there are different ways you can approach them.... Just having some more multicultural people there, maybe other people from other cultures there, in case someone has a question.” – WIC Participant, Site D*

In addition to cultural differences related to different countries of origin and primary languages, a few participants mentioned other types of differences that WIC may not address adequately. Some of these included vegetarian lifestyles, interactions with fathers or male caregivers, and accommodation of blind participants.

3.9 Other Site Characteristics

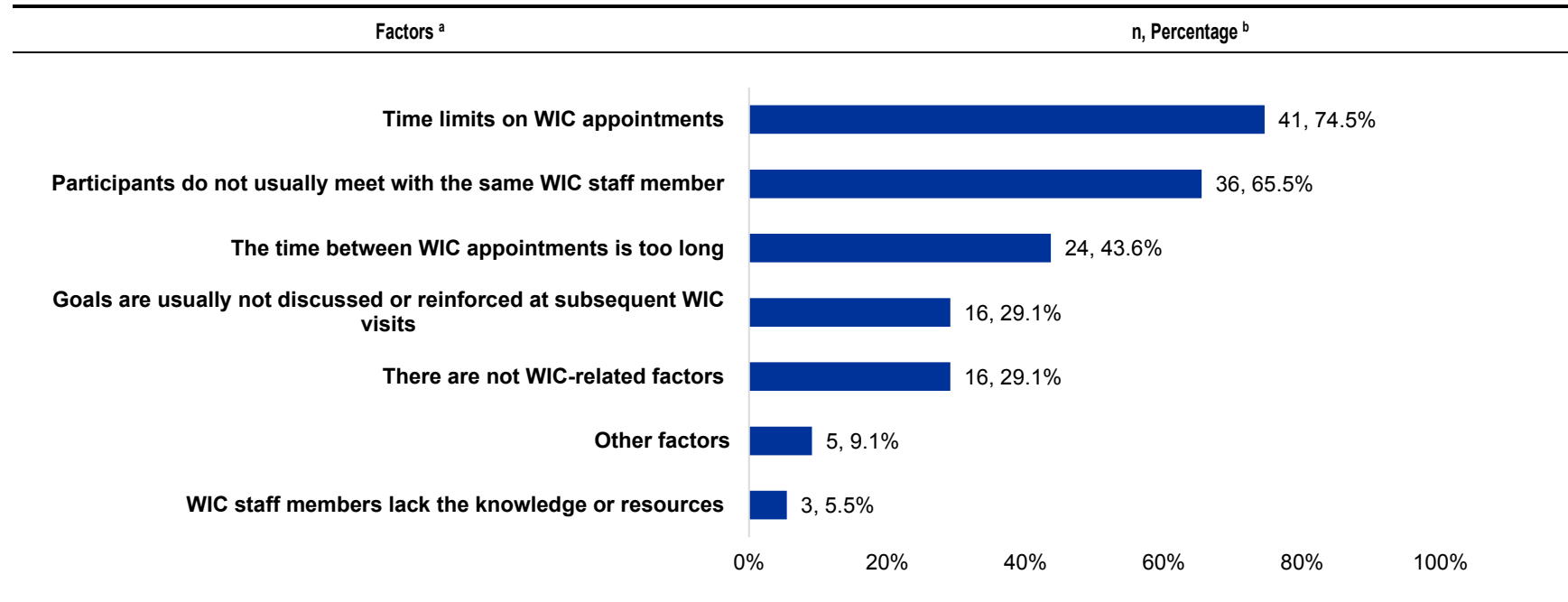
In addition to language and cultural factors, site staff and participants identified other factors that support or challenge implementation of effective nutrition education, including program or site processes, the facilities and space available for nutrition education, and other WIC-related factors. In the POC Interviews, respondents shared a range of environmental or contextual factors at the local or State level that support their site in implementing effective nutrition education, including:

- policies to accept walk-in appointments
- farmers’ markets that come to WIC sites
- cross-trained staff who can fulfill multiple roles
- support groups available for WIC participants (e.g., parenting or breastfeeding support groups)
- having a Breastfeeding Peer Counseling Program

All six site POCs reported the space within their facility for providing nutrition education is adequate. The observer noted that space for nutrition education is sufficient in each site with offices or cubicles that ensured privacy. Rooms used for group education are also private and big enough for the groups convened in them. Two sites do not have toys in the waiting rooms or offices, and the observer noted it is more challenging for parents and caregivers to occupy their children during visits at these sites. In focus groups and interviews, several participants commented about the helpfulness of toys and other activities to occupy children.

Nutrition educators were asked about WIC-related factors that present the greatest challenge to helping participants achieve their goals (see **Exhibit 3-31**). The two factors that reportedly present the greatest challenge are “time limits on WIC appointments” and “participants do not usually meet with the same WIC staff member.” The factor that presented the least challenge is “WIC staff members lack the knowledge or resources,” which indicates nutrition educators’ confidence in their knowledge level and available resources.

Exhibit 3-31. Nutrition Educators' Opinions on WIC-Related Factors that Present the Greatest Challenge to Helping Participants Achieve Goals (across All Six Sites) (RQ12)



Source: Nutrition Educator Survey. Question: In your opinion, which WIC-related factors present the greatest challenge to helping participants achieve their goals?

Notes: Respondents n = 55; nonrespondents n = 2. Three survey respondents who indicated goals are not set or rarely set during one-on-one sessions were instructed to skip the question (eligible respondents n = 57). Other factor responses (n = 5): (1) WIC participants lack experience setting goals, the process is difficult to get them to understand; (2) Too many basic needs to address—food and shelter concerns; (3) Participants sometimes do not change as goal/plan; (4) Goals set are not set by client but by WIC staff; (5) Financial matters are very significant with our caseload so it is difficult to get enough healthy foods for the child.

^a Respondents were instructed to select up to three factors from a list of seven factors.

^b Number and percentage of respondents that selected the factor.

Consistent with one of the challenges identified by nutrition educators, when asked about ideas to strengthen WIC nutrition education, several WIC participants in focus groups and interviews suggested meeting with the same staff member during each WIC visit. They suggested that meeting with the same WIC staff member would avoid duplication of questions and would help facilitate deeper ongoing conversations about behavior change.

3.10 Participant Satisfaction and Suggestions for Improvements

In focus groups, interviews, and the Participant Surveys, participants shared their perceptions of the helpfulness of WIC visits and suggestions for improvements.

3.10.1 Level of Customer Service

Focus group and interview participants had a mix of responses about the level of customer service from WIC staff, including nutrition educators. Participants at Sites D and F generally spoke positively about the level of customer service and described the staff as “courteous,” “friendly,” and “super polite.” Participants at these sites felt like they were not being judged and staff treated them “like a person.” During focus groups, participants referenced not feeling rushed as an important aspect of WIC customer service.

- *“I never feel like they have somebody else they need to rush to or something else they need to do, I’ve never felt that way.” – WIC Participant, Site F*
- *“You are their priority once they take you. So it’s not that push, get out of here as fast as possible; they’re super nice about it.” – WIC Participant, Site D*

Participant Satisfaction

- Assessments of customer service varied by site and for different staff members.
- Information received from WIC, although often not new, serves as a useful reminder.
- Tailored goals focused on participants’ interests are effective and best supported by ideas and strategies from WIC staff.
- Participants want individualized services that focus on positive changes rather than deficiencies.

Most of the negative comments related to customer service came from participants in focus groups at the two sites with the lowest number of observed attributes associated with VENA or participant-centered education (Sites A and E). Some participants at these sites had the impression that staff judged them; for example, one participant noted, “they [think they] are better than you.” Some participants considered site staff to be rude in their interactions with them.

3.10.2 Information Received from WIC

Most participants reported that the information they received from WIC is not new, and some described the information as “common sense” or “stuff that we already know.” Participants with more than one child who has received WIC benefits are more likely to report that the information they receive is repetitive. As discussed in more detail in Chapter 5, participants’ prior exposure to WIC nutrition education may have limited the impact observed on participant behaviors. Some participants shared that it would be helpful for WIC to provide more detailed nutrition information for those participants who already have a solid knowledge base. Several other participants, however, shared that having reminders about the information is helpful.

- *“For me sometimes when they repeat something it can sometimes be something that was at the back of my mind that I really didn’t think about and so having it brought up is kind of like “oh, yeah, that’s right” so it kind of reminds me sometimes.” – WIC Participant, Site F*
- *“For me it’s the reminders, or I guess there’s two things. There’s the reminder factor like ‘oh yeah, I need to really work on the whole grains’ thing; like I know whole grains are better than the white bread, but just hearing it again and ... we do the goals thing and that helps remind me like yeah, I really need to get some more vegetables in.” – WIC Participant, Site C*

In the Participant Surveys, respondents were asked which of four statements best describe the information they received at their most recent WIC visit (see Appendix I, Exhibit I-16). Consistent with comments from some participants in the focus groups and interviews, the most common response selected across sites is “The information was helpful. I knew the information but it was good to hear it again” (58% of participants to the initial survey). Thirty-four percent selected “the information was helpful because it was new to me,” 7% selected “the information was not that helpful because I [participant] already knew it,” and 1% selected “The information was not that helpful because it did not apply to me.”

3.10.3 Reported Behavior Changes

The majority of participants in focus groups and interviews described behavior changes they had made in the last 6 months. Behavior changes described by participants related to several themes including healthier food choices, drinking more water, increasing physical activity, decreasing sedentary activity, eating together as a family, eating outside the home less often, and breastfeeding. One participant commented that two of her children have lost weight since changing the way they eat.

Participants discussed factors that help them make behavior changes. Several shared that simply getting the WIC foods has resulted in changes in the way their family eats. This finding suggests that it may be difficult to directly attribute changes in participant behaviors to WIC nutrition education.

- *“If you’re offered wheat bread and brown rice on WIC, you’re more likely to eat that because it comes with it and that’s probably a better way of changing your habit than somebody just telling you that you shouldn’t eat white bread anymore.” – WIC Participant, Site D*
- *“I was eating so unhealthy and it was mainly because I didn’t have enough money to really eat healthy, but after I got on WIC I actually started eating vegetables a lot more ... I did start eating a lot healthier thanks to WIC.” – WIC Participant, Site F*

Others reported that the nutrition education they receive from WIC helps them make positive behavior changes.

- *“WIC is a great help, aside from – well, with what they give us, the products that they give. But the information that they give really helps because it makes you aware of how important it is to take care of our kids. About how important it is to help them out at home so that they can learn from an early age.” – WIC Participant, Spanish-Language Interview Site C*
- *“I feel like it’s not as bad to give her more cereal because it’s whole grain ... I’ve actually learned a lot of stuff, I was like ‘oh, this is whole grain cereal’. I ate this stuff when I was a kid, but we do eat a little better, so the program works as far as trying to get you to eat healthier.” – WIC Participant, Site A*

Participants described characteristics of the goal-setting process that help them make behavior changes. As described in Section 3.4, participants shared that they are more likely to follow through on goals that

they set themselves, and receiving ideas and strategies to achieve the goal helps them be successful. They also reported that discussing the goal and any progress or challenges in meeting the goal at a subsequent WIC visit is helpful and offered suggestions for reinforcers that may help them reach their goals such as meal planner materials and text message reminders.

3.10.4 Suggestions for Improvement

Suggestions from focus group and interview participants for improving WIC nutrition education centered on how changes in the discussions with nutrition educators would improve participants' WIC experience and other ways participants would like to receive nutrition information from WIC. Suggestions from participants regarding how nutrition educators could improve include

- focus less on negative behaviors,
- place less emphasis on a child's weight and more on healthy behaviors, and
- individualize nutrition education sessions.

Focus Less on Negative Behaviors. Several participants shared negative comments about nutrition educators telling them that what they are currently doing is wrong. Some shared that this approach makes them feel like they are “bad parents.” Several participants suggested nutrition educators focus less on negative behavior and more on offering strategies to make positive changes.

- *“Maybe making more of a relationship as opposed to them lecturing would be to not make you feel bad, because it's basically like you're going through this checklist that they have and they're telling you everything you do wrong. And they're not being mean or degrading about it, but that's like how I feel.” – WIC Participant, Site C*
- *“Maybe instead of saying “no that's a no-no” or “you know you're not supposed to do that” maybe saying “okay, well you do this, maybe you should try this.” You know ... just having a better way of telling you about it, like putting it out there towards you maybe not just telling you ‘no, this is wrong and this is how you're supposed to do it.’ Maybe having better suggestions.” – WIC Participant, Site A*

Shift Emphasis from Weight to Healthy Behaviors. In every focus group and in the interviews, participants shared negative comments about WIC's emphasis on children's weight and/or growth charts. Some participants felt that WIC does not allow for enough variation in weight and growth among children. Participants shared that focusing more on healthy behaviors and less on weight would improve their nutrition education experience.

- *“They shouldn't look at the chart and say ‘your child's obese,’ they really should know more about your child, their bodies ... that some children are taller than others, some children as thin as a pencil, you know and they can eat like a horse, so I think they should look at more than just measuring.” – WIC Participant, Site C*
- *“WIC needs to be more wellness focused and not so much numbers focused.” – WIC Participant, Site E*
- *“I feel like a lot of us agree that they should stop focusing on the weight thing, I feel like if they focused a lot more on talking about how your kid's diet is and that they're actually having fruits and vegetables and things that are healthy for them and just making sure that they're getting what's healthy then it shouldn't matter what they weigh ...” – WIC Participant, Site F*

Individualize Nutrition Education. Many participants mentioned the need for nutrition educators to individualize the information and suggestions. Several participants recommended that nutrition educators

customize conversations based on participants' culture and food preferences, previous experience, and current knowledge of health and nutrition.

- *"They do come at you assuming that you have almost no knowledge whatsoever about nutrition and some people really don't so that's helpful but some people have quite a bit of depth of understanding of the things and it would be nice to take it to the next level."* – WIC Participant, Site F
- *"Teaching them about cultural differences, saying you know, there are different cultures, there are different ways you can approach them. The way you can approach an African person, that may be different from the way you approach an Arabian."* – WIC Participant, Site D

Some participants shared that each child is different and they do not want to be treated like everyone else. At two of the sites, participants described this as "being put in a box."

- *"Each child is individual, like don't just put my child in a box with, I don't know, somebody else's child."* – WIC Participant, Site C

3.10.5 Suggestions for Reinforcing Nutrition Education

When asked about ways WIC could reinforce nutrition education, many participants suggested a periodic newsletter or information sheet delivered as an electronic newsletter or in a text message format with links to more information on various topics. Topics suggested for newsletters include information about upcoming events, recipes for WIC foods, nutrition tips, and seasonal items. They shared that receiving a newsletter should be a choice made by participants and not forced on everyone.

Many participants suggested offering cooking classes or food demonstrations at WIC sites, particularly classes that offer practical tips they can use at home. Several participants suggested involving children in the activities.

- *"I think food demonstration would be definitely good because a lot of people these days don't know how to cook and they find it easier to just go get the processed food or go to fast food ... but if people were at least shown this is how easy it is to cook."* – WIC Participant Site C
- *"You could even do a class where the kids are actually involved with preparing the food and then they might be more likely to try it."* – WIC Participant, Site E

3.11 Summary of the Process Evaluation for the Pilot Study

As described in Chapter 2, sites for the pilot study were purposively selected to vary in terms of geography, caseload, and other site-level characteristics as well as features that may influence the impact of WIC nutrition education on participant behaviors, in particular exposure to nutrition education and the use of VENA or participant-centered practices. A goal of the process evaluation was to assess whether the data collection methods developed to address the research questions could discern differences in nutrition education delivery across the pilot sites, including variation anticipated when sites were selected and variation captured through a comprehensive approach. The process evaluation was effective in identifying and describing diversity in nutrition education delivery across sites with some similarities as well as notable differences in delivery mode, participants' exposure to nutrition education (i.e., number and length of contacts), nutrition educator characteristics, techniques used by nutrition educators such as goal setting and other participant-centered practices, and resources used to reinforce nutrition messages. While

many of the nutrition education features examined differed significantly across sites, there was notably less variation within sites (e.g., there was a high degree of alignment of nutrition education features and educator practices within each site). Data collection methods were successful in responding to all research questions, although the small number of sites limited opportunity for comparisons described in a few of the questions (e.g., some features were not present in any of the sites or were the same in all six).

Section 3.11.1 integrates multiple data sources from the process evaluation to describe the diversity in nutrition education across sites and to explore features that may be more useful than others to explain variation in WIC participant satisfaction and the potential effect on outcomes. Section 3.11.2 addresses lessons learned about the process evaluation instruments and data collection methods, and Section 3.11.3 outlines potential implications for WIC nutrition education practice based on the results of the process evaluation.

3.11.1 Integrating Process Data to Describe Variation in Nutrition Education Delivery across Sites

Given all of the process data described in this chapter, the variation across sites is sufficient to *qualitatively* compare and contrast key features of nutrition education delivery, although as discussed in more detail in Chapter 5 these differences may not have contributed to an effect on participant outcomes related to nutrition and physical activity based on the results of the impact analyses. Additionally, the review of the process data yielded interesting patterns or groupings of features that may be useful for planning future evaluations. Several of the research questions target two aspects of nutrition education that may influence participant outcomes: the amount of exposure to nutrition education and the way the nutrition education is provided, for example, techniques and practices of educators. As shown in Exhibit 3-1, process data were used to classify each pilot site according to the amount of nutrition education (length of contacts) and the use of VENA/participant-centered practices (referred to as VENA for brevity) in one-on-one sessions, with two sites in each classification of low, medium, and high for each of these variables. One way to consider how length, VENA, and other nutrition education features may influence participants' experience with WIC and potentially outcomes is to examine comments participants shared during focus groups and interviews. For example, participants at two sites (Sites D and F) shared more comments about their WIC experience coded by analysts as "positive" than participants at the remaining four sites. Participants' perception of WIC and the nutrition education they receive may influence their receptivity and motivation to act on information, which, in turn, may affect participant behaviors/outcomes. A comparison of sites where participants shared more favorable comments with sites where comments were less favorable is provided below along with summaries of process data compiled for other key nutrition education features.

Length of Contacts. Anecdotal evidence from the process evaluation suggests that the impact of nutrition education on participant behaviors may be influenced less by the overall quantity of time spent with the nutrition educator and more by how that time is spent. This may help explain why significant impacts were not observed for the impact evaluation analyses presented in Chapter 5. As described in Section 3.1, the measurement used to classify sites by length of nutrition education was the average number of minutes spent on nutrition education during observed one-on-one visits for participants not identified as high risk. The two sites with the lowest number of minutes were assigned a rating of low, the two sites with the highest number of minutes were assigned a rating of high, and the remaining two sites were

assigned a rating of medium. Sites A and D were both classified as “high” with similar minutes spent on nutrition education during visits. From focus groups, Site A had the lowest number of participant comments coded as “positive,” whereas Site D had the second highest number. Data from observations at these two sites reveal differences in how the time was spent. Educators at Site A covered the highest average number of topics (see Exhibit 3-12) and provided nutrition education materials more frequently (see Exhibit 3-25) than educators in Site D and all other sites. There were also differences in the level of participant engagement in the nutrition education at these two sites; in Site A, the observer noted high participant engagement in only 25% of appointments, while it was noted during 76% of appointments at Site D (see Exhibit 3-14). These differences contributed to classifying Site D as “high” in VENA and Site A as “low,” illustrating how participant experience, and potentially behavioral outcomes, may be shaped more by what occurs *during* nutrition education than the *amount of time* spent.

Looking at length of nutrition education from the opposite perspective, at the two sites classified as “low” length of nutrition education (Sites B and E), participants in focus groups were more likely to report receiving little or no nutrition education during their WIC appointment than participants in other sites. In observations, educators in Site E spent the shortest amount of total time with participants and had the lowest average number of minutes of nutrition education. Site E was also classified as “low” VENA. As described in Section 3.1, sites were assigned a rating of low, medium, or high VENA based on an index that considered level of participant engagement, use of affirmations and open-ended questions, and whether the needs and interests of the participants determined the focus of the discussion. For Site B, although the appointments were quite short, nutrition education was observed in all appointments, and educators used sufficient VENA techniques to classify it as “medium.” This suggests there may be a minimum length of face-to-face time required for participants to perceive it as nutrition education.

VENA/Participant-Centered Practices. The results of the process evaluation suggest that use of VENA practices may be associated with greater participant satisfaction with the nutrition education experience overall. Sites D and F, where participants shared the most favorable comments about their WIC experience, were classified as “high” VENA from observation data using the index described above. The observer recorded these VENA practices in more than 75% of the appointments at both of these sites. In contrast, Sites A and E were classified as “low” VENA with the observer recording the practices in less than 33% of appointments (see Exhibit 3-14). As described in Section 3.10, participants in focus groups across all sites shared aspects of WIC that are important to them such as individualizing the nutrition education, engaging them in the discussion, and focusing more on positive and less on negative behaviors, which are key aspects of the VENA approach. As previously noted, the results of the impact analyses reported in Chapter 5 did not identify an association between site-level variation in the use of VENA and participant outcomes.

Goal Setting. Because goal setting was frequently observed in all but Site E, the data captured on the process and techniques for setting goals are useful for describing variation in what participants experience, which may influence how they act on or achieve goals. In focus groups, participants reported that individualization is important and that they are more likely to follow up on goals they set themselves. Based on the Nutrition Educator Survey, educators share this view with respondents, selecting “allowing participants to identify their own goals” as very important to their success in achieving them. Based on observations, this view does not always translate into action. While Sites D and F had high percentages of

observations where the participant was engaged in the goal-setting process, this occurred in a little under half (46%) of observations across all sites (see Exhibit 3-17). In addition to engaging participants in setting goals, educators in Sites D and F, along with those in Site C, further individualized the goals by discussing ideas and strategies to achieve them in more than 75% of observations. This occurred in fewer than 40% of observations at the other three sites (see Appendix I, Exhibit I-11). Information from different data sources about goal-setting practices was consistent for most, but not all, sites. For example, in Site A, although 89% of nutrition educators reported that participants had “a lot” of input into the goal-setting process (see Exhibit 3-16) and the majority (63%) said “the participant and I select the goal together” (see Exhibit 3-15b), the observer noted that goals were primarily determined by the nutrition educator in 78% of observed sessions.

Training and Credentials. The process evaluation data may indicate that more intensive training contributes to use of VENA techniques and greater participant satisfaction. The POCs for the two “high” VENA sites that had the most participant comments coded as “positive” also reported more hours of staff training in an average 6-month period than other sites (see Exhibit I-5). From the process data, it is unclear how nutrition educator credentials and experience relate to the use of VENA techniques or participants’ WIC experience in the six sites. Additional data on how much time educators with different credentials and experience spend providing direct nutrition education may be necessary in order to examine these characteristics. For example, educators who have more credentials and experience may have multiple roles such as site supervisor or nutrition education coordinator with minimal time spent working directly with participants.

Reinforcers and Referrals. The process data include features other than the nutrition education discussion that may influence participants’ WIC experience and outcomes, namely, items to reinforce the nutrition information and referrals to other services that may support participants’ interests and goals. Reinforcers were used across pilot sites and were often similar (e.g., written materials), making it difficult to identify site variation that may affect outcomes. Participants in focus group and interviews across all sites reported enjoying reinforcers and using them at home, but none of the sites indicated they have a method for following up with participants on use of these, and in only one observation did an educator mention a reinforcer provided previously. To assess the influence of reinforcers in future evaluations, it would be important to select sites that vary in their use.

Referrals may also support or reinforce nutrition education by either directly supporting the participants’ nutrition-related goal or by addressing an underlying need (e.g., housing, childcare), allowing the participant to then focus on a health- or nutrition-related goal. During observations, educators provided referrals in all but one session where a referral was warranted, with Site C having the highest percentage (see Exhibit 3-29). Nutrition educators from Site C also reported the highest level of confidence about having the referrals they need in the Nutrition Educator Survey. Site E was at the other end of the spectrum in both observations and nutrition educator response to the survey question. Comparing reinforcers and referral practices across a larger, more diverse group of sites may highlight the influence of resources other than the nutrition education session itself on behavior change.

Modes. The pilot study was unable to collect sufficient data about modes of nutrition education other than one-on-one, face-to-face education to accurately describe the variation in types and quality across sites or

examine the potential effect on participant experience or outcomes. This is because the use of group and technology-based education was limited among the six pilot sites. A consideration for future evaluations is not only the number and quality of nutrition education modes available but also how the mode is selected, for example, whether the participant chooses the mode or educators assign it. Some modes may be more effective or desirable for individual participants than others. Participants in all focus groups and interviews expressed interest in parent groups or classes and they also had favorable comments about Internet education. Many also commented about wanting choice, a theme that is discussed further in Section 3.11.3.

At two of the pilot sites, POCs reported that use of offsite Internet education is rapidly increasing with group education declining, and they associate this trend with implementation of EBT for food benefit delivery. As all States transition to EBT, the modes for WIC nutrition education may change with increased use of technology and “remote” education and less onsite education. Comments from participants in the pilot study indicate it is important to ensure that content offered through technology addresses diverse topics and offers advanced education options for participants who have a strong knowledge base in nutrition. Investigating diversity of topics and techniques for engaging participants who use technology-based education is an area for future exploration, as well as a consideration for WIC agencies and companies/organizations that develop technology-based education.

3.11.2 Lessons Learned for Future Evaluations

The pilot study results suggest that the methods and instruments used for the site-level data collection have potential application for future studies that involve describing attributes of nutrition education delivery, characterizing key features of WIC sites, and identifying similarities and differences among WIC sites that may explain variation in participant experience and outcomes. Lessons learned and recommendations for future evaluations of WIC nutrition education are summarized below.

Site Selection. Sites for the pilot study were purposively selected to vary in characteristics of nutrition education delivery that may influence participant behaviors and other factors such as geography and caseload. The primary source of characteristics used for the selection was self-reported, Phase I Site Survey responses. Several of the data items used for site selection were validated or updated during site POC Interviews at the start of the pilot, and for others, similar data were collected via Nutrition Educator Surveys or observations. These follow-up methods indicate that some site-reported data are reliable for use in site selection. However, the dynamic nature of WIC needs to be considered with site-reported data collected near the time of selection and evaluation protocols flexible to accommodate changes in staffing, modes, and other site characteristics during the course of the study.

Use of site-reported data on features related to nutrition education exposure may be effective in selecting sites with varying levels, but if the selection goal is to target a specific amount of nutrition education received by participants, site-reported data may be less reliable. For example, Site Survey responses for the amount (range of minutes) of nutrition education provided during one-on-one sessions facilitated selection of sites with high, medium, and low length of education, although this variation was not sufficient at the participant level to support the use of an exposure-response design for estimating impacts (see Chapter 5). Based on the observations of one-on-one sessions, all but one site overestimated the

amount of nutrition education actually provided. The pilot also indicates that site-reported data are less reliable for techniques such as use of VENA/participant-centered practices. Half of the sites provided Site Survey responses about use of these techniques that were inconsistent with data collected during the pilot. However, the pilot demonstrates that there is likely natural variation in these practices across sites even if it is difficult to predict the practices used. Changes in the use of nutrition education modes after the sites were selected and during the course of the evaluation limited data collection on group education. For future evaluations that are designed to examine specific techniques or modes of nutrition education, site selection would require in-depth discussions about current practices and/or a willingness of the sites selected to implement new practices.

Nutrition Education Observations. The pilot demonstrated that observation of one-on-one, face-to-face WIC nutrition education provides a rich source of data on educator practices and techniques. The observation data show that some practices tend to cluster or align within the individual educator. For example, in sessions where participants did 40% or more of the talking, the educators used more open-ended questions. This finding suggests that the observation process can be streamlined for future studies by reducing the number of features the observer looks for during an education session. Specifically, in the pilot study, observers collected 12 indicators pertaining to attributes of one-on-one, face-to-face education sessions. These indicators were in addition to capturing data on the number and type of topics discussed, time spent on nutrition education, and types of reinforcers used during the session. Based on the pilot study, attributes that are most important to collect through observation include whether the participants' needs and interests determine the focus of the nutrition education discussion, the level of engagement of the participant in the goal-setting process, and whether the nutrition education supports a positive approach with affirmations of participant strengths and behaviors. Examples of attributes that could be omitted in future evaluations include strategies for sharing education materials, asking permission before sharing unsolicited nutrition advice, and whether the seating arrangement facilitates conversation. Reducing the number of attributes the observer looks for would streamline the training for observers and the onsite data collection process and would also reduce the level of effort for analysis.

The pilot also identified inconsistencies between the Nutrition Educator Survey responses and observed practices related to goal setting and topic selection. Because data on practices collected by a trained observer are more objective than a self-assessment or recall of this information, for future evaluations, these questions could be omitted from a Nutrition Educator Survey to reduce burden for the site staff. However, a sufficient number of observations, for example, all educators observed three or more times, are needed to ensure the observation data accurately represent attributes and features of nutrition education at a site.

Scheduling and Length of Onsite Visits. The study team encountered logistical challenges in scheduling the onsite observations at a time when there was opportunity to observe group education, in part because a limited number of group sessions were offered. For sites that offer group education, planning the onsite visits at times when the site indicates the sessions are historically best attended may offer more opportunity to observe group education. However, these sites will require a longer onsite visit to address the possibility that some group sessions may be cancelled before or at the time of the onsite visit because of the low number of participants.

The study protocol specified that the study team spend 16 hours at each site regardless of the size of the site. For future evaluations, the length and timing of onsite observation visits should be customized based on the number of nutrition educators at the site, the modes used, and the approach to scheduling appointments. For example, it is reasonable to complete observations in 1 day in smaller sites with fewer than four nutrition educators who primarily provide one-on-one, face-to-face nutrition education. The length of a visit in a site that offers one-on-one and group modes needs to consider both the number of staff and number and timing of group sessions. None of the pilot sites offered onsite, technology-based education, but if that mode is of interest in future studies, it will be important to work with the study sites to identify times when participants are most likely to use this and schedule the onsite visit during that period. Additional time will also be required to collect data on how sites make offsite, technology-based education available and to review modules.

Educator Training Records. For the pilot study, data collected on training for nutrition educators lacked specificity. Information on types of training and the topics covered in training for the 12 months preceding the pilot was collected in the Nutrition Educator Survey. Information on training provided to educators at the site was also collected in the POC initial interviews for the 6 months before the start of the pilot and for the 12-month pilot period. In addition to describing the training topics, the interviewer asked POCs to quantify the number of hours of training on different topics. Although these combined responses provide a picture of nutrition educator exposure to training, they do not provide data for individual educators, for example, how many hours of training on a particular topic each educator has received. If future evaluations of WIC nutrition education seek to identify the type and amount of nutrition educator training that are associated with certain attributes of nutrition education delivery or positive participant outcomes, a more detailed training record for each educator at the site would be required. Using a training record could be burdensome for the sites to provide unless individual training records are maintained, so the need for this level of detail should be weighed against the burden on the sites.

Collecting Qualitative Information from WIC Participants. The focus groups and Spanish-language phone interviews were very useful in collecting qualitative data on participants' experiences and perceptions of services at their WIC sites as well as identifying areas for improvement in nutrition education. Similar themes emerged from focus group and interview participants from the site where both were conducted. If future evaluations of WIC nutrition education collect qualitative information from participants, phone interviews may be an effective method, offering the advantages of scheduling when convenient for participants at a lower cost than focus groups.

Data Collection from POCs. There was little change in the information collected during the three POC Interviews over the course of the evaluation period. This data collection effort could be reduced by asking fewer questions at the interim and final time periods and offering a short online survey for follow-up data collection rather than conducting semistructured interviews. This approach would reduce the burden on the site staff and provide a more cost-effective approach for collecting this information.

3.11.3 Pilot Study Results and Considerations for Nutrition Education Practice

The pilot study results expand on the description of nutrition education developed in Phase I of the study by providing examples of specific attributes and features of nutrition education delivery in six WIC sites. Although these data are limited because of the small number of pilot sites, they provide insights into the extent to which VENA or participant-centered practices are incorporated into nutrition education. Additionally, the process data provide information on participant perceptions of the WIC nutrition education experience and suggestions for improvements in education services. Themes from the pilot study and considerations for nutrition education practice are discussed below.

Participants want individualized WIC services. Individualization is a major theme that emerged from the pilot with implications for strengthening nutrition education and WIC services overall to improve participants' satisfaction. Participants want options and "tailored" services in many contexts, including how WIC visits are scheduled, the choice of secondary education mode, and the approach or style used in one-on-one sessions. Both participants and educators reported that successful education sessions are more likely to be those in which the participant is actively involved in determining the focus of the conversation and in setting goals. This theme of individualized service supports key principles in VENA and WIC Nutrition Education Guidance and reinforces the importance of training and support for WIC staff and sites to implement these principles. Collecting ongoing feedback from participants may be useful in understanding which modes to offer and how a particular mode will be most effective. Participants in the focus groups and interviews identified sharing ideas with other parents and having a practical, experiential focus such as cooking demonstrations, as important features of group sessions.

Prioritizing topics to address a participant's needs and interests is a key feature of participant-centered education. Educators who focused the nutrition education discussion on the priority needs and interests of participants demonstrated the largest number of attributes associated with VENA/participant-centered practices. In the sites where educators used more of these practices, the average number of minutes of nutrition education was in the mid-range of the six sites, indicating that prioritizing topics and using these practices comprise an efficient approach. These observations support WIC Nutrition Education Guidance that advises educators to prioritize the topic(s) of greatest need or interest to the participant as a means to encourage meaningful, participant-centered education.

Participants want nutrition education focused on achieving positive behaviors rather than on deficits. Two prevalent themes from the participant focus groups and interviews have important implications for providing WIC services that participants value and that are influential in changing nutrition-related behaviors. One is the participants' perception that WIC staff members focus on what they are doing wrong, and the other is WIC's emphasis on children's weight and growth charts. Shifting the focus of the nutrition education away from deficits to a more positive approach that identifies participant strengths and internal motivations for change may improve participants' perceptions and engagement in WIC nutrition education. Additionally, participants may respond better to messages that emphasize the positive behaviors that influence a healthy weight and less on weight metrics (e.g., pounds or percentiles). This change would require a flexible approach to identify which parents and caregivers are interested in viewing their child's growth patterns rather than routinely sharing the information. Although addressing both of these concerns voiced by participants in the pilot study would not require

major revisions of program policy, they may require Federal and State support for changes in local WIC sites. One example is to clarify and reinforce that the purpose of nutrition assessment is to identify not only nutrition risks, but also a participant's inner strengths and motivation to develop positive nutrition-related behaviors.

The process evaluation provided a rich description of the delivery of nutrition education at each of the six pilot sites and identified differences and similarities across the sites. Chapter 4 describes the analytical approach and presents the analysis results to describe changes in participant outcomes over time. Chapter 5 describes the analytical approach and presents the results for the impact analyses, which assessed the impact of exposure to WIC nutrition education on participant behaviors and examined other site-level and participant-level characteristics that may influence participant outcomes.

4. Analytical Approach and Results for Descriptive and Outcome Measures for the Pilot Study

Chapter 4 describes the analytical approach and presents the results for the descriptive and outcome measures for the pilot study. Summary statistics describe the study participants by enrollment group.²⁷ Analysis was conducted to examine within-person change between the initial and final periods in outcomes describing participants' nutrition and physical activity attitudes and behaviors not accounting for exposure to WIC nutrition education. This analysis is referred to as the outcome analysis and addresses Research Question 1 (see sidebar). To assess whether changes in a subset of measures (i.e., the measures of interest) varied significantly in relation to WIC nutrition education exposure, difference-in-difference (DiD) models, participant-level models, and site-level models were estimated. Chapter 5 presents the analytical approach and results for these analyses. When interpreting the results presented in this report, it is important to keep in mind that the pilot study does *not* provide nationally representative information on the impact of WIC nutrition education. Instead, this pilot study is intended to test the methodology to inform the development of future efforts to evaluate the impact of WIC nutrition education on participants' nutrition and physical activity attitudes and behaviors.

Chapter 4 is organized as follows:

- Section 4.1 provides a description of the procedures used to prepare the analysis datasets.
- Section 4.2 summarizes the demographics and other background characteristics of the pilot study participants.
- Section 4.3 provides information on attrition from WIC and attrition from the evaluation study.
- Section 4.4 describes how the outcome measures were created and the analysis approach for examining within-person change in outcomes between the initial and final periods (i.e., the outcome analysis).
- Section 4.5 presents the results of the outcome analysis and discusses the implications for future evaluations of WIC nutrition education.
- Section 4.6 describes the approach used to select the measures of interest included in the impact analyses (presented in Chapter 5).
- Section 4.7 describes the results of bivariate analyses for the measures of interest.

Research Questions Addressed by the Outcome Analysis

1. After exposure to WIC nutrition education, what, if any, statistically significant changes can be identified in (1a) pregnant and postpartum women's readiness to eat a healthy diet, (1b) parents'/caretakers' readiness to feed their children a healthy diet, (1c) the dietary habits of women and children, (1d) the physical activity habits of women and children, and (1e) food-related behaviors of women [and children]?

4.1 Data Preparation

Trained data entry staff keyed the responses from the hard copy questionnaires for the Participant Surveys using proprietary data entry software. Double keying for 100% verification was conducted, meaning that

²⁷ Enrollment refers to the status of the woman at enrollment into the study (pregnant versus postpartum), not her certification status.

two keyers independently keyed the data and the data entry software compared the data for accuracy; the second keyer resolved any inconsistencies that were found. For Participant Surveys completed by computer-assisted telephone interviewing (CATI), the telephone interviewer entered the survey responses into the survey database.

Before the survey responses were tabulated, the data were examined to isolate and address any inconsistencies or reporting errors. All data-cleaning procedures were documented in the programming code used to prepare the final analysis datasets. “Other, specify” values were processed for possible recoding into closed-ended response categories for the associated item. Additionally, all numeric questions were checked for outliers. For cases completed by mail, the following additional checks were conducted to correct any reporting errors: (1) questionnaire skip logic was checked and data cleaning conducted if there were inconsistencies based on the responses to the skip question and (2) other logic was checked (e.g., for questions in which the respondent could select more than one response, if “none of the above” was selected and another response was selected, then “none of the above” was deselected).

To prepare the analysis datasets for each enrollment group, variables were created by recoding responses to the Participant Surveys as described in Appendix J for the dependent (outcome) variables and Appendix M for the independent variables. These procedures generated separate analysis datasets for each of the three enrollment groups (women who were pregnant at study enrollment, women who were postpartum at study enrollment, and caregivers with an eligible child). Additionally, for the site-level analyses, separate datasets were prepared and covariates created by recoding responses to the Phase I Site Survey, the onsite observations of nutrition education, the Point-of-Contact (POC) Interviews, and the Nutrition Educator Survey. Codebooks provide information on the variable name, variable label, survey responses, and distribution of values or means (for numeric responses). The codebooks accompany the documentation for the analysis datasets and are not included as part of the final report.

4.2 Description of the Pilot Study Participants

4.2.1 Description of the Three Enrollment Groups

Pregnant at Enrollment. At enrollment, 154 of the participants were pregnant: 95 women were in their first or second trimester and 59 women in their third trimester. For 41% of participants, this was their first pregnancy. Women who were in their first or second trimester at enrollment completed the pregnant woman version of the survey about 1 month before their delivery date (interim period) and completed the postpartum woman version of the survey about 6 months postpartum (final period). Women who were in their third trimester at enrollment completed the postpartum woman version of the survey about 6 months after enrollment (interim period) and the postpartum woman version of the survey about 12 months after enrollment (final period). For the 154 women who were pregnant at enrollment, 61 completed both the initial and final surveys.²⁸

Postpartum at Enrollment. At enrollment, 182 of the participants were postpartum (i.e., infant up to 6 months). For 28% of participants, this was their first pregnancy. These participants completed the postpartum woman version of the survey at the initial, interim (about 6 months after enrollment), and final

²⁸ Participants did not have to complete the interim survey in order to receive the final survey.

(about 12 months after enrollment) time periods. For the 182 women who were postpartum at enrollment, 76 completed both the initial and final surveys.

Caregiver with Eligible Child. At enrollment, 506 of the participants were the mother or caregiver of an eligible child between the ages of 6 months and 4 years.²⁹ Of these, 91% were the child's mother, 5% were the child's father, 4% were another family member, and <1% were a nonfamily member or friend. Study participants who were not the child's mother had to be knowledgeable about what the child ate on a daily basis and be the person coming to the child's WIC visit over the next 12 months.

If a participant had more than one child between the ages of 6 months and 4 years at enrollment, then one child was selected to be the "target" child (i.e., the child for which the participant completed the survey) using the most recent birthday method. About 46% of the target children were female. At enrollment, about 24% of the target children were between the ages of 6 months and 12 months old, 31% were between 12 months and 24 months, and 45% were between the ages of 24 months (2 years) and 4 years. Analysis for some outcome measures was restricted on the basis of age. For example, questions on dietary intake were limited to children 2 years or older, and questions about consumption of solid foods were limited to children 1 year or older. When reporting results, the age of the child for which the analysis was conducted is noted in the exhibit title.

Caregiver participants completed the caregiver/child version of the survey at the initial, interim (about 6 months after enrollment), and final (about 12 months after enrollment) time periods. For the 506 enrolled participants who were caregivers with an eligible child, 295 completed both the initial and final surveys.

4.2.2 Demographic and Other Background Characteristics of the Pilot Study Participants

Demographic and Household Characteristics

Exhibit 4-1 summarizes the demographic and household characteristics of the pilot study participants who completed the initial survey by enrollment group and overall.³⁰ Site-level information is not available to compare the demographics of the pilot study participants with the demographics of all WIC recipients at the six sites.

²⁹ For simplicity, this enrollment group is referred to as caregiver with eligible child.

³⁰ Appendix K, Exhibits K-1 through K-3 provide additional information on the demographic and household characteristics for participants at the initial and final time periods for each enrollment group. Most of the questions on participant demographic and household characteristics were only asked in the initial survey because the responses were not expected to change over time.

Exhibit 4-1. Characteristics of the Pilot Study Participants

	Pregnant at Enrollment		Postpartum at Enrollment		Caregivers with Eligible Child		All Participants	
	N	%	N	%	N	%	N	%
Age of respondent (mean, SD)	154	26.4, 5.8	182	26.9, 6.5	506	29.5, 7.2	842	28.4, 6.9
Gender of respondent (% female)	154	100.0	182	100.0	479	94.7	815	96.8
Race/ethnicity of respondent								
Hispanic	35	23.3	28	15.6	88	17.6	151	18.2
White, non-Hispanic	84	56.0	107	59.8	297	59.3	488	58.8
Black or African American, non-Hispanic	20	13.3	34	19.0	89	17.8	143	17.2
Asian, non-Hispanic	5	3.3	6	3.4	14	2.8	25	3.0
Other, non-Hispanic ^a	6	4.0	4	2.2	13	2.6	23	2.8
Nonrespondents	4		3		5		12	
Language(s) spoken at home								
English only	112	74.2	149	82.3	384	76.5	645	77.3
Spanish only	13	8.6	14	7.7	41	8.2	68	8.2
Both English and Spanish	17	11.3	10	5.5	36	7.2	63	7.6
Other ^b	9	6.0	8	4.4	41	8.2	58	7.0
Nonrespondents	3		1		4		8	
Education level for respondent								
Less than high school	24	16.7	34	19.2	82	16.8	140	17.3
High school graduate	54	37.5	64	36.2	172	35.3	290	35.9
Some college or associate's degree	56	38.9	63	35.6	183	37.6	302	37.4
College degree	10	6.9	16	9.0	50	10.3	76	9.4
Nonrespondents	10		5		19		34	

(continued)

Exhibit 4-1. Characteristics of the Pilot Study Participants (continued)

	Pregnant at Enrollment		Postpartum at Enrollment		Caregivers with Eligible Child		All Participants	
	N	%	N	%	N	%	N	%
Marital status for respondent								
Living with partner or married	75	50.0	95	52.8	282	57.4	452	55.1
Widowed, divorced, or separated	12	8.0	16	8.9	46	9.4	74	9.0
Single or never married	63	42.0	69	38.3	163	33.2	295	35.9
Nonrespondents	4		2		15		21	
Employment status for respondent								
Full time	27	18.0	26	14.7	120	24.2	173	21.0
Part time	35	23.3	23	13.0	109	22.0	167	20.3
Not working	88	58.7	128	72.3	267	53.8	483	58.7
Nonrespondents	4		5		10		19	
Size of household (mean, SD)	154	2.8, 1.5	182	3.7, 1.8	506	3.9, 1.9	842	3.68, 1.83
Single-adult household	71	46.1	79	43.4	215	42.5	365	43.3
Food-insecure household	116	75.8	123	68.0	354	71.2	593	71.4
Number of respondents (range) ^c	142–154		177–182		481–506		801–842	

Source: Participant Surveys, Initial.

^a Other includes the following responses: Native Hawaiian or other Pacific Islander, American Indian, or Alaska Native and those who selected more than one category.

^b Other includes the following responses: English and other, Spanish and other, and other only.

^c A range is provided because the number of respondents varied by question.

SD = standard deviation

The demographic characteristics of participants at the initial period are summarized below.

- The average age of adult participants was 26 for women who were pregnant at enrollment, 27 for women who were postpartum at enrollment, and 30 for caregivers with an eligible child.
- About 59% of participants are White, non-Hispanic; 17% are African American, non-Hispanic; and 18% are Hispanic.
- About 77% of participants reported that they speak only English at home.
- More than half of participants (53%) reported having a high school education or less.
- For women who were pregnant at enrollment or participants who were a caregiver with an eligible child, more than half were not working at enrollment (59% and 54%, respectively). For women who were postpartum at enrollment, this percentage was higher (72% were not working at enrollment), likely because the woman recently had a baby.
- About half of participants reported living with a partner or being married: 50% for women who were pregnant at enrollment, 53% for women who were postpartum at enrollment, and 57% for caregivers with an eligible child.
- The average household size was 3.7 people, and 43% of participants reported living in a single-adult household.
- Many participants lived in a household classified as food insecure based on responses to the USDA's two-item food insecurity screener (Hager et al., 2010). At the initial period, the percentage of participants who lived in a food-insecure household was 76% for women who were pregnant at enrollment, 68% for women who were postpartum at enrollment, and 71% for caregivers with an eligible child.
- The Participant Surveys collected self-reported data on whether the participant or child had been diagnosed during the past 6 months with certain health conditions that may be considered risk factors by the WIC site for classifying participants as high risk. For women participants, 29% (pregnant at enrollment) to 48% (postpartum at enrollment) reported having one or more health conditions that may be considered risk factors, with anemia being most common. For caregivers with an eligible child, 23% reported that the target child had one or more health conditions that may be considered risk factors. The most common conditions were the infant was born prematurely or requires special formula. The study did not collect administrative data from the six sites on the actual risk status of study participants.³¹

WIC and Other Food Assistance Experience

The Participant Surveys collected information about participants' experiences with WIC and other food assistance programs at the initial and final periods by enrollment group.³²

³¹ High-risk status is determined through the nutrition and health assessment process conducted by authorized WIC staff and is based on criteria or guidelines set by the State agency.

³² Appendix K, Exhibits K-4 through K-6 provide additional details.

- At study enrollment, the average number of people in the household receiving WIC benefits was 1.5 for the pregnant-at-enrollment group, 2.4 for the postpartum-at-enrollment group, and 1.9 for the caregiver-with-child group. Responses were similar for the final period.
- For women who were pregnant or postpartum at enrollment, 23% and 17% of participants, respectively, reported that they or their children had been receiving WIC benefits for less than 30 days, and about one-third (28% and 33% of participants, respectively) had been receiving WIC benefits for 1 month to 1 year; thus, for about half of the women participants, this pregnancy was likely their first experience with WIC.³³ In contrast, the caregiver-with-child group had more experience with WIC. At enrollment, about 48% of caregivers had been receiving WIC benefits for themselves or their children for 3 or more years.
- At study enrollment, many participants reported receiving some other type of government assistance: 67% for women who were pregnant at enrollment, 77% for women who were postpartum at enrollment, and 79% for caregivers with an eligible child. Some participants reported receiving Supplemental Nutrition Assistance Program (SNAP) benefits in addition to WIC at the time of enrollment: 43% for women who were pregnant at enrollment, 58% for women who were postpartum at enrollment, and 55% for caregivers with an eligible child.

Community and Resource Context

Questions in the initial and final surveys asked about participants' peer support and access to fresh fruit and vegetables to understand their community and resource contexts.³⁴ To obtain information on participants perceived level of peer support, they were asked to indicate how often their family or friends encourage them to eat healthy foods, complain about eating healthy foods (negative support), encourage them to do physical activity, and do physical activity with them using a 5-point response set (1 = "almost never," 2 = "once in a while," 3 = "sometimes," 4 = "often," 5 = "almost always"). Most participants reported that they sometimes or often receive encouragement from friends and family to eat healthy foods and be physically active.

To obtain information on participants' perception of access to fresh fruit and vegetables where they live, participants were asked to indicate how strongly they agree or disagree with the following statements: "It is easy to buy fresh fruit and vegetables," "I have access to high-quality fresh fruit and vegetables," "I have access to a large selection of fresh fruit and vegetables," and "It is expensive to buy fresh fruit and vegetables" using a 4-point response set (1 = "disagree a lot," 2 = "disagree a little," 3 = "agree a little," 4 = "agree a lot."). Although availability of fresh fruit and vegetables is not a concern, most participants have concerns that fresh fruit and vegetables are expensive.

4.2.3 Descriptive Information on Breastfeeding and Infant Feeding Behaviors

Women Who Were Pregnant or Postpartum at Enrollment

The Participants Surveys collected descriptive information on intentions for breastfeeding, breastfeeding efficacy, breastfeeding duration, breastfeeding exclusivity, and infant feeding practices. Although this

³³ The following question was asked in the initial Participant Survey: "Add up all the time you or your children have even been on WIC. Has it been ...? (1) less than 30 days, (2) 1 month to 1 year, (3) 1-2 years, (4) 3-4 years, or (5) 5 or more years."

³⁴ See Appendix K, Exhibits K-7 through K-9 for details.

information was collected at either two or three time periods (depending on the status of the woman at enrollment), for many of these behaviors it was not possible to measure change over time because the desired behavior takes place at a specific time (e.g., age when solid foods were introduced) or the behavior is evaluated at an endpoint (e.g., duration of breastfeeding or exclusivity). **Exhibits 4-2 and 4-3** present this descriptive information for women who were pregnant at enrollment and women who were postpartum at enrollment, respectively.

Exhibit 4-2. Descriptive Information on Breastfeeding and Infant Feeding Behaviors: Women Who Were Pregnant at Enrollment (RQs 1b and 1e) ^a

Measure	Results
Self-efficacy ^b	
Self-efficacy for breastfeeding until infant is 6 months old (n, %)	
Low	8, 19.0
Moderate	2, 4.8
High	32, 76.2
Self-efficacy for breastfeeding until infant is 12 months old (n, %)	
Low	11, 28.2
Moderate	8, 20.5
High	20, 51.3
Self-efficacy for breastfeeding exclusivity (n, %)	
Low	20, 48.8
Moderate	6, 14.6
High	15, 36.6
Intentions to breastfeed (measured respondents' intentions to breastfeed for different time periods) (n, mean, SD)	
Intend to breastfeed until infant is at least 6 months old ^c	38, 2.7, 1.3
Intend to breastfeed until infant is at least 12 months old ^d	64, 2.0, 1.2
Intend to breastfeed exclusively until infant is 12 months old ^d	63, 1.9, 1.2
Breastfeeding duration (actual duration, as reported by participant) (n, %) ^e	
Never breastfed infant	8, 12.3
Initiated breastfeeding, but stopped breastfeeding before infant was 6 months old	29, 44.6
Initiated breastfeeding and breastfed infant until at least 6 months old	28, 43.1
When infant age up to 6 months is fed (n, %) ^f	
On a regular schedule	14, 20.6
When baby cries or seems hungry	12, 17.6
Answered both of the above	42, 61.8
When solid food was first introduced (n, %) ^g	
Less than 3 months	1, 1.9
4 months	25, 46.3
5 months	12, 22.2
6 months or older	16, 29.6

(continued)

Exhibit 4-2. Descriptive Information on Breastfeeding and Infant Feeding Behaviors: Women Who Were Pregnant at Enrollment (RQs 1b and 1e)^a (continued)

Measure	Results
First solid food fed to infant (n, %) ^h	
Baby cereal	25, 50.0
Vegetables	15, 30.0
Fruit	7, 14.0
Meat	0, 0.0
Other	3, 6.0
Prior Breastfeeding Experience (n, %)	
First pregnancy	58, 40.8
Prior pregnancy(ies), no breastfeeding experience	29, 20.4
Prior pregnancy(ies), breastfeeding experience	55, 38.7
Number of respondents (range) ⁱ	38–68

Source: Participant Survey, Final

^a Breastfeeding measures were measured at the end of the evaluation period, instead of each reporting period of initial, interim, and final because, for some measures (e.g., duration), the value of the measure is determined by analyzing data across reporting periods. Also, for some measures (e.g., infant feeding), information was not collected during each reporting period. Note that pregnant women answered the final postpartum survey at the final time period because they would have been postpartum at this time point.

^b Measured at final period. The question asked how sure the respondent was that she could do the behavior: low (not sure), moderate (somewhat sure), and high (very sure). Respondents who were not breastfeeding were excluded from the analysis because they had already made the decision to not breastfeed.

^c Measured at final period. Excludes participants who enrolled in their third trimester because infant would be older than 6 months at final period (n = 29). See Appendix J for a description of how the variable was derived using responses to Q9a in final postpartum survey. Index is on a 1–4 scale, with 1 = not thinking about doing the behavior, 2 = thinking about doing it, 3 = planning on doing it, and 4 = already doing the behavior.

^d Measured at final period. See Appendix J for a description of how outcome variable was derived using responses to Q9b (intend to breastfeed) and Q9c (intend to breastfeed exclusively) in final postpartum survey. Index for each outcome is on a 1–4 scale, with 1 = not thinking about doing the behavior, 2 = thinking about doing it, 3 = planning on doing it, and 4 = already doing the behavior.

^e Measured at final period. See Appendix J for a description of how the variable was derived using responses to Q19 in final postpartum survey. Respondents were assigned to one of the three categories shown in table based on their response.

^f For participants who enrolled in their first or second trimester, measured at final period using responses to Q17 in final postpartum survey. For participants who enrolled in their third trimester, measured at the interim period so that the infant would be less than 6 months old. Respondents who answered “I am not feeding my baby breastmilk or formula” were excluded from percentage calculation (n = 2).

^g Measured at final period using responses to Q20 in final postpartum survey. Respondents who answered “has not eaten solid foods” were excluded from percentage calculation (n = 14).

^h Measured at final period using responses to Q21 in final postpartum survey. Respondents who answered “has not eaten solid foods” to Q20 were excluded from percentage calculation (n = 14).

ⁱ A range is provided because the number of respondents varied by question.

SD = standard deviation

Exhibit 4-3. Descriptive Information on Breastfeeding and Infant Feeding Behaviors: Women Who Were Postpartum at Enrollment (RQs 1b and 1e) ^a

Measure	Results
Self-efficacy ^b	
Self-efficacy for breastfeeding until infant is 12 months old (n, %)	
Low	18, 38.3
Moderate	6, 12.8
High	23, 48.9
Self-efficacy for breastfeeding exclusivity (n, %)	
Low	23, 53.5
Moderate	5, 11.6
High	15, 34.9
Intentions to breastfeed (measured respondents' intentions to breastfeed for different time periods) (n, mean, SD)	
Intend to breastfeed until infant is at least 12 months old ^c	104, 1.8, 1.2
Intend to breastfeed exclusively until infant is 12 months old ^c	106, 1.7, 1.1
Breastfeeding duration (actual duration, as reported by participant) (n, %) ^d	
Never breastfed infant	18, 20.9
Initiated breastfeeding, but did not breastfeed infant until at least 6 months old	22, 25.6
Initiated breastfeeding and breastfed infant until at least 6 months old	46, 53.5
When infant age up to 6 months is fed (n, %) ^e	
On a regular schedule	49, 27.7
When baby cries or seems hungry	41, 23.2
Answered both of the above	87, 49.2
When solid food was first introduced (n, %) ^f	
Less than 3 months	3, 3.5
4 months	22, 25.6
5 months	14, 16.3
6 months or older	47, 54.7
First solid food fed to infant (n, %) ^g	
Baby cereal	49, 65.3
Vegetables	16, 21.3
Fruit	7, 9.3
Meat	1, 1.3
Other	2, 2.7
Prior breastfeeding experience (n, %)	
First pregnancy	50, 27.8
Prior pregnancy(ies), no breastfeeding experience	50, 27.8
Prior pregnancy(ies), breastfeeding experience	80, 44.4
Nonrespondents	2
Number of respondents (range) ^h	43–177

(continued)

Exhibit 4-3. Descriptive Information on Breastfeeding and Infant Feeding Behaviors: Women Who Were Postpartum at Enrollment (RQs 1b and 1e) ^a (continued)

Source: Participant Surveys, Interim and Final

^a Breastfeeding measures were measured at interim or final, instead of each reporting period of initial, interim, and final because for some measures (e.g., duration), the value of the measure is determined by analyzing data across reporting periods. Also, for some measures (e.g., infant feeding), information was not collected during each reporting period.

^b Measured at interim period to assess efficacy before infant is 12 months old. The question asked how sure the respondent was that she could do the behavior: low (not sure), moderate (somewhat sure), and high (very sure). Respondents who were not breastfeeding were excluded from the analysis because they had already made the decision to not breastfeed.

^c Measured at interim period to assess intentions before infant is 12 months old. See Appendix J for a description of how variable was derived using responses to Q9b (intend to breastfeed) and Q9c (intend to exclusively breastfeed) in interim postpartum survey. Index for each outcome is on a 1–4 scale, with 1 = not thinking about doing the behavior, 2 = thinking about doing it, 3 = planning on doing it, and 4 = already doing the behavior.

^d Measured at final period to assess duration. See Appendix J for a description of how the variable was defined using responses to Q19 in final postpartum survey. Respondents were assigned to one of the three categories shown in table based on their response.

^e Measured at initial period to assess behavior before infant is 6 months old using responses to Q15 in initial postpartum survey. Respondents who answered "I am not feeding my baby breastmilk or formula" were excluded from percentage calculation (n = 5).

^f Measured at final period using responses to Q20 in final postpartum survey. Respondents who answered "has not eaten solid foods" were excluded from percentage calculation (n = 2).

^g Measured at final period using responses to Q21 in final postpartum survey. Respondents who answered "has not eaten solid foods" to Q20 were excluded from percentage calculation (n = 2).

^h A range is provided because the number of respondents varied by question.

SD = standard deviation

Information on breastfeeding and infant feeding was collected for descriptive purposes and is not included in the outcome and impact analyses.

Caregivers with Children Aged 6 to 12 Months at Enrollment

For participants in the caregiver-with-child enrollment group, the Participant Survey collected descriptive information on infant feeding behaviors in the initial survey if the child was between the ages of 6 and 12 months at enrollment (n = 120) (see **Exhibit 4-4**). Because this information was only collected at the initial period, it was not possible to measure change over time. WIC guidelines recommend feeding complementary or solid foods (foods other than formula or breast milk) starting at 4 to 6 months of age, so most of the participants (92%) were following this recommendation.³⁵

³⁵ <https://wicworks.fns.usda.gov/infants/infant-feeding-guide>

Exhibit 4-4. Descriptive Information on Breastfeeding and Infant Feeding Behaviors: Caregivers with Eligible Child Aged 6 to 12 Months at Enrollment (RQs 1b and 1e) ^a

Behaviors	Results
Breastfeeding status (n, %)	
Child is being breastfed	32, 26.9
Child is <u>not</u> being breastfed	87, 73.1
Nonrespondents	1
If child is breastfeeding, expected age of child when mother plans to stop breastfeeding (n, mean months, SD) ^b	28, 16.0, 6.7
If child is breastfeeding, mother's efficacy for breastfeeding until child is 1 year old (n, %) ^c	
Low	4, 12.5
Moderate	1, 3.1
High	27, 84.4
Nonrespondents	0
Age of child when solid food was first introduced (n, %)	
Less than 3 months old	7, 5.9
4 months old	20, 16.9
5 months old	24, 20.3
6 months or older	65, 55.1
Has not eaten solid foods	2, 1.7
Nonrespondents	2
If child is eating solid food, child feeds him/herself (n, %) ^d	82, 73.2
Number of respondents (range) ^e	32–119

Source: Participant Survey, Initial

^a The descriptive information presented in this table was collected only in the initial survey for participants with a child less than 12 months old.^b Participants (n = 87) did not answer this question if the child was less than 12 months old and not breastfeeding at the time of the initial survey. Reported as number of months. The number of nonrespondents = 4. Maximum value was 36 months.^c Participants (n = 87) did not answer this question if the child was less than 12 months old and not breastfeeding at the time of the initial survey. The question asked how sure the respondent was that she could breastfeed her child until the child was 1 year old. The response options were "not sure" (coded as low), "a little sure" (coded as moderate), or "very sure" (coded as high).^d The response options were "almost never," "once in a while," "sometimes," "often," and "almost always."^e A range is provided because the number of respondents varied by question.

SD = standard deviation

4.3 Attrition from WIC and Attrition from the Evaluation Study

Study participation did not require continued WIC participation; thus, two types of attrition were possible for the pilot study: (1) attrition from WIC, meaning that the enrolled participant or her child (if the enrolled participant was a caregiver) stopped receiving WIC benefits during the study period or (2) attrition from the evaluation study (also known as "loss due to follow-up"), meaning that the participant did not complete the interim or final survey. Information on both types of attrition, and the implications for generalizability of the study findings, is summarized below.

4.3.1 Attrition from WIC

Information on whether the participants stopped receiving WIC benefits between the initial and final surveys is only available for participants who completed the Participant Surveys at the interim or final

time period. The pilot study did not collect this information because it would require additional burden on the sites; however, this information would have been useful to measure attrition from WIC.

Among all study participants, the attrition rate from WIC (number who stopped receiving WIC benefits/number of study participants) based on responses to the Participant Survey was 3% for the interim survey and 9% for the final survey (see **Exhibit 4-5**). Participants who stopped receiving WIC benefits during the study period were included in the outcome analysis but were excluded from the impact analyses because they were no longer being exposed to WIC nutrition education.

Exhibit 4-5. Number and Percentage of Study Participants Who Stopped Receiving WIC Benefits or Received WIC Benefits from Another Site During the Study Period based on Responses to the Participant Survey, by Enrollment Group ^a

Status	Pregnant at Enrollment	Postpartum at Enrollment	Caregiver with Child	All Participants
Stopped receiving WIC benefits during study period				
Interim survey	1 (1.0%)	1 (0.9%)	16 (5.0%)	18 (3.4%)
Final survey	5 (7.6%)	8 (9.2%)	27 (9.3%)	40 (9.1%)
Received WIC benefits from another WIC site				
Interim survey	14 (13.9%)	16 (14.8%)	26 (8.1%)	56 (10.5%)
Final survey	8 (12.1%)	15 (17.2%)	21 (7.3%)	44 (10.0%)

Source: Participant Surveys, Initial and Final

^a Question asked in the interim and final surveys: "Do your family's WIC benefits come from the WIC site where you signed up for this study?" The response options were (1) Yes, (2) No, I am receiving WIC from another WIC office, and (3) No, I haven't received WIC since (respondent filled in month and year).

The Participant Surveys also collected information on whether participants received their WIC benefits from another site during the study period. About 10% of participants at the interim and final time periods reported receiving their WIC benefits at a different site. These participants could have moved or received their WIC benefits from a different site for some other reason. Thus, it is likely the nutrition education received by participants was provided by a different site than the site in which the participant enrolled into the study. These participants were included in the DiD and participant-level models, but because their exposure to nutrition education may have been at a different site, these participants were excluded from the site-level models.

4.3.2 Attrition from the Evaluation Study

The potential impact of attrition from the pilot study (i.e., nonresponse to the interim or final survey³⁶) on generalizability of the findings was assessed by comparing the characteristics of study participants who provided data at interim and final to those who only completed the initial survey. This comparison was accomplished by fitting a logistic regression model that regressed completion status on the following variables: participant age, participant race/ethnicity, participant education, participant employment status, language spoken at home, and single-adult household. This analysis provided odds ratios that identify associations between participant characteristics and the odds of providing data at the interim and final

³⁶ Nonrespondents include participants who received the survey but chose not to complete it and participants who did not receive the survey (e.g., the respondent moved and a forwarding address was not available). Some of these participants may have stopped receiving WIC benefits during the evaluation period.

time periods. These analyses were conducted separately for each of the three study enrollment groups to be consistent with the approach used for the outcome and impact analyses, which were also conducted by enrollment group. The analyses were conducted using SAS 9.4 (SAS, 2016).

Demographic characteristics associated with predicted drop out are presented for variables that are statistically significant ($p \leq .05$) and discussed below (see **Exhibits 4-6** through **4-8**). The exhibits also provide p -values at the category level, comparing indicated groups to the reference groups.

- **Women who were pregnant at enrollment:** Older respondents were less likely to drop out at the time of the final survey than younger respondents ($p = .0395$). Women were about 7% less likely to drop out for every additional year of age at the time of enrollment. Accordingly, the results may be less generalizable to younger WIC participants who were pregnant at enrollment.
- **Women who were postpartum at enrollment:** Respondents who graduated from high school compared with respondents having some college or a college degree were 2.7 times more likely to drop out at the time of the interim survey ($p = .0082$) and 3.4 times more likely to drop out at the final survey ($p = .0015$). Respondents who did not graduate from high school did not differ statistically from respondents with some college or a college degree. Accordingly, results may be less generalizable to WIC participants with only a high school education who were postpartum at enrollment.
- **Caregivers with an eligible child:** Similar to women who were pregnant at enrollment, older respondents were less likely to drop out at the time of the interim ($p = .0071$) or final survey ($p = .0078$). Caregivers were about 7% less likely to drop out for every additional year of age at the time of enrollment. Black, non-Hispanic respondents were about 2.6 times more likely than White, non-Hispanic respondents to drop out at the time of the interim ($p = .0003$) or the final survey ($p = .0004$). Hispanic respondents were 2.0 times more likely than White, non-Hispanic respondents to drop out at the time of the interim survey ($p = .0420$). Accordingly, the results may be less generalizable to younger or minority WIC caregivers with an eligible child.

Consideration should be given to possible attrition bias when interpreting the results of the outcome and impact analyses. Attrition bias may limit the generalizability of the findings if those respondents who did not provide data at follow-up (interim or final surveys) are systematically different than those respondents who completed the survey. To help address attrition bias, significant covariates from the attrition analysis were included in the DiD models used to estimate the impacts of WIC nutrition education and participant- and site-level models (see Chapter 5 for additional information). Accordingly, when recruiting for similar studies in the future, study planners should over-sample younger participants, participants with lower levels of education, and non-White participants to account for higher loss to follow-up among participants with these characteristics.

Exhibit 4-6. Attrition Analysis for Women Who Were Pregnant at Enrollment: Odds Ratios Predicting Drop Out ^a

Characteristic	Initial to Interim Estimated Odds Ratio (95% CI)	p-value	Initial to Final Estimated Odds Ratio (95% CI)	p-value
Age	1.019 (0.951, 1.092)	.5860†	0.933 (0.873, 0.997)	.0395*†
Race/Ethnicity		.1927†		.4510†
White, non-Hispanic (reference group)	1.00		1.00	
Black, non-Hispanic	1.280 (0.426, 3.846)	.6595	1.076 (0.340, 3.405)	.9014
Hispanic	0.389 (0.121, 1.251)	.1131	0.668 (0.244, 1.825)	.4310
Other	0.140 (0.010, 2.042)	.1503	0.237 (0.034, 1.663)	.1475
Education		.4997†		.1233†
Less than high school	0.502 (0.085, 2.985)	.4491	0.377 (0.056, 2.513)	.3134
High school graduate	0.516 (0.103, 2.575)	.4197	0.163 (0.029, 0.926)	.0407*
Some college or associate's degree	0.336 (0.071, 1.595)	.1700	0.278 (0.052, 1.484)	.1342
College degree (reference group)	1.00		1.00	
Employment Status		.3673†		.6084†
Not working	0.509 (0.190, 1.359)	.1777	0.662 (0.251, 1.743)	.4035
Part time	0.751 (0.242, 2.328)	.6194	0.923 (0.298, 2.862)	.8894
Full time (reference group)	1.00		1.00	
Language Spoken at Home		.3972†		.9832†
English (reference group)	1.00		1.00	
Spanish only	0.710 (0.106, 4.758)	.7242	1.030 (0.228, 4.652)	.9691
Other	5.506 (0.402, 75.401)	.2014	1.221 (0.143, 10.445)	.8555
Single-Adult Household				
Yes	2.122 (0.954, 4.717)	.0650†	1.293 (0.597, 2.801)	.5151†
No (reference group)	1.00		1.00	

Source: Participant Surveys, Initial, Interim, and Final (timing of data collection varied depending on the participant's trimester at enrollment).

Notes: Generalized linear mixed models (SAS PROC GLIMMIX) were used to evaluate rate of attrition from initial to follow-up (separate analyses for interim and final surveys).

Dichotomous participation indicator (based on availability of data at interim or final) was regressed on demographic characteristics and household descriptors. The *p*-values with a dagger (†) are for the variable based on the Model Type-III *F* test, followed by the *p*-values for each individual level of the variable. Number of participants = 154 at initial, 102 at interim, and 69 at final.

* Indicates statistical significance if the *p*-value is ≤ .05.

^a Estimate (with 95% confidence limits) indicates the odds ratio of completers to those who dropped out.

Exhibit 4-7. Attrition Analysis for Women Who Were Postpartum at Enrollment: Odds Ratios Predicting Drop Out ^a

Characteristic	Initial to Interim Estimated Odds Ratio (95% CI)	p-value	Initial to Final Estimated Odds Ratio (95% CI)	p-value
Age	1.015 (0.963, 1.070)	.5749 ⁺	1.021 (0.967, 1.079)	.4535 ⁺
Race/Ethnicity		.4009 ⁺		.2225 ⁺
White, non-Hispanic (reference group)	1.00		1.00	
Black or African American, non-Hispanic	2.051 (0.848, 4.962)	.1109	1.604 (0.656, 3.924)	.3003
Hispanic	0.892 (0.262, 3.033)	.8549	0.618 (0.182, 2.096)	.4399
Other	0.860 (0.144, 5.138)	.8683	4.661 (0.807, 26.905)	.0853
Education		.0290 ^{*,†}		.0048 ^{**,†}
Less than high school	1.891 (0.732, 4.883)	.1883	2.495 (0.973, 6.400)	.0572
High school graduate	2.749 (1.299, 5.815)	.0082 ^{**}	3.392 (1.596, 7.212)	.0015 ^{**}
Some college, associate's degree, or college degree (reference group)	1.00		1.00	
Employment Status		.5332 ⁺		.1503 ⁺
Not working	1.357 (0.516, 3.567)	.5363	1.195 (0.472, 3.028)	.7070
Part time	2.030 (0.585, 7.041)	.2644	3.111 (0.882, 10.969)	.0775
Full time (reference group)	1.00		1.00	
Language Spoken at Home		.3133 ⁺		.0951 ⁺
English (reference group)	1.00		1.00	
Spanish only	1.843 (0.327, 10.387)	.4885	0.667 (0.112, 3.989)	.6573
Other	0.205 (0.020, 2.110)	.1828	0.098 (0.012, 0.822)	.0322 [*]
Single-Adult Household				
Yes	1.249 (0.640, 2.439)	.5142 ⁺	0.811 (0.415, 1.586)	.5409 ⁺
No (reference group)	1.00		1.00	

Source: Participant Surveys, Initial, July 2015; Interim, ~6 months after Initial; Final, ~12 months after Initial.

Notes: Generalized linear mixed models (SAS PROC GLIMMIX) were used to evaluate rate of attrition from initial to follow-up (separate analyses for interim and final surveys). Dichotomous participation indicator (based on availability of data at interim or final) was regressed on demographic characteristics and household descriptors. The p-values with a dagger (†) are for the variable based on the Model Type-III F test, followed by the p-values for each individual level of the variable. Number of respondents = 182 at initial, 110 at interim, and 89 at final.

* Indicates statistical significance if the p-value is ≤ .05.

** Indicates statistical significance if the p-value is ≤ .01.

^a Estimate (with 95% confidence limits) indicates the odds ratio of completers to those who dropped out.

Exhibit 4-8. Attrition Analysis for Caregivers with Eligible Child Enrollment Group: Odds Ratios Predicting Drop Out ^a

Characteristic	Initial to Interim		Initial to Final	
	Estimated Odds Ratio (95% CI)	p-value	Estimated Odds Ratio (95% CI)	p-value
Age	0.960 (0.932, 0.989)	.0071**†	0.963 (0.936, 0.990)	.0078**†
Race/Ethnicity		.0015**†		.0042**†
White, non-Hispanic (reference group)	1.00		1.00	
Black or African American, non-Hispanic	2.655 (1.565, 4.502)	.0003**	2.610 (1.539, 4.428)	.0004**
Hispanic	2.027 (1.026, 4.004)	.0420*	1.623 (0.829, 3.179)	.1576
Other	0.993 (0.377, 2.615)	.9879	1.495 (0.620, 3.609)	.3707
Education		.1805†		.0658†
Less than high school	2.634 (0.994, 6.975)	.0514	2.978 (1.208, 7.342)	.0178*
High school graduate	2.641 (1.087, 6.416)	.0320*	2.841 (1.260, 6.409)	.0118*
Some college or associate's degree	2.544 (1.059, 6.114)	.0368*	2.867 (1.286, 6.388)	.0100**
College degree (reference group)	1.00		1.00	
Employment Status		.7738†		.4896†
Not working	1.033 (0.638, 1.673)	.8937	0.895 (0.564, 1.420)	.6367
Part time	0.857 (0.475, 1.547)	.6082	0.713 (0.407, 1.252)	.2395
Full time (reference group)	1.00		1.00	
Language Spoken at Home		.2349†		.4059†
English (reference group)	1.00		1.00	
Spanish only	0.425 (0.155, 1.167)	.0969	0.524 (0.201, 1.372)	.1882
Other	1.126 (0.524, 2.417)	.7616	0.884 (0.419, 1.863)	.7453
Single-Adult Household				
Yes	0.883 (0.585, 1.335)	.5562†	1.041 (0.702, 1.543)	.8431†
No (reference group)	1.00		1.00	

Source: Participant Surveys, Initial, July 2015; Interim, ~6 months after Initial; Final, ~12 months after Initial.

Notes: Generalized linear mixed models (SAS PROC GLIMMIX) were used to evaluate rate of attrition from initial to follow-up (separate analyses for interim and final surveys).

Dichotomous participation indicator (based on availability of data at interim or final) was regressed on demographic characteristics and household descriptors. The p-values with a dagger (†) are for the variable based on the Model Type-III F test, followed by the p-values for each individual level of the variable. Number of respondents = 506 at initial, 337 at interim, and 295 at final.

* Indicates statistical significance if the p-value is ≤ .05.

** Indicates statistical significance if the p-value is ≤ .01.

^a Estimate (with 95% confidence limits) indicates the odds ratio of completers to those who dropped out.

4.4 Approach for Conducting the Outcome Analysis

4.4.1 Creation of the Dependent Variables

The Participant Surveys asked participants about their readiness to change, perceived enjoyment, self-efficacy, behaviors related to healthy foods and healthy eating, dietary intake, and physical and sedentary activity.³⁷ While some of these questions were asked of all respondents, others were tailored by enrollment group. For example, questions on readiness to change asked about the woman's eating behaviors for the pregnant and postpartum enrollment groups and the caregiver's serving behaviors for the caregiver-with-child group. For purposes of analysis, some of these variables were retained as ordinal scales, while others were recoded as binary variables where 1 indicates the preferred response options so that the variables could be analyzed as proportions. (See Exhibits J-1 through J-3 in Appendix J for details.)

For the caregiver-with-child enrollment group, analyses of the following variables were limited to respondents with children 12 months or older at enrollment so that the child was eating solid foods: readiness to change for serving healthy foods, enjoyment of healthy foods, self-efficacy for serving healthy foods, eating behaviors, and child feeding style.

Readiness to Change for Serving/Consuming Healthy Foods

Survey questions intended to measure readiness to change used a 5-point ordinal scale that can be mapped to the stages of change: "not thinking about doing it" (precontemplation), "thinking about doing it" (contemplation), "planning on doing it next month" (planning), "have been doing it for less than 6 months" (action), and "have been doing it for 6 months or longer" (maintenance). In the analyses, these responses were analyzed as ordinal variables.

Enjoyment of Healthy Foods

The questions on enjoyment of healthy foods used a 4-point ordinal scale: "never tried it," "don't like at all," "like a little," and "like a lot." The distributions for responses to these questions were reviewed and found to be highly skewed toward the positive end of the scale ("like a lot"). Dichotomous variables were created so that the variables could be analyzed as proportions, with 1 = "like a little" or "like a lot" and 0 = "never tried" or "don't like it at all." This split differentiates responses that demonstrate the preferred outcome (i.e., likes the food) from the other responses, as well as combines the small number of respondents who answered "never tried" with "don't like it at all."³⁸

Self-Efficacy for Serving/Consuming Healthy Foods

Self-efficacy was analyzed using a 3-point ordinal scale: "not sure" (meaning low efficacy), "sure" (moderate), and "very sure" (high). Additional analysis was conducted to assess the feasibility of creating

³⁷ Appendix G provides information on the source of the Participant Survey instruments and the psychometric properties of the instruments that were previously tested for validity and/or reliability.

³⁸ It should be noted that there is an operational difference between "never tried" and "don't like it at all" so that these responses are different, behaviorally speaking. This distinction is especially important if one is considering readiness to change and trying to understand characteristics of the caregivers along the readiness spectrum.

a composite for self-efficacy. This analysis is described and the Cronbach alphas provided in Appendix L. Except for the composite for efficacy for serving whole grains instead of refined grains, $\alpha = 0.76$ (comprising three separate measures: whole wheat bread, brown rice, and wheat/corn tortillas), the composite measures explored were not found to be highly correlated; thus, the decision was made to not develop such measures for use in the analysis. Because the intent was not to create composite measure when developing the questions, it is not surprising that most of the measures were not correlated.

Food Acquisition and Management Behaviors

This category of behaviors included use of the Nutrition Facts panel and meal planning and used a 5-point ordinal scale: “almost never,” “once in a while,” “sometimes,” “often,” and “almost always.”

Dichotomous variables were created so that the variables could be analyzed as proportions, with (1) “often” or “almost always” versus (0) “sometimes,” “once in a while,” or “almost never.” This split differentiates between the desired outcome (often or almost always doing the behavior) versus the other response options. However, it should be noted that by simplifying the variable some information is lost, such as the ability to discern between participants moving from “once in a while” to “sometimes” doing the behavior.

Eating Behaviors

The Participant Surveys collected information on eating behaviors using two types of questions: those that required a numeric response and those that used an ordinal scale.

For questions asking about the number of times per week the woman or child eats outside the home and the number of times per week the woman or child eats fast food, respondents provided a numerical response ranging from “0” to “8 or more.”³⁹ For the number of times the woman or child eats breakfast, respondents provided a numerical response ranging from “0” to “7” days. For the caregiver-with-child enrollment group, a question was asked on the number of times the caregiver offers a new food before deciding the child does not like it. This question used categorical response options (e.g., once, twice, 3 to 5 times) that were transformed into numerical values (using the midpoint for ranges) to create a continuous variable.

For questions that asked about the frequency of a behavior such as the caregiver sits and eats meals with the child or the woman/caregiver cooks dinner at home, a 5-point ordinal scale was used in the survey: “rarely or never,” “some days,” “most days,” “almost every day,” and “every day.” Dichotomous variables were created so that the variables could be analyzed as proportions. This split differentiates between the desired behavior versus the other response options. The response items used to indicate the desired behavior varied depending on the behavior, for example, for eating meal while watching TV, the desired behavior is “rarely or never,” whereas for cooking a homemade dinner the desired behavior is “almost every day” or “every day.” Appendix J provides the rationale for variable creation, which was based on guidelines on infant and child feeding for WIC settings from the Robert Wood Johnson Foundation’s Healthy Eating Research program (Whaley, Pérez-Escamilla, Segura-Pérez, & Lott, 2017).

³⁹ For the response category “8 or more,” a value of 8 was assigned so that the variable could be treated as continuous.

However, as previously noted, by simplifying the variable some information is lost, such as the ability to discern between participants moving from “almost every day” to “every day.”

Child Feeding Style

Questions on feeding style include practices to encourage (e.g., talked to child to encourage him/her to eat or drink) and practices to discourage (e.g., let child eat desserts/sweets to keep him/her happy). These questions used a 5-point ordinal scale: “almost never,” “once in a while,” “sometimes,” “often,” and “almost always.” For practices to encourage, the following dichotomy was used: (1) “often” or “almost always” versus (0) “sometimes,” “once in a while,” or “almost never.” For practices to discourage, the following dichotomy was used: (1) “once in a while” or “almost never” versus (0) “sometimes,” “often,” or “almost always.” Exploratory analyses tested the feasibility of creating a composite for feeding practices to discourage (Appendix L). The resulting composite measure was not used because it was not highly correlated ($\alpha = 0.56$).

Dietary Intake

To estimate dietary intake, the National Health and Nutrition Examination Survey (NHANES) 26-item 2009–2010 Dietary Screener Questionnaire (self-administered version) was used (National Institutes of Health, National Cancer Institute [NCI], 2016).⁴⁰ The Dietary Screener Questionnaire asks about the frequency of consumption in the past month of selected foods and drinks. Scoring algorithms available on the NCI’s Web site (Subar et al., 2006) were used to convert screener responses to estimates of daily dietary intake for fruit and vegetables (cup equivalents), dairy (cup equivalents), added sugars (tsp), added sugars from sugary beverages (tsp), whole grains (ounce equivalents), and fiber (g) for use in the outcome and impact analyses.⁴¹ For the caregiver-with-child enrollment group, dietary intake was only estimated when the referent child was 24 months or older at the time the caregiver was enrolled into the study because the algorithms are not appropriate to use with children less than 24 months old.

Physical and Sedentary Activity

Questions about physical and sedentary activity generally required a numeric response (e.g., number of hours, number of days, or number of minutes). For the caregiver-with-child enrollment group, some questions asked about the caregiver’s behavior (e.g., number of minutes of vigorous physical activity a day), and others asked about the child’s behavior (e.g., number of hours the child watches TV or DVDs). Responses to these questions were treated as continuous variables. Analyses of child behaviors were limited to participants with children 12 months or older at enrollment because the behaviors were not applicable to infants.

⁴⁰ The following modifications were made to the NHANES Screener for use in the current study: dropped items on meats because intake of meat was not of interest; dropped item on popcorn to reduce number of items and because it was not found to be a main source of whole grains based on NHANES data; added item on tortillas because consumption is prevalent in the WIC population and provided in WIC food package; changed to “past 30 days” for easier interpretation (e.g., past month could imply the prior month, rather than the prior 30 days); and combined 4, 5, 6, or more times a day.

⁴¹ The NHANES Screener scoring algorithms are available at <https://epi.grants.cancer.gov/nhanes/dietscreen/programs.html>.

4.4.2 Approach for Analyzing Within-Person Change over Time

To test for within-person change over time, various statistical tests were applied: McNemar's test for binary/dichotomous variables, Wilcoxon's Signed Rank Test for ordinal variables, and repeated measures analysis of variance (i.e., ANOVA) for continuous variables (Pett, 1997). Collectively, this analysis is referred to as the outcome analysis. Separate analyses were conducted for initial to interim and initial to final. Change over time was evaluated using a significance threshold of $p \leq .05$. Statistically significant results indicate that the observed values are different from the expected values and that this difference is not likely to have occurred by chance. All analyses were conducted using SAS 9.4 (SAS, 2016).

Although the analyses were conducted separately for each of the three enrollment groups, it would also be possible to pool respondents for some analyses depending on the outcome. For example, for outcomes that describe the adult respondent (e.g., use of Nutrition Facts label when shopping), it would be possible to pool the data for the three enrollment groups. Likewise, for some outcomes that describe behaviors of women participants, it would be possible to pool data for the pregnant and postpartum enrollment groups if the mother's prenatal or postpartum status would not influence the outcome (e.g., times per week eat out or self-efficacy for limiting sugar-sweetened beverage [SSB] consumption to once a month). Because most of the outcomes could not be pooled, the outcomes were analyzed by enrollment group.

4.5 Analysis Results and Lessons Learned

Results of the outcome analyses are not nationally representative and should not be generalized beyond the limited sample of respondents recruited from the six pilot sites. The results provide useful information for designing subsequent studies by demonstrating which measures may be sensitive to change and whether respondents answered questions as expected.

This section presents and discusses the results of the analysis examining within-person change in outcomes between the initial and final periods.⁴²

When interpreting the results, several limitations should be considered. First, dietary intake, dietary preferences, physical activity, and other behaviors may be influenced as a woman moves from pregnancy to postpartum status and as a child gets older; thus, changes in outcomes may not necessarily be due to receiving WIC nutrition

education. Second, the availability of foods in the WIC food package may influence what women and children eat (e.g., drink more low-fat milk relative to regular milk). Because the final period was 12 months after the initial survey for most participants, seasonality is not a concern because both the initial and final data collection took place during the summer months (most data collection was in July).

The results are organized by category of measure (e.g., readiness to change or dietary intake), consistent with the study's conceptual model (shown in Exhibit 2-2). Within each category, results for the women enrollment groups are presented first (pregnant at enrollment or postpartum at enrollment) followed by the results for caregivers with an eligible child. For ordinal variables, exhibits provide the distribution of

⁴² Appendix K, Exhibits K-10 through K-37 present the results of the outcome analysis for the initial to interim and initial to final comparisons. For some measures, such as dietary intake and physical and sedentary activity, differences between the initial and interim periods may be due to seasonal variation because the initial data were collected during the summer (July–August), and, for most participants, the interim data were collected in the winter (December–January).

responses at the initial and final periods (% and n), the estimated within-person change over time, and the *p*-value. For binomial variables, exhibits provide the proportion of participants exhibiting the desired behavior at initial and final (% and n), the estimated within-person change over time, and the *p*-value. For continuous variables, exhibits provide the mean value and standard deviation (SD) at initial and final, the within-person change over time, and the *p*-value.

The analysis was conducted for a total of 129 measures across the three enrollment groups. Of these comparisons, seven measures demonstrated positive improvement and 18 measures declined or decreased. Because this is a pilot study, no adjustment was made for the number of statistical tests conducted. Accordingly, readers are cautioned to not place too much emphasis on the specific test results and, instead, are urged to consider the pattern of results and consider how these findings might influence decisions in designing a larger evaluation effort. The following sections present and discuss the results, noting implications for the design of future evaluations.

4.5.1 Readiness to Change for Serving/Consuming Healthy Foods

Stages of Change

Precontemplation → not thinking about doing it
 Contemplation → thinking about doing it
 Planning → planning on doing it next month
 Action → have been doing it for less than 6 months
 Maintenance → have been doing it for 6 months or longer

The transtheoretical model of behavior change describes an individual's readiness to act on a new health behavior and provides strategies or processes of change to guide the individual through the stages of change to action and maintenance (see sidebar) (Prochaska & Velicer, 1997). Several studies have applied the stages of change model to adoption of a healthy diet (Glanz et al., 1994; Greene et al., 1999; Contento, 2011); thus, this measure was included in the study's conceptual model. Value Enhanced Nutrition Assessment (VENA) and participant-

centered counseling approaches suggest assessing the client's stage or readiness to change, so this measure is consistent with WIC practices.

For the pregnant-at-enrollment and postpartum-at-enrollment groups, about 70 to 80% of participants reported the desired behavior (action or maintenance) for the fruit and vegetable measures at the initial period (see **Exhibit 4-9**). For the caregiver-with-child enrollment group, about 90% of the pilot study participants were already serving their child fruit (serve fruit as snack instead of cookies or chips every day) and vegetables (serve at dinner every day) at the initial period (see **Exhibit 4-10**). Although these findings cannot be generalized beyond the six pilot sites, they do suggest that many participants are already exhibiting the desired behavior, suggesting limited opportunity to assess change for the fruit and vegetable measures, particularly among the caregiver enrollment group. Thus, planners for future evaluation studies may want to frame this measure differently so it is more sensitive to change.

Among all three enrollment groups, participants varied with respect to consuming/serving low-fat/fat-free milk, whole grains (instead of refined grains such as white bread, white rice, and flour tortillas), 100% juice, and SSBs measures. The percentage of participants reporting consuming/serving the recommended food at the initial period ranged from 32 to 82%. Given this considerable variability, there is generally potential for change and responses do not seem to reflect social desirability bias.

Exhibit 4-9. Readiness-to-Change Measures: Women Who Were Pregnant or Postpartum at Enrollment (RQ1a)

Measure ^a	Pregnant			Postpartum		
	Initial % (n)	Final % (n)	Wilcoxon Test (p-value)	Initial % (n)	Final % (n)	Wilcoxon Test (p-value)
Readiness to eat vegetables at dinner every day						
Not thinking about doing it	4.6 (3)	0.0 (0)	.0148 *	3.5 (3)	3.5 (3)	.5093
Thinking about doing it	15.4 (10)	7.7 (5)		9.4 (8)	11.8 (10)	
Planning on doing it next month	10.8 (7)	9.2 (6)		5.9 (5)	4.7 (4)	
Have been doing it for less than 6 months	12.3 (8)	18.5 (12)		14.1 (12)	16.5 (14)	
Have been doing it for 6 months or longer	56.9 (37)	64.6 (42)		67.1 (57)	63.5 (54)	
Readiness to eat fruit for snack instead of cookies or chips every day						
Not thinking about doing it	1.5 (1)	3.1 (2)	.6229	1.2 (1)	1.2 (1)	.4157
Thinking about doing it	7.7 (5)	7.7 (5)		12.9 (11)	9.4 (8)	
Planning on doing it next month	12.3 (8)	12.3 (8)		14.1 (12)	16.5 (14)	
Have been doing it for less than 6 months	29.2 (19)	27.7 (18)		28.2 (24)	23.5 (20)	
Have been doing it for 6 months or longer	49.2 (32)	49.2 (32)		43.5 (37)	49.4 (42)	
Readiness to drink low-fat (1%) or fat-free/skim milk instead of whole milk or 2% (reduced fat) milk every day						
Not thinking about doing it	17.2 (11)	17.2 (11)	.2457	20.2 (17)	29.8 (25)	.1861
Thinking about doing it	9.4 (6)	9.4 (6)		11.9 (10)	9.5 (8)	
Planning on doing it next month	9.4 (6)	3.1 (2)		4.8 (4)	2.4 (2)	
Have been doing it for less than 6 months	29.7 (19)	14.1 (9)		13.1 (11)	16.7 (14)	
Have been doing it for 6 months or longer	34.4 (22)	56.3 (36)		50.0 (42)	41.7 (35)	

(continued)

Exhibit 4-9. Readiness-to-Change Measures: Women Who Were Pregnant or Postpartum at Enrollment (RQ1a) (continued)

Measure ^a	Pregnant			Postpartum		
	Initial % (n)	Final % (n)	Wilcoxon Test (p-value)	Initial % (n)	Final % (n)	Wilcoxon Test (p-value)
Readiness to almost always eat whole grain bread instead of white						
Not thinking about doing it	12.1 (8)	12.1 (8)	.6767	7.1 (6)	11.8 (10)	.5694
Thinking about doing it	9.1 (6)	13.6 (9)		12.9 (11)	11.8 (10)	
Planning on doing it next month	10.6 (7)	1.5 (1)		10.6 (9)	9.4 (8)	
Have been doing it for less than 6 months	21.2 (14)	16.7 (11)		22.4 (19)	20.0 (17)	
Have been doing it for 6 months or longer	47.0 (31)	56.1 (37)		47.1 (40)	47.1 (40)	
Readiness to almost always eat brown rice instead of white						
Not thinking about doing it	27.7 (18)	36.9 (24)	.7556	22.9 (19)	32.5 (27)	.8494
Thinking about doing it	23.1 (15)	15.4 (10)		31.3 (26)	21.7 (18)	
Planning on doing it next month	13.8 (9)	9.2 (6)		13.3 (11)	12.0 (10)	
Have been doing it for less than 6 months	24.6 (16)	10.8 (7)		13.3 (11)	12.0 (10)	
Have been doing it for 6 months or longer	10.8 (7)	27.7 (18)		19.3 (16)	21.7 (18)	
Readiness to almost always eat whole wheat or corn tortillas instead of white flour tortillas						
Not thinking about doing it	30.8 (20)	29.2 (19)	.7203	15.9 (13)	18.3 (15)	.4463
Thinking about doing it	15.4 (10)	21.5 (14)		22.0 (18)	25.6 (21)	
Planning on doing it next month	12.3 (8)	4.6 (3)		12.2 (10)	11.0 (9)	
Have been doing it for less than 6 months	15.4 (10)	9.2 (6)		18.3 (15)	14.6 (12)	
Have been doing it for 6 months or longer	26.2 (17)	35.4 (23)		31.7 (26)	30.5 (25)	

(continued)

Exhibit 4-9. Readiness-to-Change Measures: Women Who Were Pregnant or Postpartum at Enrollment (RQ1a) (continued)

Measure ^a	Pregnant			Postpartum		
	Initial % (n)	Final % (n)	Wilcoxon Test (p-value)	Initial % (n)	Final % (n)	Wilcoxon Test (p-value)
Readiness to drink 100% juice no more than once a day						
Not thinking about doing it	9.2 (6)	9.2 (6)	.8513	8.5 (7)	8.5 (7)	.6985
Thinking about doing it	9.2 (6)	15.4 (10)		11.0 (9)	12.2 (10)	
Planning on doing it next month	13.8 (9)	10.8 (7)		17.1 (14)	14.6 (12)	
Have been doing it for less than 6 months	26.2 (17)	15.4 (10)		22.0 (18)	14.6 (12)	
Have been doing it for 6 months or longer	41.5 (27)	49.2 (32)		41.5 (34)	50.0 (41)	
Readiness to a drink regular soda or pop, sweetened fruit drinks, sports or energy drinks no more than once a month						
Not thinking about doing it	32.3 (21)	20.0 (13)	.7023	26.2 (22)	31.0 (26)	.3012
Thinking about doing it	10.8 (7)	24.6 (16)		23.8 (20)	19.0 (16)	
Planning on doing it next month	13.8 (9)	13.8 (9)		9.5 (8)	16.7 (14)	
Have been doing it for less than 6 months	13.8 (9)	10.8 (7)		7.1 (6)	9.5 (8)	
Have been doing it for 6 months or longer	29.2 (19)	30.8 (20)		33.3 (28)	23.8 (20)	
Number of respondents (range) ^b			64–66			82–85

Source: Participant Surveys, Initial and Final

* Indicates statistical significance if the p-value is ≤ .05.

^a Response categories can be mapped to the stages of change: not thinking about doing it = precontemplation, thinking about doing it = contemplation, planning on doing it next month = planning, have been doing it for less than 6 months = action, and have been doing it for 6 months or longer = maintenance. The distributions of responses are provided for the initial and final time periods and the results of the Wilcoxon test for the within-person change over time between initial and final.

^b A range is provided because the number of respondents varied by question.

Exhibit 4-10. Readiness-to-Change Measures: Caregivers with Eligible Child 12 Months or Older at Enrollment (RQ1b)

Measure ^a	Initial % (n)	Final % (n)	Wilcoxon Test (p-value)
Readiness to serve child vegetables (include baby food) at dinner every day			
Not thinking about doing it	0.9 (2)	1.9 (4)	.3554
Thinking about doing it	3.7 (8)	3.7 (8)	
Planning on doing it next month	2.8 (6)	4.7 (10)	
Have been doing it for less than 6 months	10.3 (22)	8.9 (19)	
Have been doing it for 6 months or longer	82.2 (176)	80.8 (173)	
Readiness to serve child fruit (include baby food) for a snack instead of cookies or chips every day			
Not thinking about doing it	1.9 (4)	1.4 (3)	.9311
Thinking about doing it	4.3 (9)	5.2 (11)	
Planning on doing it next month	2.8 (6)	2.8 (6)	
Have been doing it for less than 6 months	10.9 (23)	10.4 (22)	
Have been doing it for 6 months or longer	80.1 (169)	80.1 (169)	
Readiness to serve child low-fat (1%) or fat-free/skim milk instead of whole milk or 2% (reduced fat) milk every day ^b			
Not thinking about doing it	14.1 (18)	16.4 (21)	.6339
Thinking about doing it	7.0 (9)	2.3 (3)	
Planning on doing it next month	3.9 (5)	4.7 (6)	
Have been doing it for less than 6 months	11.7 (15)	8.6 (11)	
Have been doing it for 6 months or longer	63.3 (81)	68.0 (87)	
Readiness to almost always serve child whole grain bread instead of white bread			
Not thinking about doing it	5.1 (11)	6.0 (13)	.8578
Thinking about doing it	8.8 (19)	9.3 (20)	
Planning on doing it next month	4.2 (9)	3.3 (7)	
Have been doing it for less than 6 months	12.6 (27)	12.1 (26)	
Have been doing it for 6 months or longer	69.3 (149)	69.3 (149)	

(continued)

Exhibit 4-10. Readiness-to-Change Measures: Caregivers with Eligible Child 12 Months or Older at Enrollment (RQ1b) (continued)

Measure ^a	Initial % (n)	Final % (n)	Wilcoxon Test (p-value)
Readiness to almost always serve child brown rice instead of white rice			
Not thinking about doing it	19.3 (41)	20.8 (44)	.4846
Thinking about doing it	20.3 (43)	18.9 (40)	
Planning on doing it next month	3.8 (8)	9.9 (21)	
Have been doing it for less than 6 months	18.9 (40)	13.2 (28)	
Have been doing it for 6 months or longer	37.7 (80)	37.3 (79)	
Readiness to almost always serve child whole wheat or corn tortillas instead of white flour tortillas			
Not thinking about doing it	20.1 (42)	20.1 (42)	.6785
Thinking about doing it	13.4 (28)	14.4 (30)	
Planning on doing it next month	4.8 (10)	9.1 (19)	
Have been doing it for less than 6 months	16.7 (35)	10.0 (21)	
Have been doing it for 6 months or longer	45.0 (94)	46.4 (97)	
Readiness to serve child 100% juice no more than once a day			
Not thinking about doing it	7.0 (15)	8.5 (18)	.4188
Thinking about doing it	8.9 (19)	5.6 (12)	
Planning on doing it next month	6.6 (14)	6.1 (13)	
Have been doing it for less than 6 months	18.8 (40)	13.6 (29)	
Have been doing it for 6 months or longer	58.7 (125)	66.2 (141)	

(continued)

Exhibit 4-10. Readiness-to-Change Measures: Caregivers with Eligible Child 12 Months or Older at Enrollment (RQ1b) (continued)

Measure ^a	Initial % (n)	Final % (n)	Wilcoxon Test (p-value)
Readiness to serve child regular soda or pop, sweetened fruit drinks, sports drinks or energy drinks no more than once a month			
Not thinking about doing it	49.8 (107)	37.2 (80)	.0149 *
Thinking about doing it	4.7 (10)	9.8 (21)	
Planning on doing it next month	5.1 (11)	7.4 (16)	
Have been doing it for less than 6 months	10.2 (22)	7.9 (17)	
Have been doing it for 6 months or longer	30.2 (65)	37.7 (81)	
Number of respondents (range) ^c			128–215

Source: Participant Surveys, Initial and Final

* Indicates statistical significance if the p-value is $\leq .05$.

^a Response categories can be mapped to the stages of change: not thinking about doing it = precontemplation, thinking about doing it = contemplation, planning on doing it next month = planning, have been doing it for less than 6 months = action, and have been doing it for 6 months or longer = maintenance. The distributions of responses are provided for the initial and final time periods and the results of the Wilcoxon test for the within-person change over time between initial and final.

^b Participants with a target child less than 2 years old (n = 276) did not answer this question because the current dietary recommendation suggests children less than 12 months old should not drink cow's milk and children 1 to 2 years old should drink whole milk unless otherwise recommended by their health care provider.

^c A range is provided because the number of respondents varied by question.

For most of the measures, the movement between stages was not statistically significant; however, there were a few exceptions. For women who were pregnant at enrollment (see Exhibit 4-9), one measure exhibited statistically significant change: readiness to eat vegetables at dinner every day. At the initial period, 57% of women reported eating vegetables at dinner every day for 6 months or longer, and this percentage increased to 65% at the final period when the woman was 6 months postpartum, reflecting movement of women into the maintenance stage ($p = .0148$). For the caregiver enrollment group (see Exhibit 4-10), about 30% of participants were in the maintenance stage for readiness to limit serving the child SSBs to once a month at the initial period. The percentage in the precontemplation stage (i.e., not thinking about doing it) decreased from 50% at the initial period to 37% at the final period, 12 months later, thus demonstrating movement across the stages of change ($p = .0149$).

Based on these results, inclusion of measures on readiness to change is recommended for future evaluations, with consideration given to framing the measures for fruit and vegetables differently so that these measures are more sensitive to change. For example, instead of using a single question to assess readiness to change for eating more fruit (vegetables) as was done for the pilot study, the questionnaire could use a series of questions so that a scale can be created.

4.5.2 Enjoyment of Healthy Foods

The conceptual model for the study (see Exhibit 2-2) identified enjoyment or preferences for healthy foods as a behavioral antecedent for eating healthy foods (Randall, 1982). Research suggests that food preferences and reported frequencies of consumption of the same foods are related (Drewnowski & Hann, 1999). All or most women (94 to 100%) reported liking fruit, vegetables, and whole grains a little or a lot at the initial period, and about 74 to 79% reported liking low-fat/fat-free milk (see **Exhibit 4-11**). For caregivers with children, nearly all (96 to 99%) reported their child liking fruit and vegetables, and many reported their child liking low-fat/fat-free milk (84%) and whole grains (92%) (see **Exhibit 4-12**). These findings suggest there was little room for improvement between the initial and final surveys and that these views were stable over time; thus, inclusion of enjoyment measures is not recommended for future evaluations.

Exhibit 4-11. Enjoyment of Food Measures: Women Who Were Pregnant or Postpartum at Enrollment (RQ1a)

Measure ^a	Pregnant				Postpartum			
	Initial % (n)	Final % (n)	Change ^b	McNemar's Test (p-value)	Initial % (n)	Final % (n)	Change ^b	McNemar's Test (p-value)
Like fruit	100.0 (67)	100.0 (67)	0.0	— ^c	100.0 (88)	100.0 (88)	0.0	— ^c
Like vegetables	94.0 (63)	98.5 (66)	4.5	.0833	97.8 (87)	98.9 (88)	1.1	.3173
Like low-fat (1%) or fat-free/skim milk	79.1 (53)	82.1 (55)	3.0	.5930	73.9 (65)	68.2 (60)	-5.7	.2253
Like whole grains	97.0 (65)	89.6 (60)	-7.5	.0588	95.5 (85)	92.1 (82)	-3.4	.1797
Number of respondents (range) ^d			67				88–89	

Source: Participant Surveys, Initial and Final

^a Response categories were 1 = "never tried," 2 = "don't like at all," 3 = "like a little," 4 = "like a lot." Tabled values report the percentage of respondents who answered "like a little" or "like a lot" at initial and final.

^b Within-person change over time between initial and final. Analysis of change is based on the number of respondents who provided data at initial and final and calculated as the change over time in the percentage of respondents who reported they like the food "a little" or "a lot" at final.

^c Not estimated because one or more of the point estimates was equal to zero.

^d A range is provided because the number of respondents varied by question.

Exhibit 4-12. Child Enjoyment of Food Measures: Caregivers with Eligible Child 12 Months or Older at Enrollment (RQ1b)

Measure ^a	Initial % (n)	Final % (n)	Change ^b	McNemar's Test (p-value)
Child likes vegetables	99.1 (221)	99.6 (222)	0.4	.3173
Child likes fruit	95.5 (211)	94.1 (208)	-1.4	.4386
Child likes low-fat (1%) or fat-free/skim milk ^c	84.4 (114)	81.5 (110)	-3.0	.4142
Child likes whole grains	92.0 (207)	91.6 (206)	-0.4	.8618
Number of respondents (range) ^d			135–225	

Source: Participant Surveys, Initial and Final

^a Response categories were 1 = "never tried," 2 = "don't like at all," 3 = "like a little," 4 = "like a lot." Tabled values report the percentage of respondents who answered "like a little" or "like a lot" at initial and final.

^b Within-person change over time between initial and final. Analysis of change is based on the number of respondents who provided data at initial and final and calculated as the change over time in the percentage of respondents who reported they like the food "a little" or "a lot" at final.

^c Participants with a target child less than 2 years old (n = 156) were instructed to skip this question because the current dietary recommendation suggests children less than 12 months old should not drink cow's milk and children 1 to 2 years old should drink whole milk unless otherwise recommended by their health care provider.

^d A range is provided because the number of respondents varied by question.

4.5.3 Self-Efficacy to Serve/Consume Healthy Foods

Self-efficacy is an individual's impression of his/her own ability to perform a difficult task and was also identified as a behavioral antecedent in the study's conceptual model (Mullen, Hersey, & Iverson, 1987; Henry et al., 2006; Hildebrand & Betts, 2009). Several of the self-efficacy items had statistically significant within-person change between the initial and final time periods.⁴³ For women who were pregnant at enrollment, two items were statistically significant: can eat fruit for snack instead of cookies or chips every day—the percentage in the high-efficacy category decreased from 86 to 65% ($p = .0057$) and can almost always eat brown rice instead of white rice, which decreased from 43 to 35% ($p = .0184$) (see **Exhibit 4-13**). Thus, self-efficacy did not improve, with a smaller percentage of participants in the “high” self-efficacy category at final compared with the initial period.

For caregivers with an eligible child, self-efficacy for serving the child SSBs no more than once a month improved significantly and self-efficacy for four items declined significantly (see **Exhibit 4-14**). For SSBs, the percentage of participants in the “high” self-efficacy category increased from 63% at initial to 82% at final ($p \leq .001$). For serving child low-fat/fat-free milk instead of whole milk/2% milk every day, the percentage of participants in the “high” self-efficacy category decreased from 78 to 74% ($p = .0364$). For serving child vegetables (including baby food) at dinner every day, the “high” percentage decreased from 89 to 81% ($p = .0396$). For serving child whole grain bread instead of white bread, the “high” percentage decreased from 84 to 76% ($p = .0193$). For serving child whole wheat/corn tortillas instead of white flour tortillas, the “high” percentage decreased from 70 to 63% ($p = .0273$). These changes in caregiver self-efficacy could be because as children get older they may exert more control over what they choose to eat or drink.

Although the item with a three-level response option was statistically significant for some measures, future work should consider including more sensitive measures such as multiple items scales and response sets that provide interval-level data rather than ordinal data. For example, self-efficacy questions could be used with a 10-item response set that includes bipolar anchors “cannot do at all” and “highly certain can do” (Bandura, 2006). Another option to consider is the 8-item Self-Efficacy for Healthy Diet Scale for young women developed and validated by Simmonds and colleagues (2016).

⁴³ A 3-point ordinal response set was used so that movement from low to moderate, low to high, or moderate to high was considered an improvement in self-efficacy.

Exhibit 4-13. Self-Efficacy for Eating Behavior Measures: Women Who Were Pregnant or Postpartum at Enrollment (RQ1a)

Measure ^a	Pregnant			Postpartum		
	Initial % (n)	Final % (n)	Wilcoxon Test (p-value)	Initial % (n)	Final % (n)	Wilcoxon Test (p-value)
Can eat vegetables at dinner every day						
Low	7.7 (5)	3.1 (2)	.1024	2.3 (2)	1.2 (1)	1.0000
Moderate	24.6 (16)	20.0 (13)		22.1 (19)	23.3 (20)	
High	67.7 (44)	76.9 (50)		75.6 (65)	75.6 (65)	
Can eat fruit for snack instead of cookies or chips every day						
Low	1.5 (1)	1.5 (1)	.0057 **	2.3 (2)	3.5 (3)	.2319
Moderate	12.1 (8)	33.3 (22)		30.2 (26)	19.8 (17)	
High	86.4 (57)	65.2 (43)		67.4 (58)	76.7 (66)	
Can drink low-fat (1%) or fat-free/skim milk instead of whole milk or 2% (reduced fat) milk every day						
Low	13.6 (9)	21.2 (14)	.2850	23.3 (20)	29.1 (25)	.0628
Moderate	19.7 (13)	16.7 (11)		12.8 (11)	19.8 (17)	
High	66.7 (44)	62.1 (41)		64.0 (55)	51.2 (44)	
Can almost always eat whole grain bread instead of white						
Low	7.7 (5)	12.3 (8)	.5211	11.9 (10)	11.9 (10)	1.0000
Moderate	27.7 (18)	23.1 (15)		27.4 (23)	28.6 (24)	
High	64.6 (42)	64.6 (42)		60.7 (51)	59.5 (50)	
Can almost always eat brown rice instead of white						
Low	23.8 (15)	38.1 (24)	.0184 *	26.2 (22)	27.4 (23)	.9637
Moderate	33.3 (21)	27.0 (17)		35.7 (30)	33.3 (28)	
High	42.9 (27)	34.9 (22)		38.1 (32)	39.3 (33)	

(continued)

Exhibit 4-13. Self-Efficacy for Eating Behavior Measures: Women Who Were Pregnant or Postpartum at Enrollment (RQ1a) (continued)

Measure ^a	Pregnant			Postpartum		
	Initial % (n)	Final % (n)	Wilcoxon Test (p-value)	Initial % (n)	Final % (n)	Wilcoxon Test (p-value)
Can almost always eat whole wheat or corn tortillas instead of white						
Low	26.2 (17)	32.3 (21)	.0540	9.9 (8)	19.8 (16)	.1742
Moderate	23.1 (15)	30.8 (20)		39.5 (32)	32.1 (26)	
High	50.8 (33)	36.9 (24)		50.6 (41)	48.1 (39)	
Can drink 100% juice no more than once a day						
Low	3.0 (2)	6.1 (4)	.1316	2.4 (2)	9.8 (8)	.0986
Moderate	24.2 (16)	31.8 (21)		25.6 (21)	25.6 (21)	
High	72.7 (48)	62.1 (41)		72.0 (59)	64.6 (53)	
Can drink regular soda or pop, sweetened fruit drinks, sports or energy drinks no more than once a month						
Low	23.4 (15)	23.4 (15)	.9751	17.6 (15)	24.7 (21)	.4544
Moderate	31.3 (20)	31.3 (20)		36.5 (31)	29.4 (25)	
High	45.3 (29)	45.3 (29)		45.9 (39)	45.9 (39)	
Number of respondents (range) ^b			63–66			81–86

Source: Participant Surveys, Initial and Final

* Indicates statistical significance if the *p*-value is ≤ .05.** Indicates statistical significance if the *p*-value is ≤ .01.^a The question asked how sure the respondent was that she could do the behavior: low (not sure), moderate (somewhat sure), and high (very sure). The distributions of responses are provided for the initial and final time periods and the results of the Wilcoxon test for the within-person change over time between initial and final.^b A range is provided because the number of respondents varied by question.

Exhibit 4-14. Self-Efficacy for Child Feeding Behavior Measures: Caregivers with Eligible Child 12 Months or Older at Enrollment (RQ1b)

Measure ^a	Initial % (n)	Final % (n)	Wilcoxon Test (p-value)
Can serve child vegetables (include baby food) at dinner every day			
Low	3.7 (8)	2.3 (5)	.0396 *
Moderate	6.9 (15)	16.6 (36)	
High	89.4 (194)	81.1 (176)	
Can serve child fruit (include baby food) for a snack instead of cookies or chips every day			
Low	2.3 (5)	1.4 (3)	.1085
Moderate	6.9 (15)	14.2 (31)	
High	90.8 (198)	84.4 (184)	
Can serve child low-fat (1%) or fat-free/skim milk instead of whole milk or 2% (reduced fat) milk every day ^b			
Low	7.8 (10)	17.1 (22)	.0364 *
Moderate	14.0 (18)	9.3 (12)	
High	78.3 (101)	73.6 (95)	
Can serve child whole grain bread instead of white bread			
Low	4.7 (10)	7.4 (16)	.0193 *
Moderate	11.6 (25)	16.7 (36)	
High	83.7 (180)	75.8 (163)	
Can serve child brown rice instead of white rice			
Low	14.6 (31)	21.2 (45)	.1355
Moderate	28.8 (61)	24.5 (52)	
High	56.6 (120)	54.2 (115)	

(continued)

Exhibit 4-14. Self-Efficacy for Child Feeding Behavior Measures: Caregivers with Eligible Child 12 Months or Older at Enrollment (RQ1b) (continued)

Measure ^a	Initial % (n)	Final % (n)	Wilcoxon Test (p-value)
Can serve child whole wheat or corn tortillas instead of white flour tortillas			
Low	13.1 (28)	18.8 (40)	.0273 *
Moderate	17.4 (37)	18.3 (39)	
High	69.5 (148)	62.9 (134)	
Can serve child 100% juice no more than once a day			
Low	6.5 (14)	2.8 (6)	.1428
Moderate	13.4 (29)	14.3 (31)	
High	80.2 (174)	82.9 (180)	
Can serve child regular soda or pop, sweetened fruit drinks, sports drinks or energy drinks no more than once a month			
Low	24.2 (52)	2.8 (6)	<.001 ***
Moderate	13.0 (28)	14.9 (32)	
High	62.8 (135)	82.3 (177)	
Number of respondents (range) ^c			129–218

Source: Participant Surveys, Initial and Final

* Indicates statistical significance if the *p*-value is ≤ .05.

*** Indicates statistical significance if the *p*-value is ≤ .001.

^a The question asked how sure the respondent was that she could do the behavior: low (not sure), moderate (somewhat sure), and high (very sure). The distributions of responses are provided for the initial and final time periods and the results of the Wilcoxon test for the within-person change over time between initial and final.

^b Participants with a target child less than 2 years old (*n* = 56) did not answer this question because the current dietary recommendation suggests children less than 12 months old should not drink cow's milk and children 1 to 2 years old should drink whole milk unless otherwise recommended by their health care provider.

^c A range is provided because the number of respondents varied by question.

4.5.4 Food Acquisition and Management

Planning meals ahead of time and reading labels are two behaviors that encourage individuals to purchase healthy foods (Glanz et al., 2012). **Exhibits 4-15** and **4-16** present the results for these measures. At the initial period, 57 to 66% of participants often or almost always planned meals ahead of time with no change between initial and final. Consistency in self-reporting across time and enrollment groups suggests that participants understood the question.

For use of the Nutrition Facts label, the percentage of participants who often or almost always used this label ranged from 24 to 48% at the initial period. For women who were pregnant at enrollment, this percentage increased significantly (13.2 percentage points, $p = .0201$), and no change was observed for women who were postpartum at enrollment. For caregivers, this percentage decreased significantly between the initial and final periods (8.5 percentage points, $p = .0088$). Use of the Nutrition Facts label may be related to the length of time the participant is on WIC, such that individuals may read the Nutrition Facts label the first time they purchase a certain food but not for subsequent purchases.

Future evaluations should consider retaining questions about the use of the Nutrition Facts label and may want to use additional questions such as the Newest Vital Sign to better understand the role that health literacy plays in participants' ability to use nutrition information (Weiss et al., 2005). Also, it is now more common for nutritional information to be placed on the front of the package in addition to the Nutrition Facts label, which is usually on the back of the package. WIC provides all women and caregivers with an orientation and periodic updates on identifying foods they can purchase with WIC benefits and this information includes reading labels for ingredients (e.g., 100% whole wheat), type (e.g., 100% juice), brand, and other information. Although the emphasis is on selecting allowable WIC foods, this orientation is also an opportunity to educate participants about how to read a label to select healthier options. Thus, the question should not be limited to the Nutrition Facts label but should ask more broadly about using nutritional information on product packaging.

Meal planning and label reading (beyond the orientation to selecting WIC foods) are most likely to be included in group education or online modules, which are options for secondary education for some sites. The Participant Surveys and the site-level data collection provided information on whether shopping for and preparing healthy foods were topics addressed by the six sites. About 70 to 74% of participants reported as least one exposure to this topic during the 18-month period for which data were collected (see Appendix I, Exhibit I-8). However, information is not available to know to what extent participants received education specifically on planning meals and reading labels. If these measures are included in future evaluation studies, study planners should also collect site- and participant-level information to assess whether the sites address these specific topics and if participants recall receiving this information.

Exhibit 4-15. Food Acquisition and Management Measures: Women Who Were Pregnant or Postpartum at Enrollment (RQ1e)

Measure ^a	Pregnant				Postpartum			
	Initial % (n)	Final % (n)	Change ^b	McNemar's Test (p-value)	Initial % (n)	Final % (n)	Change ^b	McNemar's Test (p-value)
Plan meals ahead of time ^b	57.4 (39)	58.8 (40)	1.5	.8273	60.2 (53)	59.1 (52)	-1.1	.8575
Use Nutrition Facts on food labels to choose foods ^b	23.5 (16)	36.8 (25)	13.2 *	.0201	35.2 (31)	42.0 (37)	6.8	.2008
Number of respondents (range) ^c			68				88	

Source: Participant Surveys, Initial and Final

* Indicates statistical significance if the *p*-value is ≤ .05.

^a Respondents answered on a 5-point response set: 1 = almost never, 2 = once in a while, 3 = sometimes, 4 = often, 5 = almost always. Tabled values report the percentage of respondents who answered "often" or "almost always" at initial and final.

^b Within-person change over time between initial and final. Analysis of change is based on the number of respondents who provided data at initial and final and calculated as the change over time in the percentage of respondents who reported "often" or "almost always" at final.

^c A range is provided because the number of respondents varied by question.

Exhibit 4-16. Food Acquisition and Management Measures: Caregivers with Eligible Child (RQ1e)

Measure ^a	Initial % (n)	Final % (n)	Change ^b	McNemar's Test (p-value)
Plan meals ahead of time	65.8 (185)	63.0 (177)	-2.8	.3524
Use Nutrition Facts on food labels to choose foods	48.4 (136)	39.9 (112)	-8.5 **	.0088
Number of respondents (range) ^c			281	

Source: Participant Surveys, Initial and Final

** Indicates statistical significance if the *p*-value is ≤ .01.

^a Respondents answered on a 5-point response set: 1 = almost never, 2 = once in a while, 3 = sometimes, 4 = often, 5 = almost always. Tabled values report the percentage of respondents who answered "often" or "almost always" at initial and final.

^b Within-person change over time between initial and final. Analysis of change is based on the number of respondents who provided data at initial and final and calculated as the change over time in the percentage of respondents who reported "often" or "almost always" at final.

^c A range is provided because the number of respondents varied by question.

4.5.5 Eating Behaviors

Eating breakfast daily and limiting the number of meals eaten at restaurants (especially fast food restaurants) are encouraged as part of a healthy diet and thus may be topics addressed in WIC nutrition education. For these behaviors, the pilot study participants are generally exhibiting the desired behavior at the initial period; thus, limited change was observed between the initial and final periods. At the initial period, participants who were pregnant or postpartum at enrollment ate breakfast about 5 days a week, ate out about 2 times per week, and ate at fast food restaurants about once a week; results were similar at the final period, with no statistically significant differences (see **Exhibit 4-17**). At the initial period, caregivers reported that their child ate breakfast nearly every day (6.6 days per week), ate out about once per week, and ate at fast food restaurants about once a week; results were the same or similar at the final period, with no statistically significant differences (see **Exhibit 4-18**). Consistency in self-reporting across time and enrollment groups suggests that participants were responding to the survey items in a consistent manner. However, because there is limited room for change, it may not be very useful to ask these questions in future evaluations.

Because children may be picky, WIC guidance suggests that caregivers offer children a new food many times before deciding the child does not like the food and that it may take up to a dozen tries for a child to accept a new food (USDA, FNS, 2012; USDA, FNS, n.d.). More recent guidance suggests that it may take some children up to 15 or 20 tries before accepting a new food (Whaley, Pérez-Escamilla, Segura-Pérez, & Lott, 2017). For the pilot study participants, the mean number of times was 5.2 at the initial period, with an increasing trend to 5.6 times at final. Study planners for future evaluations may want to review the literature for a question item that has been tested for validity and reliability because one was not available when the pilot study was designed.

Exhibit 4-17. Eating Behavior Measures (Times per Week): Women Who Were Pregnant or Postpartum at Enrollment (RQ1e)

Measure	Pregnant				Postpartum			
	Initial Means (SD)	Final Means (SD)	Change ^a	p-value for t test	Initial Means (SD)	Final Means (SD)	Change ^a	p-value for t test
Days per week eat breakfast	5.5 (2.2)	5.2 (2.1)	-0.3	.2800	5.1 (2.1)	4.7 (2.0)	-0.4	.1557
Times per week eat out ^b	1.9 (1.2)	1.7 (1.6)	-0.2	.3457	1.5 (1.2)	1.6 (1.7)	0.1	.4411
Times per week eat fast food ^b	1.4 (1.3)	1.3 (1.4)	-0.0	.8602	1.3 (1.4)	1.5 (1.7)	0.2	.3245
Number of respondents (range) ^c			64–66				83–85	

Source: Participant Surveys, Initial and Final

^a Within-person change over time between initial and final.^b Response options ranged from 0 to “8 or more”; “8 or more” was assigned a value of 8 to calculate a mean.^c A range is provided because the number of respondents varied by question.

SD = standard deviation

Exhibit 4-18. Child Eating Behavior Measures (Times per Week/Number of Times): Caregivers with Eligible Child 12 Months or Older at Enrollment (RQ1e)

Measure	Initial Means (SD)	Final Means (SD)	Change ^a	p-value for t test
Days per week child eats breakfast	6.6 (1.2)	6.6 (1.2)	0.0	.9585
Times per week household eats out ^b	1.0 (1.0)	1.2 (1.2)	0.1	.1177
Times per week child eats fast food ^b	0.9 (1.2)	1.0 (1.1)	0.1	.2966
Number of times caregiver offers a new food before deciding the child does not like it ^c	5.2 (3.0)	5.6 (3.3)	0.4	.0651
Number of respondents (range) ^d			182–227	

Source: Participant Surveys, Initial and Final

^a Within-person change over time between initial and final.^b Response options ranged from 0 to “8 or more”; “8 or more” was assigned a value of 8 to calculate a mean.^c Mean score was assigned using responses to categorical variable by assigning a value of 1 for “once,” 2 for “twice,” 4 for “3–5 times,” 5 for “6–10 times,” 11 for “more than 10 times.” Recommended behavior is to try serving new foods at least 5 times. Because a numerical score was created, the responses “My child likes everything” and “My child hasn’t tried new foods” were excluded (n = 26).^d A range is provided because the number of respondents varied by question.

SD = standard deviation

The pilot study considered the frequency of eating a meal while watching TV (behavior to limit) and cooking homemade dinners (behavior to encourage) for woman participants. For women who were pregnant at enrollment, eating a meal while watching TV increased significantly, from 22% at the initial period to 34% at the final period ($p = .0209$); this behavior did not change for women who were postpartum at enrollment (see **Exhibit 4-19**).

Exhibit 4-19. Eating Behavior Measures (Frequency): Women Who Were Pregnant or Postpartum at Enrollment (RQ1e)

Measure	Pregnant				Postpartum			
	Initial % (n)	Final % (n)	Change ^a	McNemar's Test (<i>p</i> -value)	Initial % (n)	Final % (n)	Change ^a	McNemar's Test (<i>p</i> -value)
Eat meal while watching TV ^b	22.4 (15)	34.3 (23)	11.9 *	.0209	23.9 (21)	33.0 (29)	9.1	.1025
Cook homemade dinner ^c	72.1 (49)	77.9 (53)	5.9	.2850	71.4 (60)	78.6 (66)	7.1	.1573
Number of respondents (range) ^d	67–68				84–88			

Source: Participant Surveys, Initial and Final

* Indicates statistical significance if the *p*-value is $\leq .05$.

^a Within-person change over time between initial and final. Analysis of change is based on the number of respondents who provided data at initial and final and calculated as the change over time in the percentage of respondents who reported the desired behavior at final.

^b Respondents answered on a 5-point response set: 1 = rarely or never, 2 = some days, 3 = most days, 4 = almost every day, and 5 = every day. Tabled values report the percentage of respondents who answered "rarely or never" at initial and final.

^c Respondents answered on a 5-point response set: 1 = rarely or never, 2 = some days, 3 = most days, 4 = almost every day, and 5 = every day. Tabled values report the percentage of respondents who answered "almost every day" or "every day" at initial and final.

^d A range is provided because the number of respondents varied by question.

Additionally, the pilot study considered the frequency with which the caregiver or child engaged in eating behaviors that are encouraged (e.g., caregiver sits and eats meal with child) or discouraged (e.g., child eats meal while watching TV/DVDs) (see **Exhibit 4-20**). The caregiver cooking a homemade dinner for child decreased from 91% at the initial period to 83% at the final period (approached statistical significance at $p = .0588$). No changes were observed in the other measures.

In general, these variables were consistent across time and enrollment groups, suggesting that participants were responding reliably. The Participant Surveys asked participants to recall whether they received information from WIC on shopping for and preparing healthier foods but did not ask whether nutrition education was provided on specific behaviors such as cooking homemade meals and screen time while eating. As previously noted, if these measures are included in future evaluations, study planners should also collect site- and participant-level information to assess whether the sites address these specific topics and if participants recall receiving this information.

Exhibit 4-20. Child Eating Behavior Measures (Frequency): Caregivers with Eligible Child More than 12 Months Old at Enrollment (RQ1e)

Measure	Initial % (n)	Final % (n)	Change ^a	McNemar's Test (p-value)
Child eats meal while watching TV/DVDs ^b	46.3 (105)	41.4 (94)	-4.8	.1590
Caregiver sits and eats meal with child ^c	81.0 (183)	77.4 (175)	-3.5	.2382
Caregiver cooks homemade dinner for child ^c	90.5 (124)	83.2 (114)	-7.3	.0588
Number of respondents (range) ^d			137–227	

Source: Participant Surveys, Initial and Final

^a Within-person change over time between initial and final. Analysis of change is based on the number of respondents who provided data at initial and final and calculated as the change over time in the percentage of respondents who reported the desired behavior at final.^b Respondents answered on a 5-point response set: 1 = rarely or never, 2 = some days, 3 = most days, 4 = almost every day, and 5 = every day. Tabled values report the percentage of respondents who answered "rarely or never" at initial and final.^c Respondents answered on a 5-point response set: 1 = rarely or never, 2 = some days, 3 = most days, 4 = almost every day, and 5 = every day. Tabled values report the percentage of respondents who answered "almost every day" or "every day" at initial and final.^d A range is provided because the number of respondents varied by question.

4.5.6 Child Feeding Style

Exhibit 4-21 presents the results for questions that collected information on caregiver feeding practices to describe the style of feeding, for example, laissez-faire, pressuring, restrictive, and responsive (Thompson et al., 2009). These practices were grouped by behaviors to encourage versus behaviors to discourage. Statistically significant changes were observed for the two behaviors to encourage, with one practice increasing and one decreasing. Statistically significant changes were not observed for the behaviors to discourage.

For kept track of what the child eats and drinks, a significant decrease was found between the percentage of participants reporting this practice most of the time or almost always at the initial period (53%) and those that reported this practice most of the time or almost always at final (45%, $p = .0350$). A potential reason for this finding being in the opposite direction as expected is that this practice may be more difficult to follow as the child gets older and spends less time with the caregiver. For talked to child and encouraged him/her to eat or drink, a significant increase was found between the percentage of participants reporting this practice most of the time or almost always at the initial period (60%) and those who reported this practice most of the time or almost always at final (70%, $p = .0455$).

While recommended, the behaviors shown in Exhibit 4-21 may not be routinely addressed in WIC nutrition education. They may arise during nutrition counseling related to a goal a parent/caregiver might choose, and educational materials or group or Internet modules related to parent/child responsibilities for feeding may address some of these behaviors. The Participant Surveys and the Nutrition Educator Survey (part of the site-level data collection) provided information on whether infant or child feeding was a topic addressed in WIC nutrition education; however, the study did not collect data to confirm the extent to which sites provided nutrition education on these specific practices. Thus, the analysis cannot address whether participants changed their behavior in response to messaging on these practices. To establish such a link in future studies, it would be necessary to collect site- and participant-level information to assess whether these specific topics were discussed and whether participants recall those exchanges.

Exhibit 4-21. Child Feeding Style Measures: Caregivers with Eligible Child 12 Months or Older at Enrollment (RQ1e)

Measure	Initial % (n)	Final % (n)	Change ^a	McNemar's Test (p-value)
Behaviors to Encourage ^b				
Kept track of what child eats and drinks	52.7 (117)	45.0 (100)	-7.7 *	.0350
Talked to child to encourage him/her to eat or drink	60.3 (79)	69.5 (91)	9.2 *	.0455
Behaviors to Discourage ^c				
Tried to get child to finish his/her food and drinks	12.3 (27)	15.9 (35)	3.6	.1573
Tried to get child to eat even if s/he does not seem hungry	49.3 (107)	48.8 (106)	-0.5	.9104
Carefully controlled how much child eats or drinks	31.8 (70)	32.3 (71)	0.5	.8997
Let child eat desserts/sweets to keep him/her happy	82.9 (184)	80.2 (178)	-2.7	.3763
Number of respondents (range) ^d	131–222			

Source: Participant Surveys, Initial and Final

* Indicates statistical significance if the p-value is ≤ .05.

^a Within-person change over time between initial and final. Analysis of change is based on the number of respondents who provided data at initial and final and calculated as the change over time in the percentage of respondents who reported the desired behavior at final.

^b Respondents answered for how often they did the behavior in the past 30 days using a 5-point response set: 1 = almost never, 2 = once in a while, 3 = sometimes, 4 = often, 5 = almost always. Tabled values report the percentage of respondents who answered "often" or "almost always" at initial and final (i.e., the desired behavior).

^c Respondents answered for how often they did the behavior in the past 30 days using a 5-point response set: 1 = almost never, 2 = once in a while, 3 = sometimes, 4 = often, 5 = almost always. Tabled values report the percentage of respondents who answered "almost never" or "once in a while" at initial and final (i.e., the desired behavior).

^d A range is provided because the number of respondents varied by question.

4.5.7 Dietary Intake

Dietary intake was estimated using responses to the NHANES Screener instrument (see **Exhibit 4-22** for women participants and **Exhibit 4-23** for children of caregiver participants). To facilitate interpretation, the exhibits provide the recommended values for the food category based on the 2015–2020 Dietary Guidelines for Americans (U.S. Department of Health and Human Services and USDA, 2015). As a point of comparison, the exhibits also provide national estimates using information on national averages from USDA-Agricultural Research Service's (ARS's) What We Eat in America, which were estimated using data from NHANES. For women participants, the national averages are for men and women aged 20 or older unless data specific to women were available, and for children the averages are for children aged 2 to 5; the national averages are not limited to WIC participants.

When interpreting these results, keep in mind that dietary intake may be influenced as a woman moves from pregnancy to postpartum status as her nutrient needs change and as a child ages over the study period. Also, the availability of foods in the WIC food package may influence what a woman or child consumes.⁴⁴ Thus, changes observed in dietary intake may not be directly attributed to WIC nutrition education.

⁴⁴ The WIC food package requirements are the same for children between the ages of 2 and 4 years.

Exhibit 4-22. Dietary Intake Measures: Women Who Were Pregnant or Postpartum at Enrollment (RQ1c)

Measure	Recommended Intake ^a	National Average ^b	Pregnant				Postpartum			
			Initial Means (SD)	Final Means (SD)	Change ^c	p-value for t test	Initial Means (SD)	Final Means (SD)	Change ^c	p-value for t test
Fiber (g/day)	≥25	14.3	16.1 (3.8)	14.9 (2.7)	-1.3 *	.0187	15.7 (3.1)	15.8 (3.1)	0.1	.8443
Added sugar (tsp/day)	≤12.5	18.2 tsp equiv.	15.5 (4.9)	15.5 (4.4)	0.0	.9337	16.0 (4.9)	15.4 (5.6)	-0.5	.4556
Added sugar from sugary beverages (tsp/day)	—	—	6.8 (3.2)	7.7 (4.0)	0.9 *	.0430	7.4 (3.8)	7.6 (4.3)	0.2	.6096
Whole grains (oz/day)	≥3	1.0	0.9 (0.5)	0.7 (0.3)	-0.1	.0631	0.8 (0.4)	0.8 (0.4)	0.0	.4127
Dairy (cup/day)	3	1.6	1.8 (0.5)	1.6 (0.5)	-0.2 **	.0018	1.9 (0.6)	1.7 (0.6)	-0.2 *	.0107
Fruit and vegetables, including legumes (cup/day)	4.5	2.6	2.7 (0.9)	2.5 (0.6)	-0.2	.0631	2.6 (0.7)	2.7 (0.7)	0.1	.2004
Fruit and vegetables including legumes but excluding fried potatoes (cup/day)	—	—	2.7 (0.9)	2.5 (0.7)	-0.2	.0942	2.5 (0.7)	2.6 (0.7)	0.1	.2135
Number of respondents (range) ^d					52–66	.			65–82	

Source: Participant Surveys, Initial and Final

Note: Dietary intake measures estimated using NHANES Screener instrument.

* Indicates statistical significance if the p-value is ≤ .05.

** Indicates statistical significance if the p-value is ≤ .01.

^a 2015–2020 Dietary Guidelines for Americans (U.S. Department of Health and Human Services and USDA, 2015)^b National averages from USDA-ARS's What We Eat in America, which were estimated using data from NHANES (2013–2014, 2011–2012, 2005–2010). Information for all measures was not available for the most recent year, so the most current information was used. In most cases the national averages are for men and women aged 20 or older unless data specific to women were available.^c Within-person change over time between initial and interim.^d A range is provided because the number of respondents varied by question.

— = not available

Exhibit 4-23. Child Dietary Intake Measures: Caregivers with Eligible Child 24 Months or Older at Enrollment (RQ1c)

Measure	Recommended Intake ^a	National Average ^b	Initial Means (SD)	Final Means (SD)	Change ^c	p-value for t test
Fiber (g/day)	≥ 14	12.4 boys, 10.8 girls	13.1 (2.6)	12.7 (2.0)	-0.4	.1274
Added sugar (tsp/day)	≤ 6.25	12.9 tsp equip	12.8 (2.4)	12.8 (2.2)	0.0	.8051
Added sugar from sugary beverages (tsp/day)	—	—	4.0 (0.8)	4.2 (1.0)	0.1 *	.0447
Whole grains (oz/day)	≥ 1.5	0.7	0.6 (0.2)	0.5 (0.2)	-0.1 **	.0060
Dairy (cup/day)	2	2.3	2.4 (0.6)	2.1 (0.4)	-0.3 ***	<.0001
Fruit and vegetables, including legumes (cup/day)	2	2.1	2.3 (0.6)	2.2 (0.5)	-0.1	.1156
Fruit and vegetables including legumes but excluding fried potatoes (cup/day)	—	—	2.2 (0.6)	2.1 (0.5)	-0.1	.0999
Number of respondents (range) ^d					91–130	

Source: Participant Surveys, Initial and Final

Notes: Dietary intake measures estimated using NHANES Screener instrument.

* Indicates statistical significance if the p-value is ≤ .05.

** Indicates statistical significance if the p-value is ≤ .01.

*** Indicates statistical significance if the p-value is ≤ .001.

^a 2015–2020 Dietary Guidelines for Americans (U.S. Department of Health and Human Services and USDA, 2015)

^b National averages for children aged 2 to 5 from USDA-ARS's What We Eat in America, which were estimated using data from NHANES (2013–2014, 2011–2012, 2005–2008). Information for all measures was not available for the most recent year, so the most current information was used.

^c Within-person change over time between initial and final.

^d A range is provided because the number of respondents varied by question.

— = not available

Pregnant and postpartum women participants in the pilot sites were not meeting dietary recommendations at the initial or final period (see Exhibit 4-22). The pilot study results are similar to (or better than) the national averages noted in the exhibit. For women who were pregnant at enrollment, several items changed significantly between the initial and final periods (fiber, added sugar from sugary beverages, and dairy). The changes were generally small in magnitude and for some items may reflect woman's changing caloric needs during pregnancy. For fiber, intake decreased from 16.1 to 14.9 g/day ($p = .0187$). For added sugar from sugary beverages, intake increased from 6.8 to 7.7 tsp/day ($p = .0430$). For dairy, intake decreased from 1.8 to 1.6 cup/day ($p = .0018$). For women who were postpartum at enrollment, dairy intake decreased significantly from 1.9 to 1.7 cup/day ($p = .0107$), and no statistically significant changes were observed for the remaining food categories.

At the initial and final time periods, children of caregiver participants were not meeting the dietary recommendations for fiber, added sugar, and whole grains but were meeting the recommendations for dairy and fruit and vegetables, including legumes (see Exhibit 4-23). The pilot study results for the initial and final periods are similar to the national averages presented in the exhibit. Several food/beverage items changed significantly between the initial and final periods. Added sugar from sugary beverages increased from 4.0 to 4.2 tsp/day ($p = .0447$), dairy decreased from 2.4 to 2.1 cup/day ($p < .0001$), and whole grains decreased from 0.6 to 0.5 oz/day ($p = .0060$). The changes are small in magnitude and may reflect children's changing caloric needs as they get older.

Study planners for future evaluations should consider using the NHANES Screener instrument to collect information on dietary intake. First, the NHANES Screener, as a food frequency questionnaire, asks participants to report their "usual" intake of a listed food. As a result, participants tend to report on their behavior over a period of time (e.g., week, month), which can reduce the influence of day-to-day variation in consumption and thus provide an assessment of intervention-related change. Second, the NHANES Screener is a validated instrument with an extensive history of use, thus allowing evaluators to compare the study sample and national averages. In the pilot study, for example, results are comparable to national averages. Conducting multiple 24-hour dietary recalls to estimate usual intake is another option for collecting information on dietary intake, but this approach would be more burdensome for participants and require additional resources for data collection and analysis.

4.5.8 Physical and Sedentary Activity

The 2008 Physical Activity Guidelines for Americans recommends at least 150 minutes of moderate physical activity per week, 75 minutes of vigorous physical aerobic activity, or an equivalent combination of the two types of physical activity for adults (U.S. Department of Health and Human Services, 2008). Results from the National Health Interview Survey suggest that 24% of females aged 25 to 64 meet these guidelines (Ward, Clarke, Nugent, & Schiller, 2016). The Participant Surveys used a modified version of questions from the International Physical Activity Questionnaire (Craig et al., 2003) to collect information on physical activity (see **Exhibits 4-24** and **4-25**). Participants who were pregnant at enrollment reported an average of 160 minutes per week of moderate or vigorous physical activity at the initial period and 177 minutes at the final period; this increase was not significant. Participants who were postpartum at enrollment reported an average of 111 minutes per week of moderate or vigorous physical activity at the initial period, with a statistically significant increase to 160 minutes at the final period ($p = .0010$). When interpreting these results, keep in mind a woman's level of physical activity may change as she moves from pregnancy to postpartum status. For example, the final value for women who were postpartum at enrollment (160 minutes per week) is about the same as the initial value for women who were pregnant at enrollment (160 minutes per week), suggesting that the increase between the initial and final periods for women who were postpartum at enrollment may be due to their postpartum status (i.e., exercised less frequently in the early stages of postpartum). Caregivers with an eligible child reported an average of 171 minutes per week of moderate or vigorous physical activity at the initial period, with an increase to 185 minutes at the final period; this increase was not significant.

Exhibit 4-24. Physical and Sedentary Activity Measures: Women Who Were Pregnant or Postpartum at Enrollment (RQ1d)

Measure	Pregnant				Postpartum			
	Initial Means (SD)	Final Means (SD)	Change ^a	p-value for t test	Initial Means (SD)	Final Means (SD)	Change ^a	p-value for t test
Number of minutes of moderate or vigorous physical activity per week (minutes/week) ^b	160.3 (119.0)	177.3 (129.8)	16.9	.4434	111.1 (97.6)	160.8 (116.7)	49.8 ***	.0010
Number of hours watch TV or DVDs daily ^c	3.1 (2.0)	3.1 (2.2)	0.0	.9457	3.0 (1.8)	2.7 (1.7)	-0.4 *	.0328
Number of respondents (range) ^d	44–65				61–87			

Source: Participant Surveys, Initial and Final

* Indicates statistical significance if the p -value is $\leq .05$.

*** Indicates statistical significance if the p -value is $\leq .001$.

^a Within-person change over time between initial and final.

^b See Appendix J for a description of how the outcome variable was derived using responses to questions on number of days of physical activity and minutes per day.

^c Response options ranged from 0 to "8 or more"; "8 or more" was assigned a value of 8 to calculate a mean.

^d A range is provided because the number of respondents varied by question.

Exhibit 4-25. Physical and Sedentary Activity Measures: Caregivers with Eligible Child (RQ1d)

Measure	Initial Means (SD)	Final Means (SD)	Change ^a	p-value for t test
Number of minutes of moderate or vigorous physical activity per week for caregiver (minutes/week) ^b	171.1 (106.2)	185.4 (124.5)	14.2	.1369
Number of hours caregiver watches TV or DVDs daily	2.0 (1.4)	2.2 (1.6)	0.2	.0652
Number of days per week caregiver plays outside with child (> 12 mo old)	4.4 (2.1)	4.4 (2.2)	0.0	.8317
Number of hours per week child (> 12 mo old) plays outside	15.3 (12.0)	16.5 (12.4)	1.3	.1133
Number of hours child (> 12 mo old) spends on screen time daily (TV, DVDs, video, or computer games) ^c	2.4 (2.2)	2.7 (1.8)	0.3 *	.0361
Number of respondents (range) ^d			182–261	

Source: Participant Surveys, Initial and Final

* Indicates statistical significance if the *p*-value is ≤ .05.^a Within-person change over time between initial and final.^b See Appendix J for a description of how the outcome variable was derived using responses to questions on number of days of physical activity and minutes per day.^c See Appendix J for a description of how the outcome variable was derived using responses to questions on number of hours of use for different types of devices (e.g., TV, video games).^d A range is provided because the number of respondents varied by question.

As a point of comparison, the 2016 American Time Use Survey found that female adults spent an average of 15 minutes a day participating in sports, exercise, and recreation (U.S. Department of Labor, Bureau of Labor Statistics, 2017), which equates to 105 minutes a week. Thus, women who were postpartum at enrollment exercised a similar amount to this national estimate (111 versus 105 minutes per week), and women who were pregnant at enrollment reported a higher level (160 versus 105 minutes per week). It is important to note that the American Time Use Survey did not use the same measure for physical activity as the pilot study and the results are for all females, not just those on WIC.

The number of hours adult participants watched TV or DVDs daily ranged from 2 to 3 hours at the initial period (see Exhibit 4-23).⁴⁵ For women who were postpartum at enrollment, a statistically significant decrease from 3.0 to 2.7 hours per day was observed between initial and final ($p = .0328$). The average number of hours children (for caregiver participants) spent on screen time (TV, DVDs, video or computer games) daily was 2.4 hours at initial, which increased to 2.7 hours at final ($p = .0361$) (see Exhibit 4-24). At the time of the study, the American Academy of Pediatrics (AAP) recommended limiting total entertainment media time (television, videotapes, and videogames) for children 2 or older to no more than 1 to 2 hours of quality programming per day (AAP, 2001). In 2016, the AAP revised its recommendation to limit screen time to 1 hour a day of high-quality programming for children aged 2 to 5 years (AAP, 2016). Children of the caregiver participants slightly exceeded the upper range of the 2001 recommendation. The Participant Surveys used questions from the Healthy Kids Survey (Townsend, 2011; Townsend et al., 2014) to collect information on screen time for women and children. These measures have been validated for face validity, but information is not available on reliability testing.

Although direct evidence of participant understanding of these questions is not available from the pilot study, if these behaviors are of interest for future evaluations, study planners may want to consider including multi-item scales that would provide more information than single items.

⁴⁵ Information on video games or other screen time was not collected for adult participants.

4.5.9 Implications for the Design of Future Evaluations

The results of the outcome analysis provide useful information for designing future evaluations in terms of the measures to include and how to best frame these measures. **Exhibit 4-26** provides a summary of the pilot study findings and recommendations for future evaluations organized by the category of measures used in the Participant Surveys. Some of the measures included in the pilot study were either not sensitive enough to detect changes in outcomes of interest or there was limited change in the measures between the initial and final periods. Study planners for future evaluations should review the recent literature to identify tools and measures that have been tested for validity and reliability given that the instruments for the Participant Surveys were developed 5 years ago. Additionally, when feasible, study planners should use multi-item scales instead of single items. Also, extensive cognitive testing with the target audience is recommended for new questions. For the pilot study, the study team conducted nine interviews split between the three instruments (pregnant, postpartum, child). For future studies, it would be useful to conduct multiple iterations of cognitive interviews.

4.6 Selection of Measures for Exploratory Impact Analyses

Because this was a feasibility study, the impact analyses focused on a limited number of measures. For brevity, these measures are referred to as the measures of interest. This section identifies the six measures selected and describes the approach and justification for selecting these measures.

4.6.1 Selection Criteria

Several criteria were considered for selecting the measures of interest. First, only measures that demonstrated change for the outcome analysis were considered. Demonstrated change was defined as within-person change over time between the initial and final periods that was statistically significant at $p \leq .05$.⁴⁶ Limiting the measures to those that demonstrated significant change yielded 25 measures for consideration. The measures were then grouped by five domains (pregnant and postpartum women's readiness to consume a healthy diet, caregiver's readiness to serve their child a healthy diet, dietary habits, food-related behaviors, and physical and sedentary activity). Within each of the five domains, the following factors were considered in selecting one or more measures per domain:

- Priority was placed on measures that were based on a validated survey question in which there is a high degree of confidence based on the available literature.
- The selected measure(s) are those that seem to have the strongest alignment with WIC nutrition education. That is to say, they are closely tied to the content and messaging of WIC nutrition education, and there are few obvious confounding factors or plausible alternative explanations such as physical changes in the mother (as she moves from prenatal to postpartum and the number of months the mother is postpartum) or physical changes in the child over time that would affect the selected measure.
- The extent to which participants received WIC nutrition education related to the measure based on self-reported data from the Participant Surveys.

⁴⁶ For one measure (caregiver cooks homemade dinner) the p -value approached statistical significance, $p = .0588$.

Exhibit 4-26. Participant Outcome Measures: Implications for the Design of Future Evaluations

Measure	Findings	Recommendations Based on Pilot
Readiness to change to consume/serve child healthy foods	- Considerable variability in responses by item and enrollment group, suggesting that respondents were not responding only in socially desirable ways. - Observed statistically significant change between the initial and final periods for some items. - Measure is consistent with WIC guidelines for delivery of nutrition education.	Use multi-item scales for each food/beverage of interest (e.g., multiple items to assess fruit consumption, multiple items to assess vegetable consumption)
Enjoyment of healthy foods	No or limited room for improvement for most items because all or most participants reported enjoying the foods asked about at the initial period.	Do not recommend including this measure.
Efficacy to consume/serve healthy foods	- Observed statistically significant change between the initial and final periods for some items. - Measure is consistent with WIC guidelines for delivery of nutrition education.	Recommend using this measure but consider using a response set with more than 3-points and multi-item scales (as noted above for readiness to change).
Food acquisition and management	Consistency in self-reporting across time and enrollment groups suggests that participants reliably answered the questions.	If these measures are used, need to collect data from participants and sites on the specific topics (e.g., meal planning and reading labels).
Eating behaviors	- Consistency in self-reporting across time and enrollment groups suggests that participants reliably answered the questions. - For many of the items there was limited room for change.	For items with limited room for change, may not be very useful to ask these questions.
Child feeding style	Observed statistically significant change between the initial and final periods for some items.	If these measures are used, need to collect data from participants and sites on the specific topics (e.g., talked to child to encourage him/her to eat).
Dietary intake	Observed statistically significant change between the initial and interim periods for some items.	NHANES Screener is a food frequency questionnaire, it is a validated measure, and some measures were statistically significant; thus, recommend retaining for future evaluations if information is collected on dietary intake.
Physical and sedentary activity	While direct evidence of participant understanding is not available, there are concerns that responding to these questions may have been challenging based on how participants answered the questions.	Recommend multi-item scales.

4.6.2 Measures of Interest and Justification for Selection

Using these criteria, the study team selected the following measures for inclusion in the impact evaluation analyses (grouped by domain):

- Pregnant and Postpartum Women's Readiness to Consume a Healthy Diet
 - Pregnant women enrollment group: can almost always eat brown rice instead of white rice (self-efficacy)⁴⁷

⁴⁷ Because of the limited amount of data available, impact models could not be estimated on pregnant women's efficacy to increase consumption of brown rice.

- Caregiver’s Readiness to Serve their Child a Healthy Diet
 - Caregiver/child enrollment group: readiness to serve child (aged 1 through 4 years) regular soda or pop, sweetened fruit drinks, sports drinks, or energy drinks (referred to as SSBs) no more than once a month
 - Caregiver/child enrollment group: can serve child (aged 1 through 4 years) SSBs no more than once a month (self-efficacy)
- Dietary Habits
 - Caregiver/child enrollment group: child’s (aged 2 through 4 years) dietary intake for whole grains
- Physical and Sedentary Activity
 - Caregiver/child enrollment group: number of hours the child (aged 1 through 4 years) spends on screen time daily (i.e., TV, DVDs, video, or computer games)
- Food-Related Behaviors
 - Caregiver/child enrollment group: caregiver cooks homemade dinner for child (6 months to 4 years)

In the sections that follow, the rationale for selecting these measures is discussed, organized by the five domains.

Pregnant and Postpartum Women’s Readiness to Consume a Healthy Diet

The self-efficacy measure “*can almost always eat brown rice instead of white rice*” was selected for the impact analyses. As women move from pregnancy to postpartum status, total food intake may increase or decrease; accordingly, changes in consumption of foods such as fruit and vegetables may be a result of external programmatic factors. In contrast, selecting brown rice over white rice reflects dietary decisions, not intake. It is independent of caloric requirements and is less likely to be affected by participant status. Additionally, brown rice is a food in the WIC food package, so this food is addressed in WIC programming. Based on the Participant Survey results, 83% of participants who were pregnant at enrollment reported receiving at least one exposure to messaging on eating more whole grains during the study period. Although this measure has been used in data collection with children, it was found to have low correlation with intake for the fruit and vegetable item (Baranowski et al., 2010).⁴⁸ At the time that the survey instrument was developed for the Participant Surveys, there was not a validated tool to measure self-efficacy for healthy eating among women of childbearing age.

Caregiver’s Readiness to Serve their Child a Healthy Diet

Two measures—“*readiness to serve child regular soda or pop, sweetened fruit drinks, sports drinks, or energy drinks no more than once a month*” and “*can serve child regular soda or pop, sweetened fruit drinks, sports drinks, or energy drinks no more than once a month*”—were selected for the impact analyses. Although WIC guidance offers no specific guidelines on limiting consumption of SSBs, 74% of study participants in the caregiver enrollment group reported receiving at least one exposure related to

⁴⁸ This correlation was not examined for the pilot study.

messaging on limiting SSBs during the study period.⁴⁹ The AAP recommends that pediatricians “promote a diet free of sugar-sweetened beverages” (Daniels & Hassink, 2015, p. e275). Recently the American Heart Association recommended that children aged 2 or older should limit SSB consumption (Vos et al., 2016). Thus, limiting SSBs is an important message to convey to parents of young children. However, because messaging about SSBs is coming from multiple sources, attributing change in these measures to WIC nutrition education may be difficult.

Dietary Habits

Child’s *dietary intake of whole grains* was selected for inclusion in the impact analyses. Although caloric intake is likely to change as the child ages, switching from refined to whole grains should be independent of the child’s age and caloric needs. The NHANES Screener instrument, which is a validated instrument, was used to collect information for estimating dietary intake for different food groups.

Physical and Sedentary Activity

The *number of hours the child spends on screen time daily (i.e., TV, DVDs, video or computer games)* was included in the impact analyses for several reasons. Based on the Participant Survey results, 62% of participants reported receiving at least one exposure during the study period to messaging on getting more physical activity. This measure is from the Healthy Kids Survey, a parent-report obesity risk assessment tool that has been validated for face validity and the readability assessed with low-income mothers (Townsend et al., 2014). WIC guidance for physical activity for infants published in 2009 provided the AAP recommendations for screen time; thus, this behavior is discussed in WIC guidance documents (USDA, FNS, 2009). Because data collection for the initial and final surveys took place during the same season (i.e., summer months), seasonality should not be a concern.

Food-Related Behaviors

The measure *caregiver cooks homemade dinner for child* was selected for inclusion in the impact analyses for several reasons. This measure is consistent with WIC messaging on healthy eating, and based on the Participant Survey results, 74% of participants in the caregiver enrollment group reported receiving at least one exposure to messaging on “shopping for and preparing healthier food” during the study period. The question asked in the Participant Surveys was obtained from the Expanded Food and Nutrition Education Program (EFNEP) Economic Research Service Behavior Checklist, which has been used in surveys of low-income women participating in EFNEP, and the content validity was established in focus groups with low-income women (Hersey et al., 2001).

4.7 Bivariate Analyses for the Measures of Interest

Bivariate analyses were conducted to assess whether the values of the measures at the initial time period were similar or different for several variables: site, length of time receiving WIC benefits, and when Part 1 of the survey was completed. The results of these analyses are summarized below.

⁴⁹ The specific message asked about in the Participant Surveys was “drinking water instead of soda and sugary drinks.”

Differences in the initial values for the selected measures by site were not statistically significant (see Appendix K, Exhibit K-38); thus, participants' behaviors were similar across the six sites at the initial time period for these measures.

Despite having received WIC nutrition education for different lengths of time, differences in the initial values for the selected measures by the length of time the participant or her child has received WIC benefits (less than 30 days versus 1 month or longer) were not statistically significant (see Appendix K, Exhibit K-39).⁵⁰ The failure to find significant effects could be due to the small number of respondents in the "less than 30 days group" ($n = 32$ for women who were pregnant at enrollment and $n = 14$ for caregiver with eligible child). The length of time the participant has received WIC benefits was included as a covariate in the impact analyses. As previously noted, many of the pilot study participants had been receiving WIC benefits before enrolling in the study and thus had been exposed to WIC nutrition education. Therefore, planners for future evaluations may want to limit study participation to WIC participants who are new to the WIC program or oversample such individuals.

As previously described, the preferred approach for the initial data collection was for participants to complete Part 1 of the survey before their WIC appointment to avoid potentially "priming" participants. Because this was not always possible, about half of participants completed Part 1 of the survey before their appointment and this percentage varied greatly by site, from 0 to 87%. Differences in the initial values for the selected measures by whether the participant completed Part 1 of the initial survey before or after their WIC appointment were not statistically significant (see Appendix K, Exhibit K-40); thus, no evidence of a priming effect was found for these measures. Planners for future evaluations should consider whether it is important to complete Part 1 of the survey before the participant's appointment. Eliminating this requirement would help simplify the logistics of enrolling participants at WIC sites.

4.8 Summary

The analysis reported in this chapter tested for change over time between the initial and final periods for the outcome measures included in the pilot study. This analysis was conducted by enrollment group, for a total of 129 comparisons. Of these comparisons, 25 measures demonstrated statistically significant change ($p \leq .05$): 7 measures demonstrated positive improvement and 18 measures declined or decreased. Among these, 8 measures were for the pregnant-at-enrollment group, 3 were for the postpartum-at-enrollment group, and 14 were for the caregiver-with-child group. Measures with significant changes detected represented a variety of behaviors: readiness to change (2), self-efficacy (7), food acquisition (2), dietary intake (7), eating behaviors (2), child feeding style (2), and physical and sedentary activity (3). The measures with significant changes detected also represented a variety of foods: fruit (1), vegetables (2), SSBs (4), dairy (4), whole grains/fiber (5), and not food specific (9). Because the results are so varied and represent a variety of populations, behaviors, and foods, it is difficult to draw any overall conclusions.

From the 25 measures that demonstrated statistically significant change, a systematic approach was used to select a subset of measures to examine in the impact analyses. The results of the outcome analyses

⁵⁰ The Participant Surveys did not ask participants if the visit that they enrolled into the study was the first time she or her child had ever received WIC benefits. Thus, the response category "less than 30 days" was used as a proxy to indicate the woman/child was receiving WIC benefits for the very first time and likely had no prior exposure to WIC nutrition education.

were reviewed to make recommendations on which measures to include in future evaluations and which measures to exclude or modify. The next chapter presents the approach and results of the impact analyses conducted for the measures of interest.

5. Analytical Approach and Results for the Impact Analyses for the Pilot Study

This chapter describes the analytical approach and results for the analyses conducted to understand the contribution of nutrition education to changes in key outcomes (see sidebar for the study's research questions [RQs]). When interpreting the results, it is important to keep in mind that the pilot study does *not* provide nationally representative information on the impact of WIC nutrition education. Instead, the pilot study is intended to test the methodology to inform how best to evaluate the impact of WIC nutrition education on participants' nutrition and physical activity attitudes and behaviors.

To measure the impact of nutrition education, the analysis used a difference-in-difference (DiD) approach that compared change across time in the low- versus high-exposure groups and used latent class analysis (LCA) to define exposure groups. These analyses addressed whether changes in participant behaviors can be attributed to an incremental change in the amount (i.e., dosage and duration) of participant exposure to WIC nutrition education (RQ1f and RQ3c).

The remaining research questions were addressed using statistical approaches such as multivariable and multilevel models, with some analyses emphasizing individual variation in exposure to nutrition education (participant-level models) and others capitalizing on site-level variation in nutrition education (site-level models). The participant-level models examined features and characteristics using data from the Participant Surveys (RQs 2, 3d, 4, 6a, 6c, 7, 8, and 9). The site-level models used data from the Phase I Site Survey, the Point-of-Contact (POC) Interviews, the Nutrition Educator Survey, and the observations of nutrition education (RQs 3a, 3b, 5, and 6b). The participant- and site-level models compared outcomes measured at the final data collection between high- and low-exposure groups. These models (i.e., adjusted endpoint) include covariates from the initial data collection period to reduce confounding or improve precision. The analyses for each research question

Research Questions and Analysis Approach for the Impact Analyses

Difference-in-Difference Models

- 1f. How much of the changes in the outcome measures can be attributed to WIC nutrition education?
- 3c. Does the impact of WIC nutrition education vary by dosage and duration of nutrition education?

Participant-Level Models

2. Are there particular combinations of features of WIC nutrition education that are more effective than other combinations in achieving improvements in participant behaviors?
- 3d. Does the impact vary by participant characteristics, length of time on WIC, exposure to previous WIC nutrition education, participation in other programs, or use of emergency food providers?
4. What dosage and mode of nutrition education delivery (initial and follow-up) are most effective in helping participants improve behaviors?
- 6a. What attributes of group nutrition education sessions are most effective in helping WIC participants improve behaviors?
- 6c. What types and dosage of reinforcers are most effective in helping participants improve behaviors?
7. What other characteristics of WIC nutrition education delivery are most effective in helping WIC participants improve behaviors?
8. What experiences with WIC nutrition education are most often cited by women and child caretakers as motivating them to change their own or their children's behaviors?
9. How does the content of WIC nutrition education affect participants' behaviors?

Site-Level Models

- 3a. Does the impact of WIC nutrition education vary by nutrition educator characteristics?
- 3b. Does the impact of WIC nutrition education vary by agency characteristics?
5. What attributes of individual nutrition education sessions are most effective in helping WIC participants improve behaviors?
- 6b. What skills and attributes of the nutrition educator for group sessions are most effective in helping participants improve behaviors?

examined a subset of participant behaviors (i.e., the outcome measures of interest) as previously identified in Chapter 4. As previously noted, in addition to not being nationally representative and therefore not providing results that are generalizable, the analyses were not sufficiently powered to detect significant changes in all of the outcome measures examined. Therefore, all of the research questions must be considered exploratory, and conclusions should not be made about the effectiveness of WIC nutrition education based on the results presented. Instead, the analyses conducted help demonstrate the feasibility of the pilot study design, instruments, and analysis procedures for answering these questions in future evaluations.

Chapter 5 is organized as follows:

- Section 5.1 describes the LCA analysis and the estimation of DiD models.
- Section 5.2 describes the characteristics of the participants included in the analysis.
- Section 5.3 presents the results of the DiD models.
- Section 5.4 describes the estimation of participant-level models and presents the results.
- Section 5.5 describes the estimation of site-level models and presents the results.
- Section 5.6 discusses the implications of the pilot for designing future evaluations.
- Section 5.7 concludes this chapter with a summary of limitations of the pilot study.

5.1 Latent Class Analysis and the Estimation of Difference-in-Difference Models

This section describes the analysis conducted to address whether changes in participant behaviors can be attributed to WIC nutrition education (RQ1f) and how the impact of WIC nutrition education varies by dosage and duration (RQ3c). The analysis approach was designed to determine the feasibility of assessing the contribution of WIC nutrition education to key behavior changes closely aligned with the goals of the WIC program. Because WIC nutrition education is available for all who meet the eligibility criteria, an evaluation design based on amount of exposure to nutrition education was selected. A measure of exposure was operationalized using measures of frequency of nutrition education contacts, duration of the contacts, the use of reinforcers during nutrition education sessions (e.g., brochures or bulletin boards), and the types of follow-up (e.g., texts or phone calls) that occurred between nutrition education sessions. Section 5.1.1 provides details on the exposure measure along with the methodology used to classify study participants into low-exposure and high-exposure groups.

Data from the Participants Surveys were used in the analyses. Although participants are nested within sites, both exposure conditions (low versus high) are represented in each site, meaning that the overall impact evaluation has a crossed design and the impact models were conducted at the individual level (participant as unit of analysis) with a six-level fixed effect to account for site-to-site differences. The models used a repeated-measure, between-group comparison, or DiD approach to determine the influence of nutrition education on participant behavior. Section 5.1.2 provides additional information on the DiD analysis.

5.1.1 Latent Class Analysis for Determining Exposure Groups

LCA is a person-centered clustering approach used to identify a set of discrete, mutually exclusive classes based on the observed distribution of measured characteristics. In other words, the LCA procedure categorizes participants based on similarity of reported experiences (McCutcheon, 1987). Persons in the same class have response patterns that are more similar to others in their class than they are to persons in another class. Typically, an LCA model provides researchers with more than one solution, where each solution is based on a different number of classes and a set of model fit statistics that allows them to determine the best-fitting solution. The empirically derived classes can then be used in regression models to assess, for example, the impact of higher versus lower exposure to nutrition education on nutrition and nutrition-related behaviors. Using this approach, researchers specify a set of observable (i.e., measurable) variables thought to represent aspects of the latent factor.

An LCA model was used to classify study participants based on self-reported information on the amount of WIC nutrition education and nutrition education supports they received over an 18-month period. The LCA model was developed using MPlus (version 7) (Muthén & Muthén, 1998–2015). Variables for the LCA included the following:

- Average **frequency** of WIC nutrition education contacts over a 6-month period.⁵¹
- Average **duration** of WIC nutrition education visits over a 6-month period. Participants reported duration for each mode of nutrition education experienced (group, one-on-one, Internet) during their most recent visit. For each participant, a sum total of duration (minutes) across modes was calculated for the 6-month period.
- Average number of different types of **reinforcers** (brochure/handout/paper with information, bulletin board/poster, video/DVD, tasting/cooking demonstration, activity/game, item to pass around like measuring cup) used at WIC nutrition education visits over a 6-month period (range: 0–6).
- Average number of different types of **follow-ups** (personal phone call, text message, email message, online education, invitation to a Facebook or Twitter page, brochure or handout in the mail) in between WIC appointments about healthy eating over a 6-month period (range: 0–6).

These variables were constructed using responses to the Participant Surveys at initial, interim, and final (see **Exhibit 5-1**). For each variable, data were aggregated and averaged over the number of completed surveys provided by the participant (participants did not have to complete all three surveys to be included in the calculations) across the 18-month period (the 6 months before enrollment into the study plus the 12-month evaluation period). Accordingly, each variable can be understood as the average exposure over a 6-month period. The model is limited to the data provided by the participants about their experiences receiving WIC nutrition education and does not consider personal or programmatic factors that may channel some participants toward receiving more frequent or longer WIC nutrition education sessions. LCA models were run separately for the two enrollment groups: women who were pregnant at enrollment and caregivers with an eligible child. It was not necessary to run an LCA model for the postpartum-at-enrollment group because no measures were examined for this group.

⁵¹ Indicates any 6-month period for which data are available for the participant during the 18-month period for which these data were collected.

Exhibit 5-1. Indicators of Exposure for the LCA Analysis Created Using Responses to the Participant Surveys

Variable	Description	Survey Question	Variable Creation
Frequency	Average frequency of WIC nutrition education contacts over a 6-month period	In the past six months, how many times did you visit a WIC office and get information on health or healthy eating? Include the day you signed up for this study. Do not include visits for other reasons such as picking up a food instrument or voucher or taking a friend to her appointment. Response options: none (respondent skipped remaining questions on nutrition education received), once, 2 times, 3 times, 4 times, 5 times, 6 or more times. Three respondents selected 6 or more times. Asked at initial, interim, and final periods.	For each survey (initial, interim, and final), created continuous variable equal to the number of times received information, assigned value of 0 if "none" was selected and assigned value of 6 if "6 or more times" was selected. Then, used the values from the completed surveys to calculate a mean value for each participant.
Duration	Average duration of WIC nutrition education visits over a 6-month period	[Respondent answered question if did not respond "none" to number of visits in past 6 months] At your most recent WIC visit, how long did you talk <u>one-on-one</u> with a WIC staff person about health or healthy eating? Response options: I did not talk one-on-one about health or healthy eating, less than 5 minutes, 5–15 minutes, 16–30 minutes, more than 30 minutes. Asked at initial, interim, and final periods. At your most recent WIC visit, how long did you spend in a <u>group session</u> talking about health or healthy eating? Response options: I was not in a group session, less than 5 minutes, 5–15 minutes, 16–30 minutes, more than 30 minutes. Asked at initial, interim, and final periods. [If respondent indicated use of WIC Web site at the site or remotely in the past 6 months] How long did you spend using the <u>WIC Web site</u>? Response options: Less than 5 minutes, 5–15 minutes, 16–30 minutes, more than 30 minutes. Asked at initial, interim, and final periods.	For each survey (initial, interim, and final), assigned a midpoint to each of the response options for each of the three mode questions: less than 5 minutes = 4.5 minutes; 5–15 minutes = 10 minutes; 16–30 minutes = 23 minutes; more than 30 minutes = 31, then summed across the three modes to calculate the total duration. Then, used the values from the completed surveys to calculate a mean value for each participant.
Reinforcers	Count variable (0–6) that indicates the number of different types of reinforcers reported by the participant	[Respondent answered question if did not respond "none" to number of visits in past 6 months] At your most recent WIC visit, did the WIC staff show you any of the following or use any of these with you while they talked about health or healthy eating? Response options: Personal phone call, Text message, Email message, Online education that I could log into from home or someplace else, Invitation or link to Facebook, Twitter, or other social media site, Brochure or handout in the mail, None of the above	For each survey (initial, interim, and final), created continuous variable equal to the number of items selected, assigned value of 0 if "none of the above" was selected. Then, used the values from completed surveys to calculate a mean value for each participant.
Follow-ups	Count variable (0–6) that indicates the number of different types of follow-ups reported by the participant	[Respondent answered question if did not respond "none" to number of visits in past 6 months] In the past 6 months, <u>in between WIC visits</u>, what did you get from WIC with information about health or healthy eating? Do not include things you got during your WIC visit. Response options: personal phone call; text message; email message; online education that I could log into from home or someplace else; invitation or link to Facebook, Twitter, or other social media site; brochure or handout in the mail; None of the above. Asked at initial, interim, and final periods.	For each survey (initial, interim, and final), created continuous variable equal to the number of items selected, assigned value of 0 if "none of the above" was selected. Then, used the values from completed surveys to calculate a mean value for each participant.

As noted previously, a larger than expected number of participants indicated that they had not visited their site during the previous 6 months and received any information on health or healthy eating. This may be because participants did not understand the question, so they failed to answer it correctly or they were unable to recall the number of visits. Also, the question did not take into account Web- or phone-based nutrition education because these contacts do not require a visit to the site. It could also represent that no

nutrition education was actually received. Participants who indicated that they had not visited their site during the previous 6 months were instructed to skip the remaining questions on their experiences with nutrition education; thus, information on length of the visit and number of different types of reinforcers and follow-ups was not available. Appendix L provides a comparison of the participant-reported data on number of visits with the information on number of nutrition education visits from WIC administrative data for the subset of participants for which administrative data were provided. Based on this comparison, there were inconsistencies between the two data sources.

Because there is no gold standard, it is difficult to validate the self-reported data from the Participant Surveys. As noted previously, for future evaluations, real-time data collection is recommended to increase the accuracy of the data collected to describe the participant's experiences (i.e., exposure) with WIC nutrition education and maximize the response rate for the survey. Such approaches include sending participants a text message containing a URL to the survey to complete online (optimized for use on smartphones) to coincide with their scheduled appointment or providing an application (app) that can be accessed on a smartphone or other electronic device. It may also be useful to work with sites to collect detailed information on participants' experiences with nutrition education, although collection of such data may potentially change delivery of nutrition education if educators know they are being monitored.

Another concern with the self-reported data on exposure from the Participant Surveys is item nonresponse; however, calculating an average of the available data across the three surveys helped address this concern. Item nonresponse for the caregiver-with-child enrollment group is as follows. For average frequency of nutrition education, an average was calculated for all participants. For average duration of nutrition education, data were not available for 4% of participants. For number of different types of reinforcers, data were not available for 1% of participants, and for number of different types of follow-ups, data were not available for 1% of participants. The use of a Web-based survey may help minimize item nonresponse for future evaluations.

Exhibit 5-2 provides the fit statistics for each LCA model. Fit statistics assess the degree to which the observed data meet theoretical data modeling expectations. In the case of an LCA model, fit statistics describe how well the number of classes describe the sample. Better fit can be equated to more consistency within classes. Although there is no single method for determining the number of classes, the preponderance of data support the use of a two-class solution for both enrollment groups. In these LCA models, the bootstrapped likelihood ratio test suggests that both the 2-class and 3-class solutions perform equally well, but the Vuong-Lo-Mendell-Rubin (V-L-M-R) test indicates that the 2-class solution is slightly better. In addition, the 2-class solution provided somewhat more interpretable classes. The caregiver-with-child enrollment group includes one class (Class 2) where average exposure on all four of the observed measures is higher than the other class (Class 1). The pregnant-at-enrollment group includes one class (Class 2) where average exposure on three of four observed measures is higher than the other class (Class 1); the average for the fourth variable (duration) is similar in the two groups (23.20 minutes versus 22.13 minutes). Thus, both statistical information and substantive information support the reasonableness of selecting the two-class solution for both enrollment groups. It is also worth noting that these are empirically derived classifications, and the terms "high" and "low" with respect to exposure are relative and do not imply that the majority of participants had low exposure to WIC nutrition education. As previously noted, participants received the required number of contacts as mandated by Federal WIC requirements.

Exhibit 5-2. Latent Class Model Fit Indices

Enrollment Group/Index	Number of Classes		
	1	2	3
Women who were Pregnant at Enrollment			
Akaike information criterion (AIC)	973	941	908
Bayesian information criterion (BIC)	994	973	953
Sample-adjusted BIC	963	926	887
Entropy	—	1.00	0.99
Vuong-Lo-Mendell-Rubin Likelihood Ratio Test (LRT) for k vs. k-1 classes	—	0.002	0.003
Parametric bootstrapped LRT for k vs. k-1 classes	—	< 0.001	< 0.001
Caregivers with Eligible Child			
AIC	3724	3635	3590
BIC	3764	3693	3665
Sample-adjusted BIC	3729	3642	3599
Entropy	—	0.84	0.88
Vuong-Lo-Mendell-Rubin LRT for k vs. k-1 classes	—	0.007	0.119
Parametric bootstrapped LRT for k vs. k-1 classes	—	< 0.001	< 0.001

Source: Participant Surveys, Initial, Interim, and Final

— = not applicable

However, several important caveats should be noted. First, the 2-class solution resulted in a high degree of imbalance: 97% of women who were pregnant at enrollment and 81% of caregivers with an eligible child were in Class 1 (low exposure). Second, the actual differences between the two exposure groups appear to be quite modest. Among caregivers with children, for example, the difference amounts to approximately 17 minutes of contact (i.e., the difference between classes when considering duration * frequency) and receipt of slightly more reinforcers (0.7) and follow-ups (1.3) over a 6-month period. Whether this amounts to a sufficiently meaningful difference upon which to base an impact evaluation is a substantive question that is beyond the scope of this report to address. Third, exposure (i.e., dose-response) may not be an appropriate basis for comparison given Federal requirements on minimum number of visits. **Exhibit 5-3** provides additional detail on the exposure characteristics for each class.

Exhibit 5-3. Mean Exposure Scores by Enrollment Group and Latent Class

Variable	1-Class Solution	2-Class Solution		3-Class Solution		
	Class 1	Class 1	Class 2	Class 1	Class 2	Class 3
Women who Were Pregnant at Enrollment	(100%)	(97%)	(3%)	(83%)	(14%)	(3%)
Duration	23.17	23.20	22.13	18.59	50.90	22.11
Frequency	2.38	2.29	5.24	2.20	2.82	5.24
Reinforcers	1.24	1.18	3.00	1.15	1.36	3.00
Follow-ups	0.91	0.85	3.00	0.72	1.58	3.00
Caregivers with Eligible Child	(100%)	(81%)	(19%)	(16%)	(78%)	(5%)
Duration	17.66	16.62	21.94	20.22	15.18	46.71
Frequency	1.72	1.64	2.05	1.97	1.66	1.87
Reinforcers	0.99	0.85	1.56	1.56	0.85	1.00
Follow-ups	0.65	0.39	1.71	1.72	0.38	0.69

Source: Participant Surveys, Initial, Interim, and Final

5.1.2 Difference-in-Difference Models for Estimating the Impact of WIC Nutrition Education on Participant Behaviors

The impact of exposure to WIC nutrition education on nutrition-related behaviors (RQs 1f and 3c) for this sample was estimated via DiD methods that explicitly model change over time. These models compare change across time (initial to final) in one exposure group with change across time in another exposure group. Because of the limited amount of data for pregnant women, DiD models could not be run on pregnant women's efficacy to increase consumption of brown rice. DiD analyses were conducted to examine five behaviors among caregivers with children: (1) efficacy for caregiver's limiting children's sugar-sweetened beverages (SSBs) (three-level ordinal variable), (2) caregiver's readiness to change for limiting SSBs (five-level ordinal variable), (3) frequency caregiver cooks homemade dinner for child (dichotomous variable, with 1 = "almost every day" or "every day"), (4) children's consumption of whole grains (continuous variable), and (5) amount of screen time for children (continuous variable). Linear regression models were used for continuous variables (SAS PROC MIXED), and logistic regression models (SAS PROC GLIMMIX) were used for dichotomous variables. All analyses were conducted using SAS 9.4 (SAS, 2016). Appendix M provides the DiD model specification (specified by equation [4] in the appendix).

These models included a fixed-effect variable indicating a participant's level of exposure to WIC nutrition education, a fixed-effect variable indexing time period (i.e., initial, final), and an interaction term that captures the effect of different levels of exposure over time on the behavior outcome. For each behavior, three models were run:

- An unadjusted model that added only a variable to account for site-to-site differences (i.e., dummy indicator for sites).
- A minimally adjusted model that added significant covariates from the attrition analysis (age and race of respondent), age of child, length of time receiving WIC benefits, and a variable to account for site-to-site differences.

- A fully adjusted model with the following covariates: age of woman participant or caregiver, race/ethnicity of participant, education level for participant, language(s) spoken at home, single-adult household, food insecurity status, length of time receiving WIC benefits, whether the participant's household currently participates in other food assistance programs, whether child has a health concern that may make them high risk, age of child, and site-to-site differences. The conceptual model shown in Exhibit 2-2 guided the selection of the covariates.

The Akaike information criterion⁵² (AIC) was used to determine the best-fitting and most parsimonious model, and only the results for this model are presented. When reporting the results, the footnotes indicate which model results are shown. The AIC is based on the model's log likelihood value (similar to an R^2), which is penalized based on the number of parameters. In other words, AIC indicates whether the inclusion of additional covariates improves model fit (i.e., the degree to which the observed data match the theoretical expectation of the data) over the simpler, unadjusted model.

5.2 Sample Characteristics

The sample for the impact analysis was limited to participants who completed the initial and final surveys. As noted in Chapter 4, the number of caregiver participants included in the sample varied by outcome based on the target child's age. Readiness to serve SSBs, self-efficacy to serve SSBs, and child screen time were examined for caregivers with a target child aged 1 to 4, child's consumption of whole grains was examined for caregivers with a target child aged 2 to 4, and cook homemade meal was examined for all caregivers in the sample (target child aged 6 months to 4 years).

In terms of participant characteristics, the low-exposure group included more participants who had received WIC benefits for 1 year or more, whereas the high-exposure group had children who were, on average, slightly younger than eligible children in the low-exposure group (21.4 months versus 25.1 months). The two exposure groups did not differ significantly at the initial period in terms of parent age, race/ethnic distribution, level of education, and the two groups had similar percentages of children with health conditions that may be high risk (see **Exhibit 5-4**). Additionally, there was no relationship between site and exposure group, suggesting that exposure as defined by participant self-report was distributed similarly across the six sites.

In terms of the measures of interest, the two exposure groups did not differ at the initial period on the distribution of responses for any of the outcomes (see **Exhibit 5-5**).

⁵² The AIC is a measure of the relative quality of statistical models for a given set of data. Given a collection of models for the data, AIC estimates the quality of each model, relative to each of the other models. Hence, AIC provides a means for model selection.

Exhibit 5-4. Bivariate Analysis for Demographic Variables by Exposure Class for Sample of Caregivers with Eligible Child

Characteristic	Low Exposure		High Exposure		p-value ^a
	N	%	N	%	
Child Age (months)					
Age (mean, SD)	215	25.1, 12.4	50	21.4, 10.7	.0483 *
Adult Age (years)					
Age (mean, SD)	218	30.9, 6.9	50	29.0, 6.8	.0820
Race/Ethnicity of Adult (n, %)					.6179
Hispanic	41	18.8	9	18.8	
White, non-Hispanic	139	63.8	27	56.3	
Black or African American, non-Hispanic	26	11.9	9	18.8	
Asian, non-Hispanic	12	5.5	3	6.3	
Nonrespondents	0		2		
Education (n, %)					.7334
Less than high school	34	16.3	8	16.7	
High school graduate	67	32.2	17	35.4	
Some college or associate's degree	77	37.0	19	39.6	
College degree	30	14.4	4	8.3	
Nonrespondents	10		2		
High-Risk Status for Target Child (n, %)					
Participant indicated child had high-risk condition	44	20.7	11	22.0	.8336
Length of Time Receiving WIC Benefits (n, %)					.0297 *
Less than 30 days	6	2.9	3	6.1	
1 month to a year	33	16.0	8	16.3	
1–2 years	48	23.3	20	40.8	
3 or more years	119	57.8	18	36.7	
Nonrespondents	10	.	2	.	
Sites (n, %)					.4129
A	31	14.2	9	18.0	
B	41	18.8	4	8.0	
C	31	14.2	9	18.0	
D	40	18.3	12	24.0	
E	27	12.4	4	8.0	
F	48	22.0	12	24.0	
Number of respondents ^b	208–218		48–50		

Source: Participant Survey, Initial

* Indicates statistical significance if the p-value is ≤ .05.

^a Statistical tests assessed change using the chi-squared test for dichotomous variables and repeated measures of analysis of variance (i.e., ANOVA) for continuous variables.^b A range is provided because the number of respondents varied by question.

SD = standard deviation

Exhibit 5-5. Comparison of Outcome Measures for Sample of Caregivers with Eligible Child, Initial Values by Exposure Group

Measure	Low Exposure		High Exposure		p-value ^a
	N	%	N	%	
Caregiver Readiness to Change for Limiting SSBs ^b					.4385
Not thinking about doing it	79	46.7	23	62.2	
Thinking about doing it	7	4.1	2	5.4	
Planning on doing it in next month	9	5.3	2	5.4	
Have been doing it for less than 6 months	18	10.7	3	8.1	
Have been doing it for 6 months or longer	56	33.1	7	18.9	
Caregiver Self-Efficacy for Limiting SSBs ^c					.2544
Low	40	23.5	13	36.1	
Moderate	22	12.9	5	13.9	
High	108	63.5	18	50.0	
Caregiver Cooks Homemade Dinner					
Percentage responding almost every day or every day	155	90.1	33	89.2	.8649
Child's Dietary Intake for Whole Grains, oz/day					
Mean, SD (oz/day)	108	0.6, 0.2	19	0.6, 0.3	.4608
Child's Screen Time, hours per day					
Mean, SD	171	2.4, 2.3	33	2.4, 2.0	.9940
Number of respondents ^d	108–172		19–37		.

Source: Participant Survey, Initial

^a Statistical tests assessed change using the chi-squared test for dichotomous variables and repeated measures of analysis of variance (i.e., ANOVA) for continuous variables.^b Response categories can be mapped to the stages of change: not thinking about doing it = precontemplation, thinking about doing it = contemplation, planning on doing it next month = planning, have been doing it for less than 6 months = action, and have been doing it for 6 months or longer = maintenance.^c The question asked how sure the respondent was that she could do the behavior: low (not sure), moderate (somewhat sure), and high (very sure).^d A range is provided because the number of respondents varied by question.

SD = standard deviation, SSBs = sugar-sweetened beverages

5.3 Influence of Higher Levels of Exposure to WIC Nutrition Education on Participant Behaviors: Results of Difference-in-Difference Analysis

The DiD models did not find significant differences in change over time among participants exposed to higher levels of nutrition education compared with participants exposed to lower levels of nutrition education (see **Exhibits 5-6** and **5-7**). However, the magnitudes of the impacts observed for readiness to change (2.57) and self-efficacy (0.43) for caregivers to limit serving their child SSBs are noteworthy. Each suggests more than a twofold increase in likelihood even though the confidence intervals around these estimates indicate that they cannot be interpreted as statistically significant. It should also be pointed out that these effects are in the opposing direction, meaning that while readiness to change seems to favor the high-exposure group, efficacy seems to favor the low-exposure group (i.e., the odds ratio of 0.43 indicates that the low-exposure group is about 2.3 times more likely to report higher efficacy). Thus, in spite of the magnitude, readers are cautioned from drawing conclusions about these results.

Exhibit 5-6. Difference-in-Difference Analysis: Impact of Nutrition Education Exposure on Continuous Measures among a Sample of Caregivers with Eligible Child (RQs 1f and 3c)

Measure	Model Type ^a	Model-Adjusted Initial Means (SE)		Model-Adjusted Final Means (SE)		Estimated Impact ^b (95% CI)	p-value
		Low Exposure	High Exposure	Low Exposure	High Exposure		
Child's dietary intake for whole grains, oz/day	UA	0.58 (0.02)	0.61 (0.05)	0.52 (0.02)	0.51 (0.05)	-0.03 (-0.15, 0.09)	.5791
Child's screen time, hours per day	FA	2.33 (0.15)	2.35 (0.33)	2.67 (0.15)	3.20 (0.32)	0.50 (-0.32, 1.33)	.2280
Number of respondents	233–268						

Source: Participant Surveys, Initial and Final

Notes: General linear mixed models (SAS PROC MIXED) were used to evaluate program impacts for continuous variables. Predictor variables are statistically significant when $p \leq .05$ based on the Type-III F test.

^a The results for the model with the best fit are reported. FA = fully adjusted model with the following covariates: age of respondent, age of child, race/ethnicity, education, language spoken at home, single-adult household, food insecurity status, length of time on WIC, currently participate in other food assistance programs, health concerns that may make child high risk, and site; MA = minimally adjusted model with covariates that were significant for the attrition analysis (age of respondent, race/ethnicity), age of child, length of time on WIC, and site; UA = unadjusted model only controlling for age of child, length of time on WIC, and site.

^b Program impact (with 95% confidence limits) estimated via DiD models comparing change across time (initial and final) in the low- versus high-exposure groups.

SE = standard error, CI = confidence interval

Exhibit 5-7. Difference-in-Difference Analysis: Impact of Nutrition Education Exposure on Binary Measures among a Sample of Caregivers with Eligible Child (RQs 1f and 3c)

Measure ^a	Model Type ^a	Model-Adjusted Initial Proportion (SE)		Model-Adjusted Final Proportion (SE)		Estimated Impact ^b (95% CI)	p-value
		Low Exposure	High Exposure	Low Exposure	High Exposure		
Caregiver cooks homemade dinner ^c	FA	93.09 (2.25)	91.38 (4.92)	83.35 (3.62)	85.70 (6.68)	1.52 (0.36, 6.48)	.5690
Caregiver readiness to change for limiting SSBs ^d	FA	47.65 (4.75)	22.92 (8.04)	52.92 (4.81)	48.53 (10.42)	2.57 (0.81, 8.17)	.1095
Caregiver self-efficacy for limiting SSBs ^e	FA	67.53 (4.42)	50.12 (10.05)	86.33 (3.08)	86.49 (6.42)	0.43 (0.10, 1.88)	.2628
Number of respondents		187–233					

Source: Participant Surveys, Initial and Final

Notes: Generalized linear mixed models (SAS PROC GLIMMIX) were used to evaluate program impacts for dichotomous variables. Predictor variables are statistically significant when $p \leq .05$ based on the Type-III F test.

^a The results for the model with the best fit are reported. FA = fully adjusted model with the following covariates: age of respondent, age of child, race/ethnicity, education, language spoken at home, single-adult household, food insecurity status, length of time on WIC, currently participate in other food assistance programs, health concerns that may make child high risk, and site; MA = minimally adjusted model with covariates that were significant for the attrition analysis (age of respondent, race/ethnicity), age of child, length of time on WIC, and site; UA = unadjusted model only controlling for age of child, length of time on WIC, and site.

^b Program impact (with 95% confidence limits) estimated via DiD models comparing change across time (initial and final) in the low- versus high-exposure groups. Program impacts provided as odds ratios for dichotomous variables.

^c Dichotomous variable indicates the proportion responding “almost every day” or “every day” vs. “rarely or never,” “some days,” or “most days.”

^d Dichotomous variable indicates the proportion responding “thinking about doing it,” “planning on doing it next month,” “have been doing it for less than 6 months,” and “have been doing it for 6 months or longer” vs. “not thinking about doing it.”

^e Dichotomous variable indicates the proportion in the “high efficacy” category vs. “low efficacy” or “moderate efficacy.”

SE = standard error, CI = confidence interval

These findings highlight a number of challenges study planners for future evaluations will need to address to better measure exposure and classification variables. Challenges include reconsideration of exposure as a comparison factor, additional consideration of the objective of the evaluation (i.e., what is producing differential change?), and additional consideration of the main study outcome measures. These challenges are addressed in more detail in Chapter 6 of this report.

5.4 Assessing the Influence of WIC Nutrition Education on Participant Behaviors: Methods and Results of Participant-Level Models

The effect of participant characteristics and experience with WIC nutrition education on participant behaviors among the study sample population was assessed using regression models that implicitly model change over time by examining the different participant behavior outcomes controlling for the initial value of the outcome. These models are referred to as covariate-adjusted models or adjusted endpoint models (see equation [5] in Appendix M for the model specification). For continuous variables, these models were estimated using an ordinary least squares estimator. For binary variables, these models were estimated using a binomial logit estimator. The behavior, as measured at the final data collection period, was the dependent variable. Independent variables in the model were specified based on the specific research question as detailed below (see Appendix M for a description of the coding of the independent variables using responses to the initial and final Participant Surveys). In addition, all participant-level statistical models included control covariates that account for the baseline measure of the dependent variable, number of years the participant/child has been on WIC, the age of the target child, and a six-level indicator to account for site-to-site difference. Because of the limited amount of data, the participant-level models for pregnant women's efficacy for consuming brown rice would not converge; thus, the results of these models are not presented. All analyses were conducted using SAS 9.4 (SAS, 2016).

RQ2. Are there particular combinations of features of WIC nutrition education that are more effective than other combinations in achieving improvements in readiness to eat a healthy diet, readiness to feed the child participant a healthy diet, dietary habits, physical activity habits, and food-related behaviors?

To address whether particular combinations of features of WIC nutrition education are more effective than other combinations in achieving improvements in participant behaviors, predictors of interest were entered into regression models and post hoc estimation was conducted to quantify and compare the additive effects of combinations of features. Predictors of interest were:

- Participant's perception of the use of Value Enhanced Nutrition Assessment (VENA)/participant-centered practices included as a dichotomous variable.
- Participant's perception of whether goals were set included as a dichotomous variable.
- The number of different types of follow-ups (i.e., personal phone calls, text messages, email messages, online education, social media invitations, and brochures and handouts) reported by the participant.

- Measure of communication style for individual sessions included as a continuous variable (1 to 12). This item was constructed using three items that asked participants about the type of communication they experienced during their nutrition education session.
- Whether participants reported the use of a video or DVD during their education session included as a dichotomous variable.

It was not possible to examine combinations of features because none of the regression models included more than one statistically significant feature of WIC nutrition education. Instead, results of the regression models are presented and discussed. Logistic regression models examining the caregiver's self-efficacy regarding SSBs and cooking homemade dinners failed to converge with all proposed features (i.e., independent variables) included. Accordingly, these models were rerun focusing on VENA/participant-centered practices and goal setting.

Features of WIC nutrition education were not found to have a statistically significant effect on child's hours per day of screen time, child's dietary intake for whole grains, caregiver cooks homemade dinners, or caregiver readiness to change for SSBs (results shown in **Exhibit 5-8** for continuous variables and **Exhibit 5-9** for binary variables).⁵³ However, as seen in the middle column of Exhibit 5-9, goal setting was found to be associated with significantly reduced SSB efficacy for the study sample ($p = .04$). Findings suggest that participants who did not report goal setting were about four times more likely to report high levels of self-efficacy than participants who did engage in goal setting. This finding is not consistent with the findings from the process evaluation in that goal setting helps facilitate behavior change; however, it is not known what specific goals participants were setting, that is, whether the goals were related to limiting SSBs.

⁵³ Note that models that included all features of WIC nutrition education could not be estimated for the following behaviors: caregiver self-efficacy for limiting SSBs and caregiver cooks homemade dinners. This is because these models could not converge because of the limited number of observations. Therefore, for these behaviors, only models that included the following features were estimated: participants' perceived use of VENA/participant-centered practices and participant reported setting goals.

Exhibit 5-8. Participant-Level Analysis for Continuous Variables: Effective Combinations of Features of WIC Nutrition Education (RQ2)

Variables	Child's Screen Time, hours per day (n = 102)			Child's Dietary Intake for Whole Grains, oz/day (n = 58)		
	Coefficient Estimate	Standard Error	p-value	Coefficient Estimate	Standard Error	p-value
Participant perceived use of participant-centered practices (1 = yes) [†]	-0.42	0.39	.28	0.004	0.08	.96
Participant reported setting goals (1 = yes) [†]	0.56	0.33	.10	0.004	0.07	.95
Number of different types of follow-ups [†]	0.05	0.17	.78	-0.04	0.03	.24
Communication style for individual sessions [†]	-0.05	0.11	.65	0.02	0.02	.49
Use of video or DVD [†]	1.65	0.88	.06	-0.09	0.17	.58
Initial value for measure [‡]	0.10	0.08	.24	0.40	0.14	.01
Child's age (months) [‡]	0.04	0.02	.01	0.01	0.004	.12
Total amount of time participant and/or her children have been on WIC [‡]						
Less than 30 days	-0.42	0.81	.60	-0.22	0.22	.33
1 month to a year	-1.19	0.59	.05	-0.005	0.12	.97
1–2 years	0.50	0.37	.18	0.01	0.08	.92
3 or more years (reference group)	0.00			0.00		
Site [‡]						
Site A	1.04	0.61	.09	-0.01	0.24	.97
Site B	-0.18	0.50	.72	-0.06	0.09	.49
Site C	0.15	0.48	.76	-0.10	0.10	.31
Site D	0.37	0.47	.44	-0.13	0.09	.14
Site E	-0.25	0.58	.67	-0.15	0.12	.23
Site F (reference group)	0.00			0.00		
Intercept	1.20	1.11	.28	0.01	0.31	.97
Adjusted R ²			.19			.11

Source: Participant Surveys, Initial and Final.

Note: Estimated using linear regression model (SAS PROC REG). Two-sided *t* test used to identify variables associated with diet-related outcomes. Coefficients are statistically significant when *p*-value $\leq$.05. Table row heads with a dagger (†) indicate predictors of interest. Table row heads with a double dagger (‡) indicate control variables. R-square is a statistical measure that explains how well the model fits the data.

Exhibit 5-9. Participant-Level Analysis for Binary Variables: Effective Combinations of Features of WIC Nutrition Education (RQ2)

Variables	Caregiver Readiness to Change for Limiting SSBs ^a (n = 103)					Caregiver Self-Efficacy for Limiting SSBs ^b (n = 117)					Caregiver Cooks Homemade Dinner ^c (n = 105)				
	Odds Ratio	95% Confidence Limits		Standard Error	p-value	Odds Ratio	95% Confidence Limits		Standard Error	p-value	Odds Ratio	95% Confidence Limits		Standard Error	p-value
		Lower	Upper				Lower	Upper				Lower	Upper		
Participant perceived use of participant-centered practices (1 = yes) [†]	1.59	0.51	4.92	0.58	.42	1.40	0.45	4.42	0.59	.56	0.72	0.23	2.26	0.58	.58
Participant reported setting goals (1 = yes) [†]	0.90	0.33	2.40	0.50	.83	0.24	0.06	0.91	0.68	.04	0.94	0.28	3.19	0.62	.92
Number of different types of follow-ups [†]	0.63	0.37	1.09	0.28	.10	— ^d	— ^d	— ^d	— ^d	— ^d	— ^d	— ^d	— ^d	— ^d	— ^d
Communication style for individual sessions [†]	1.03	0.76	1.39	0.16	.86	— ^d	— ^d	— ^d	— ^d	— ^d	— ^d	— ^d	— ^d	— ^d	— ^d
Use of video or DVD [†]	0.22	0.02	3.20	1.37	.27	— ^d	— ^d	— ^d	— ^d	— ^d	— ^d	— ^d	— ^d	— ^d	— ^d
Initial value for measure [‡]	2.14	0.85	5.38	0.47	.11	0.97	0.33	2.90	0.56	.96	0.08	0.02	0.34	0.76	.001
Child's age (months) [‡]	0.97	0.93	1.02	0.02	.25	1.03	0.98	1.09	0.03	.29	0.96	0.90	1.01	0.03	.13
Total amount of time participant and/or her children have been on WIC [‡]															
Less than 30 days	0.33	0.03	4.13	1.29	.39	0.20	0.03	1.52	1.03	.12	19.83	1.83	214.55	1.22	.01
1 month to a year	0.60	0.13	2.79	0.79	.51	1.83	0.19	17.31	1.15	.60	0.58	0.04	8.36	1.37	.69
1–2 years	1.16	0.38	3.53	0.57	.79	0.85	0.25	2.88	0.62	.79	2.48	0.75	8.16	0.61	.13
3 or more years (reference group)	0.00					0.00					0.00				
Site [‡]															
Site A	0.38	0.07	2.15	0.88	.28	1.13	0.21	5.96	0.85	.89	0.95	0.12	7.53	1.06	.96
Site B	0.46	0.12	1.84	0.70	.27	2.57	0.41	15.94	0.93	.31	1.02	0.16	6.53	0.95	.98
Site C	0.19	0.04	0.87	0.77	.03	1.47	0.28	7.76	0.85	.65	3.90	0.73	20.76	0.85	.11
Site D	0.82	0.21	3.21	0.70	.77	1.62	0.33	7.92	0.81	.55	1.64	0.29	9.43	0.89	.58
Site E	0.59	0.11	3.170	0.86	.54	0.48	0.08	2.73	0.89	.40	4.56	0.66	31.61	0.99	.13
Site F (reference group)	0.00					0.00					0.00				
McFadden's pseudo R ²					.14					.11					.22

Source: Participant Surveys, Initial and Final

Notes: Estimated using logistic regression model (SAS PROC LOGISTIC). Two-sided *t* test used to identify variables associated with diet-related outcomes. Coefficients are statistically significant when *p*-value ≤ .05. Table row heads with a dagger (†) indicate predictors of interest. Table row heads with a double dagger (‡) indicate control variables. McFadden's pseudo R-square is a statistical measure that explains how well the model fits the data.

^a Dichotomous variable indicates the proportion responding "thinking about doing it," "planning on doing it next month," "have been doing it for less than 6 months," and "have been doing it for 6 months or longer" vs. "not thinking about doing it."

^b Dichotomous variable indicates the proportion in the "high efficacy" category vs. "low efficacy" or "moderate efficacy."

^c Dichotomous variable indicates the proportion responding "almost every day" or "every day" vs. "rarely or never," "some days," or "most days."

^d Indicates that including the listed covariate resulted in failure of the statistical model to converge. The final model was obtained by removing the covariate.

RQ3d. Does the impact vary by participant’s characteristics, length of time on WIC, exposure to previous WIC nutrition education, participation in other programs, or use of emergency food providers?

To address whether the impact of WIC nutrition education varies by participant characteristics, predictors of interest were entered into regression models along with an indicator variable for exposure and a set of exposure-by-characteristic interaction terms. Predictors of interest were:

- Age of adult participant (years) included as a continuous variable.
- Participant’s race/ethnicity included as a four-level categorical variable.
- Participant’s education level included as a four-level categorical variable.
- Language(s) spoken at home included as a three-level categorical variable.
- Whether the participant resides in a single-adult household included as a categorical variable.
- Whether the participant’s household is food insecure included as a dichotomous variable.
- Whether the participant’s household receives other food assistance (SNAP or food bank/food pantry/soup kitchen) included as a dichotomous variable.
- Whether the participant (or child) has health concerns that may make them high risk included as a dichotomous variable.
- Number of people in the household on WIC included as a continuous variable.

For the continuous outcome variables—child’s screen time and child’s dietary intake for whole grains—exposure modified the effect of several participant characteristics (results shown in **Exhibit 5-10**). Specifically, children of participants who had more education had more screen time (relative to children of less educated participants) if they were in the high-exposure group than if they were in the low-exposure group. For example, among the high-exposure group, children of participants who completed high school had 3.10 more hours per day of screen time than children of participants who did not complete high school. By contrast, among the low-exposure group, children of participants who completed high school had 0.20 fewer hours per day of screen time than children of participants who did not complete high school. The net effect (3.30 hours per day) was statistically significant. The analysis found similar results for whole grain intake. Among the high-exposure group, children of participants who completed college ate 0.76 more ounces of whole grains per day than children of participants who did not complete high school, while among the low-exposure group, children of participants who completed college ate 0.05 fewer ounces of whole grains per day than children of participants who did not complete high school. The net effect (0.81 more ounces) was statistically significant.

For the binary outcomes, the full models that included all variables and interaction terms failed to converge. As a next step, the models were rerun without the interaction terms that capture impact (i.e., the differential effects of participant characteristics between the high-exposure group and the low-exposure group). Accordingly, the models reported (**Exhibit 5-11**) focus on the *main effect* of participant characteristics on nutrition education. The analysis did not find any participant characteristics that were significantly associated with caregiver’s readiness to change for limiting SSBs. However, several participant characteristics were significantly associated with caregiver self-efficacy for limiting SSBs.

Caregiver's age, education level, language spoken at home, whether their child has health concerns that may be high risk, and whether the household is food insecure were associated with caregiver efficacy for limiting SSBs.

- **Age:** For each additional year of age, caregivers were 1.12 times as likely to report high levels of self-efficacy for limiting SSBs ($p = .01$).
- **Education:** Compared with caregivers with less than a high school education, caregivers with some college or an associate's degree were 0.10 times as likely to report high levels of self-efficacy for limiting SSBs ($p = .01$), and caregivers with a college degree were 0.09 times as likely to report high levels of self-efficacy for limiting SSBs ($p = .03$). In other words, the reported self-efficacy for limiting SSBs was highest among caregivers with less than a high school education.
- **Language spoken at home:** Caregivers who reported speaking other languages at home (all other responses) were 7.71 times as likely to report high levels of self-efficacy for limiting SSBs than caregivers speaking English only or English and Spanish ($p = .01$).
- **Child health concerns:** Caregivers who reported their child has health concerns that may make him/her high risk were 5.45 times as likely to report high levels of self-efficacy for limiting SSBs than caregivers who did not report the child has high-risk health concerns ($p = .04$).
- **Food-secure household:** Caregivers in a food-insecure household were 0.24 times as likely (76% less likely) to report high levels of self-efficacy for limiting SSBs than caregivers in a food-secure household ($p = .03$).

We also found one participant characteristic that was significantly associated with whether the caregiver cooks homemade dinners. Specifically, for each additional person in the household on WIC, caregivers were 0.65 times as likely to cook homemade dinners every day or almost every day ($p = .04$). In other words, the more family members in the home receiving WIC benefits, the less likely the caregiver was to cook homemade dinners every day or almost every day.

Exhibit 5-10. Participant-Level Analysis for Continuous Variables: Effect of Participant and Household Characteristics on Outcomes (RQ3d)

Variables	Child's Screen Time, hours per day (n = 183)				Child's Dietary Intake for Whole Grains, oz/day (n = 107)			
	High Exposure	Low Exposure	Impact (SE)	p-value	High Exposure	Low Exposure	Impact (SE)	p-value
Participant race/ethnicity†								
Black non-Hispanic	3.59	0.97	2.61 (1.36)	.06	0.42	0.03	0.39 (0.4)	.34
Hispanic	-1.45	0.16	-1.61 (1.98)	.42	0.70	0.15	0.54 (0.6)	.37
White non-Hispanic (reference group)	0.00	0.00			0.00	0.00		
Participant education level†								
High school	3.10	-0.20	3.30 (1.35)	.02	0.30	-0.10	0.4 (0.22)	.08
Some college or associate's degree	3.21	-0.17	3.38 (1.28)	.01	0.07	-0.10	0.18 (0.2)	.39
College degree	5.10	-0.52	5.61 (2.53)	.03	0.76	-0.05	0.81 (0.4)	.04
Less than high school (reference group)	0.00	0.00			0.00	0.00		
Participant reported language(s) spoken at home†								
Spanish only	1.33	0.270	1.06 (2.78)	.70	-0.88	-0.13	-0.76 (0.74)	.31
Other (all other responses)	-1.30	-0.39	-0.9 (1.35)	.50	-0.17	-0.06	-0.11 (0.36)	.76
English Only or English and Spanish (reference group)	0.00	0.00			0.00	0.00		
Single-adult household†	1.39	-0.21	1.6 (0.89)	.08	-0.03	-0.04	0 (0.15)	.98
Household is food insecure†	1.64	0.06	1.58 (1.21)	.19	-0.09	-0.07	-0.02 (0.23)	.91
Participant's household receives other food assistance (SNAP, food bank, pantry, soup kitchen)†	0.39	-0.40	0.79 (0.82)	.33	0.10	0.03	0.07 (0.19)	.73
Child has health concerns that may make him/her high risk (participant reported)†	0.20	-0.33	0.53 (1.68)	.75	—	—	—	—
Number of people in household on WIC†	-1.16	-0.17	-0.99 (0.51)	.052	-0.20	-0.03	-0.17 (0.14)	.22
Participant/respondent age (years)†	-0.09	-0.01	-0.08 (0.08)	.34	-0.01	0.00	0 (0.02)	.82
Intercept	1.90	2.51	-0.61 (3.25)	.9	0.9	0.6	0.32 (0.68)	.642

(continued)

Exhibit 5-10. Participant-Level Analysis for Continuous Variables: Effect of Participant and Household Characteristics on Outcomes (RQ3d) (continued)

Variables	Child's Screen Time, hours per day			Child's Dietary Intake for Whole Grains, oz/day		
	Coefficient Estimate	Standard Error	p-value	Coefficient Estimate	Standard Error	p-value
Initial value for measure†	0.22	0.06	.001	0.29	0.11	.01
Child's age (months)‡	0.03	0.01	.03	0.004	0.003	.18
Total amount of time participant and/or her children have been on WIC‡						
Less than 30 days	0.33	0.77	.67	0.06	0.12	.64
1 month to a year	-0.39	0.56	.48	0.14	0.1	.17
1–2 years	-0.09	0.33	.79	-0.04	0.06	.57
3 or more years (reference group)	0.00			0.00		
Site‡						
Site A	-0.15	0.50	.76	-0.04	0.08	.64
Site B	-0.05	0.44	.91	-0.09	0.07	.16
Site C	-0.15	0.50	.76	-0.08	0.08	.36
Site D	0.49	0.41	.23	-0.11	0.06	.09
Site E	0.3	0.48	.53	-0.15	0.08	.06
Site F (reference group)	0.00			0.00		
Adjusted R ²			.36			.42

Source: Participant Surveys, Initial and Final

Notes: Estimated using linear regression model (SAS PROC REG). Two-sided *t* test used to identify variables associated with diet-related outcomes. Coefficients are statistically significant when *p*-value $\leq$.05. Table row heads with a dagger (†) indicate predictors of interest. Table row heads with a double dagger (§) indicate control variables. R-square is a statistical measure that explains how well the model fits the data.

SE = standard error

— = This parameter was excluded from the model due to collinearity and could not be estimated.

Exhibit 5-11. Participant-Level Analysis for Binary Variables: Effect of Participant and Household Characteristics on Outcomes (RQ3d)

Variables	Caregiver Readiness to Change for Limiting SSBs ^a (n = 180)					Caregiver Self-Efficacy for Limiting SSBs ^b (n = 181)					Caregiver Cooks Homemade Dinner ^c (n =190)				
	Odds Ratio	95% Confidence Limits		Standard Error	p-value	Odds Ratio	95% Confidence Limits		Standard Error	p-value	Odds Ratio	95% Confidence Limits		Standard Error	p-value
		Lower	Upper				Lower	Upper				Lower	Upper		
Participant race/ethnicity†															
Black non-Hispanic	1.37	0.45	4.22	0.57	.58	0.67	0.14	3.27	0.81	.62	1.25	0.33	4.69	0.68	.74
Hispanic	0.19	0.03	1.18	0.93	.07	0.55	0.07	4.17	1.03	.56	0.57	0.09	3.72	0.96	.56
White non-Hispanic (reference group)	0.00					0.00					0.00				
Participant education level†															
High school	1.67	0.58	4.81	0.54	.35	0.25	0.04	1.52	0.93	.13	0.50	0.14	1.80	0.65	.29
Some college or associate's degree	1.06	0.36	3.10	0.55	.92	0.10	0.02	0.58	0.92	.01	0.58	0.16	2.08	0.66	.40
College degree	1.86	0.53	6.56	0.64	.33	0.09	0.01	0.76	1.10	.03	0.49	0.10	2.46	0.83	.39
Less than high school (reference group)	0.00					0.00					0.00				
Participant reported language(s) spoken at home†															
Spanish only	9.03	0.80	102.62	1.24	.08	1.56	0.13	18.50	1.26	.73	0.19	0.01	2.97	1.39	.24
Other (all other responses)	2.13	0.52	8.71	0.72	.29	7.71	1.71	34.76	0.77	.01	0.32	0.08	1.36	0.74	.12
English only or English and Spanish (reference group)	0.00					0.00					0.00				
Single-adult household†	0.98	0.46	2.06	0.38	.95	0.70	0.24	2.06	0.55	.52	1.03	0.43	2.50	0.45	.94
Household is food insecure†	0.98	0.46	2.06	0.39	.43	0.24	0.07	0.85	0.63	.03	0.79	0.29	2.12	0.51	.63
Participant's household receives other food assistance (SNAP, food bank, pantry, soup kitchen)†	1.09	0.52	2.29	0.38	.81	0.49	0.17	1.47	0.56	.20	1.99	0.74	5.36	0.51	.18
Child has health concerns that may make him/her high risk (participant reported)†	1.16	0.48	2.77	0.45	.74	5.45	1.06	28.14	0.84	.04	0.75	0.25	2.25	0.56	.61

(continued)

Exhibit 5-11. Participant-Level Analysis for Binary Variables: Effect of Participant and Household Characteristics on Outcomes (RQ3d) (continued)

Variables	Caregiver Readiness to Change for Limiting SSBs ^a (n = 180)					Caregiver Self-Efficacy for Limiting SSBs ^b (n = 181)					Caregiver Cooks Homemade Dinner ^c (n = 190)				
	Odds Ratio	95% Confidence Limits		Standard Error	p-value	Odds Ratio	95% Confidence Limits		Standard Error	p-value	Odds Ratio	95% Confidence Limits		Standard Error	p-value
		Lower	Upper				Lower	Upper				Lower	Upper		
Number of people in household on WIC†	0.95	0.69	1.32	0.17	.78	0.96	0.62	1.48	0.22	.084	0.65	0.43	0.99	0.21	.04
Participant/respondent age (years)†	1.00	0.94	1.05	0.03	.94	1.12	1.02	1.23	0.05	.01	0.97	0.90	1.04	0.04	.41
Initial value for measure‡	2.37	1.20	4.71	0.35	.01	2.88	1.02	8.17	0.53	.05	0.08	0.02	0.30	0.65	.0001
Child's age (months)‡	0.99	0.96	1.02	0.02	.54	0.98	0.93	1.04	0.03	.51	1.02	0.98	1.07	0.02	.35
Total amount of time participant and/or her children have been on WIC‡															
Less than 30 days	1.86	0.25	13.67	1.02	.54	0.08	0.01	1.01	1.29	.05	4.62	0.51	41.74	1.12	.17
1 month to a year	0.86	0.22	3.41	0.70	.83	0.16	0.03	1.05	0.95	.06	1.49	0.25	8.75	0.90	.66
1–2 years	1.55	0.65	3.68	0.44	.32	0.70	0.21	2.35	0.62	.56	2.03	0.72	5.75	0.53	.18
3 or more years (reference group)	0.00					0.00					0.00				
Site‡															
Site A	0.18	0.05	0.67	0.68	.01	4.14	0.59	28.96	0.99	.15	2.22	0.45	10.96	0.81	.33
Site B	0.47	0.16	1.38	0.55	.17	1.12	0.27	4.65	0.73	.88	0.66	0.12	3.60	0.87	.63
Site C	0.70	0.18	2.76	0.70	.61	4.70	0.66	33.56	1.00	.12	3.68	0.73	18.63	0.83	.12
Site D	1.25	0.41	3.88	0.58	.69	2.63	0.57	12.06	0.78	.21	3.30	0.81	13.36	0.71	.09
Site E	0.38	0.11	1.33	0.64	.13	0.85	0.16	4.52	0.85	.85	2.52	0.48	13.13	0.84	.27
Site F (reference group)	0.00					0.00					0.00				
McFadden's pseudo R ²					.15					.13					.21

Source: Participant Surveys, Initial and Final

Notes: Estimated using logistic regression model (SAS PROC LOGISTIC). Two-sided *t* test used to identify variables associated with diet-related outcomes. Coefficients are statistically significant when *p*-value ≤ .05. Table row heads with a dagger (†) indicate predictors of interest. Table row heads with a double dagger (‡) indicate control variables. McFadden's pseudo R-square is a statistical measure that explains how well the model fits the data.

^a Dichotomous variable indicates the proportion responding "thinking about doing it," "planning on doing it next month," "have been doing it for less than 6 months," and "have been doing it for 6 months or longer" vs. "not thinking about doing it."

^b Dichotomous variable indicates the proportion in the "high efficacy" category vs. "low efficacy" or "moderate efficacy."

^c Dichotomous variable indicates the proportion responding "almost every day" or "every day" vs. "rarely or never," "some days," or "most days."

RQ4. What dosage and mode of nutrition education delivery (initial and follow-up) are most effective in helping participants improve their dietary and physical activity habits, readiness to change behaviors, and other food-related behaviors?

To address the joint effect of exposure and mode of nutrition education, a categorical variable for mode of nutrition education (one-on-one, group, technology based, multiple modes), an indicator for exposure (high exposure versus low exposure), and the interaction between these terms were entered into the regression models.

Results for this analysis are not reported. Because of the small number of participants whose mode was solely group education ($n = 4$) and solely technology-based education ($n = 3$), it was not possible to run this model. The relatively large number of participants who reported receiving both one-on-one and group nutrition education at the same visit is somewhat surprising, suggesting that participants may have misunderstood the question. Accordingly, it is not possible to draw any conclusions on the modifying effect of exposure (i.e., dose) on mode of nutrition education from this study.

RQ6a. What attributes of group nutrition education sessions are most effective in helping WIC participants improve their dietary and physical activity habits, readiness to change behaviors, and other food-related behaviors?

To address whether specific characteristics of group education are effective in helping WIC participants, the predictors of interest were entered into regression models. Predictors of interest were:

- Participant's perception of the use of VENA/participant-centered practices during group sessions included as a dichotomous variable.
- Participant's perception of the use of goal setting during group sessions included as a dichotomous variable.
- Measure of communication style during group sessions included as a continuous variable (1 to 8). This measure was constructed using three items that asked participants about the type of communication they experienced during their group session.

Results for this analysis are not reported for any of the estimated models because very few individuals participated in only group sessions among the six pilot sites ($n = 4$). The models did not include participants who participated in group sessions as well as other modes (e.g., one-on-one) in the analysis since program effects by mode cannot be disaggregated given that, for example, VENA used in group sessions would be correlated with VENA used in one-on-one sessions. Thus, it was not possible to calculate consistent model estimates.

RQ6c. What types and dosage of reinforcers are most effective in helping participants improve their dietary and physical activity habits and their readiness to change these behaviors?

The pilot sought to examine the effect of types and dosage of reinforcers on helping participants improve behaviors. However, data on dosage of reinforcers (i.e., amount) were not collected. Accordingly, the regression models focused on types and *number* of different reinforcers. Predictors of interest were:

- Whether the participant reported the use of a video or DVD during their education session included as a dichotomous variable.
- Number of different reinforcers (i.e., brochure or handout, bulletin board, video/DVD, tasting or cooking demonstration, activity or game, items to be passed around) reported by the participant included as a count variable (0 to 6).
- Whether the participant reported the use of a poster or bulletin board during their education session included as a dichotomous variable.
- Whether the participant reported the use of a brochure or pamphlet during their education session included as a dichotomous variable.
- Whether the participant reported the use of an interactive learning tool (e.g., tastings, activity/game, items) during their education session included as a dichotomous variable.

The models estimating efficacy for limiting SSBs and cooking homemade dinners did not converge, so results are not available for these behaviors. With respect to the other behaviors, none of the reinforcers examined were found to have a statistically significant effect on participant behaviors among the sample population after controlling for values of these behaviors at the initial period, years on WIC, site location, and child's age (results shown in **Exhibit 5-12** for continuous variables and **Exhibit 5-13** for binary variables).

Exhibit 5-12. Participant-Level Analysis for Continuous Variables: Effect of Reinforcers on Improving Behaviors (RQ6c)

Variables	Child's Screen Time, hours per day (n = 133)			Child's Dietary Intake for Whole Grains, oz/day (n = 79)		
	Coefficient Estimate	Standard Error	p-value	Coefficient Estimate	Standard Error	p-value
Participant reported use of a video or DVD during education session†	1.07	1.17	.36	−0.07	0.17	.69
Participant reported use of poster or bulletin board during education session†	−0.04	0.85	.96	0.08	0.16	.60
Participant reported use of brochure or pamphlet during education session†	0.28	0.68	.67	0.04	0.13	.76
Participant reported use of interactive learning tool (e.g., tastings, activity/game, items) during education session†	0.38	0.78	.63	−0.04	0.14	.80
Participant reported number of reinforcements used during education session†	−0.03	0.59	.96	−0.05	0.12	.69
Initial value for measure‡	0.16	0.07	.03	0.34	0.11	.002
Child's age (months)‡	0.04	0.02	.02	0.01	0.003	.03
Total amount of time the participant and/or her children have been on WIC‡						
Less than 30 days	−0.01	0.73	.99	−0.08	0.12	.50
1 month to a year	−0.98	0.58	.09	−0.02	0.09	.84
1–2 years	0.32	0.35	.37	0.01	0.06	.85
3 or more years (reference group)	0.00			0.00		
Site‡						
Site A	0.59	0.52	.26	0.03	0.10	.73
Site B	−0.19	0.46	.68	−0.07	0.07	.29
Site C	0.01	0.50	.98	−0.10	0.08	.24
Site D	0.33	0.46	.47	−0.10	0.07	.16
Site E	0.43	0.52	.41	−0.24	0.09	.01
Site F (reference group)	0.00			0.00		
Intercept	0.75	0.68	.27	0.18	0.16	.25
Adjusted R ²			.07			.18

Source: Participant Surveys, Initial and Final

Notes: Estimated using linear regression model (SAS PROC REG). Two-sided *t* test used to identify variables associated with diet-related outcomes. Coefficients are statistically significant when *p*-value ≤ .05. Table row heads with a dagger (†) indicate predictors of interest. Table row heads with a double dagger (‡) indicate control variables. R-square is a statistical measure that explains how well the model fits the data.

Exhibit 5-13. Participant-Level Analysis for Binary Variables: Effect of Reinforcers on Improving Behaviors (RQ6c)

Variables	Caregiver Readiness to Change for Limiting SSBs ^a (n = 133)				
	Odds Ratio	95% Confidence Limits		Standard Error	p-value
		Lower	Upper		
Participant reported use of a video or DVD during education session†	0.16	0.01	5.16	1.78	.30
Participant reported use of poster or bulletin board during education session†	1.75	0.14	21.34	1.28	.66
Participant reported use of brochure or pamphlet during education session†	1.96	0.26	14.75	1.03	.51
Participant reported use of interactive learning tool during education session†	0.62	0.07	5.59	1.12	.67
Participant reported number of reinforcements during education session†	0.84	0.14	5.25	0.93	.85
Initial value for measure‡	1.98	0.90	4.35	0.40	.09
Child's age (months)‡	0.98	0.94	1.02	0.02	.43
Total amount of time participant and/or her children have been on WIC‡					
Less than 30 days	0.59	0.09	3.84	0.95	.58
1 month to a year	0.57	0.14	2.27	0.71	.43
1–2 years	1.77	0.68	4.62	0.49	.24
3 or more years (reference group)	0.00				
Site‡					
Site A	0.35	0.09	1.41	0.71	.14
Site B	0.59	0.19	1.86	0.59	.37
Site C	0.29	0.07	1.12	0.70	.07
Site D	1.41	0.41	4.94	0.64	.59
Site E	0.40	0.10	1.61	0.71	.19
Site F (reference group)	0.00				
McFadden's pseudo R ²					.14

Source: Participant Surveys, Initial and Final

Notes: Estimated using logistic regression model (SAS PROC LOGISTIC). The models for self-efficacy for SSBs and caregiver cooks homemade dinner would not converge, so no results are available. Two-sided *t* test used to identify variables associated with diet-related outcomes. Coefficients are statistically significant when *p*-value $\leq .05$. Table row heads with a dagger (†) indicate predictors of interest. Table row heads with a double dagger (‡) indicate control variables. McFadden's pseudo R-square is a statistical measure that explains how well the model fits the data.

^a Dichotomous variable indicates the proportion responding "thinking about doing it," "planning on doing it next month," "have been doing it for less than 6 months," and "have been doing it for 6 months or longer" vs. "not thinking about doing it."

RQ7. What other characteristics of WIC nutrition education delivery are most effective in helping WIC participants improve their dietary and physical activity habits, readiness to change behaviors, and other food-related behaviors?

To address whether other characteristics of WIC nutrition education delivery are effective in helping WIC participants improve behaviors, participants' perceptions of the helpfulness of WIC nutrition education were considered based on responses to the Participant Survey. The predictor of interest was:

- Whether the participant believes the education session was helpful (1) or not (0) included as a dichotomous variable.

Participants' opinions on the helpfulness of WIC nutrition education did not have a statistically significant effect on participant behaviors among the sample population after controlling for values of these behaviors at the initial period, years on WIC, site location, and child's age (results shown in **Exhibit 5-14** for continuous variables and **Exhibit 5-15** for binary variables).

Exhibit 5-14. Participant-Level Analysis for Continuous Variables: Effect of Other Characteristics of WIC Nutrition Education Delivery on Improving Behaviors (RQ7)

Variables	Child's Screen Time, hours per day (n = 130)			Child's Dietary Intake for Whole Grains, oz/day (n = 78)		
	Coefficient Estimate	Standard Error	p-value	Coefficient Estimate	Standard Error	p-value
Participant reported education session was helpful†	-0.01	0.40	.98	0.01	0.06	.89
Initial value for measure‡	0.15	0.08	.06	0.31	0.11	.01
Child's age (months)‡	0.04	0.02	.03	0.01	0.003	.03
Total amount of time participant and/or her children have been on WIC‡						
Less than 30 days	-0.06	0.71	.93	-0.08	0.12	.50
1 month to a year	-1.01	0.60	.10	-0.04	0.09	.69
1–2 years	0.35	0.35	.31	-0.01	0.06	.80
3 or more years (reference group)	0.00			0.00		
Site‡						
Site A	0.96	0.51	.06	0.02	0.10	.84
Site B	-0.20	0.46	.67	-0.09	0.06	.17
Site C	0.07	0.48	.88	-0.11	0.07	.13
Site D	0.29	0.47	.54	-0.11	0.07	.13
Site E	0.31	0.53	.55	-0.24	0.08	.01
Site F (reference group)	0.00			0.00		
Intercept	1.05	0.75	.17	0.20	0.16	.22
Adjusted R ²			.06			.21

Source: Participant Surveys, Initial and Final

Notes: Estimated using linear regression model (SAS PROC REG). Two-sided *t* test used to identify variables associated with diet-related outcomes. Coefficients are statistically significant when *p*-value $\leq .05$. Table row heads with a dagger (†) indicate predictors of interest. Table row heads with a double dagger (§) indicate control variables. R-square is a statistical measure that explains how well the model fits the data.

Exhibit 5-15. Participant-Level Analysis for Binary Variables: Effect of Other Characteristics of WIC Nutrition Education Delivery on Improving Behaviors (RQ7)

Variables	Caregiver Readiness to Change for Limiting SSBs ^a (n = 129)					Caregiver Self-Efficacy for Limiting SSBs ^b (n = 129)					Caregiver Cooks Homemade Dinner ^c (n = 134)				
	Odds Ratio	95% Confidence Limits		Standard Error	p-value	Odds Ratio	95% Confidence Limits		Standard Error	p-value	Odds Ratio	95% Confidence Limits		Standard Error	p-value
		Lower	Upper				Lower	Upper				Lower	Upper		
Participant reported education session was helpful†	1.64	0.61	4.36	0.50	.33	1.59	0.45	5.58	0.64	.47	0.55	0.15	2.00	0.66	.37
Initial value for measure‡	1.91	0.89	4.11	0.39	.10	1.80	0.67	4.88	0.51	.25	0.08	0.02	0.36	0.79	.001
Child's age (months)‡	0.99	0.95	1.03	0.02	.66	1.03	0.98	1.09	0.03	.24	0.97	0.92	1.03	0.03	.36
Total amount of time participant and/or her children have been on WIC‡															
Less than 30 days	0.95	0.16	5.63	0.91	.96	0.19	0.03	1.18	0.93	.07	10.40	1.30	83.00	1.06	.03
1 month to a year	0.69	0.18	2.67	0.69	.59	0.48	0.11	2.17	0.77	.34	0.60	0.04	8.49	1.35	.70
1–2 years	1.63	0.65	4.07	0.47	.29	1.02	0.32	3.22	0.59	.97	2.80	0.90	8.72	0.58	.08
3 or more years (reference group)	0.00					0.00					0.00				
Site‡															
Site A	0.27	0.07	1.02	0.68	.05	2.28	0.45	11.56	0.83	.32	1.70	0.29	10.01	0.91	.56
Site B	0.52	0.17	1.58	0.57	.25	2.40	0.52	11.01	0.78	.26	0.95	0.15	6.18	0.95	.96
Site C	0.26	0.07	0.94	0.65	.04	2.28	0.45	11.53	0.83	.32	3.53	0.73	16.98	0.80	.12
Site D	1.28	0.38	4.32	0.62	.69	2.54	0.53	12.31	0.80	.25	1.72	0.31	9.55	0.88	.54
Site E	0.47	0.12	1.89	0.71	.29	1.01	0.22	4.69	0.78	.99	2.78	0.44	17.74	0.95	.28
Site F (reference group)	0.00					0.00					0.00				
McFadden's pseudo R ²					.09					.08					.18

Source: Participant Surveys, Initial and Final

Notes: Estimated using logistic regression model (SAS PROC LOGISTIC). Two-sided *t* test used to identify variables associated with diet-related outcomes. Coefficients are statistically significant when *p*-value ≤ .05. Table row heads with a dagger (†) indicate predictors of interest. Table row heads with a double dagger (‡) indicate control variables. R-square is a statistical measure that explains how well the model fits the data^a Dichotomous variable indicates the proportion responding "thinking about doing it," "planning on doing it next month," "have been doing it for less than 6 months," and "have been doing it for 6 months or longer" vs. "not thinking about doing it."^b Dichotomous variable indicates the proportion in the "high efficacy" category vs. "low efficacy" or "moderate efficacy."^c Dichotomous variable indicates the proportion responding "almost every day" or "every day" vs. "rarely or never," "some days," or "most days."

RQ8. What experiences with WIC nutrition education are most often cited by women and child caretakers as motivating them to change their own or their children's dietary and physical activity habits, readiness to change behaviors, and other food-related behaviors?

To address the experiences with WIC nutrition education that are most often cited as motivating women and child caregivers to change their own or their child's behavior, the predictors of interest were entered into the regression models. Predictors of interest were:

- Participant reported (agree-disagree) whether they believe that they learned about good reasons to eat healthfully included as a continuous variable (1–4).
- Participant reported (agree-disagree) whether they believe that they learned about good ways to eat healthfully included as a continuous variable (1–4).
- Participant's level of interest in making a change related to the health behavior included as a four-level categorical variable. Response options range from 1 = "I am not thinking about doing it" to 4 = "I am already doing it."

None of the independent variables describing participants' experiences with WIC nutrition education (i.e., learning reasons to eat healthy foods, learning good ways to eat healthy foods, interest in making a change in diet) were found to have a statistically significant effect on child's hours per day of screen time, child's dietary intake for whole grains, or caregiver readiness to change for SSBs after controlling for values of these behaviors at the initial period, time on WIC, site location, and child's age (results shown in **Exhibit 5-16** for continuous variables and **Exhibit 5-17** for binary variables). Several of the independent variables are statistically significant but have large odds ratios and very wide confidence intervals. These findings may be misleading, resulting from the small sample size relative to the number of independent variables; thus, readers should exercise caution when interpreting these results.

Exhibit 5-16. Participant-Level Analysis for Continuous Variables: Experiences with WIC Nutrition Education that Motivate Behavior Change (RQ8)

Variables	Child's Screen Time, hours per day (n = 62)			Child's Dietary Intake for Whole Grains, oz/day (n = 37)		
	Coefficient Estimate	Standard Error	p-value	Coefficient Estimate	Standard Error	p-value
Participant reported learning good reasons to eat healthy†	-0.88	0.51	.09	0.07	0.09	.43
Participant reported learning good ways to eat healthy†	0.90	0.55	.11	-0.03	0.11	.77
Participant reported interest in making a change†	-0.39	0.41	.36	0.08	0.05	.09
Initial value for measure‡	0.07	0.10	.52	0.13	0.24	.58
Child's age (months)‡	0.03	0.02	.11	0.01	0.005	.21
Total amount of time participant and/or her children have been on WIC‡						
Less than 30 days	-0.67	0.92	.47	-0.22	0.19	.26
1 month to a year	-0.96	0.67	.16	0.17	0.15	.28
1-2 years	0.46	0.46	.33	0.02	0.09	.84
3 or more years (reference group)	0.00			0.00		
Site‡						
Site A	0.84	0.66	.21	0.11	0.14	.46
Site B	-0.39	0.60	.52	-0.03	0.09	.73
Site C	0.60	0.62	.34	0.05	0.11	.67
Site D	-0.12	0.74	.88	-0.11	0.15	.45
Site E	0.004	0.69	1.00	-0.11	0.13	.41
Site F (reference group)	0.00			0.00		
Intercept	2.51	2.12	.24	-0.18	0.31	.58
Adjusted R ²			.08			.20

Source: Participant Surveys, Initial and Final

Notes: Estimated using linear regression model (SAS PROC REG). Two-sided *t* test used to identify variables associated with diet-related outcomes. Coefficients are statistically significant when *p*-value $\leq$.05. Table row heads with a dagger (†) indicate predictors of interest. Table row heads with a double dagger (‡) indicate control variables. R-square is a statistical measure that explains how well the model fits the data.

Exhibit 5-17. Participant-Level Analysis for Binary Variables: Experiences with WIC Nutrition Education that Motivate Behavior Change (RQ8)

Variables	Caregiver Readiness to Change for Limiting SSBs ^a (n = 74)					Caregiver Efficacy for Limiting SSBs ^b (n = 74)					Caregiver Cooks Homemade Dinner ^c (n = 73)				
	Odds Ratio	95% Confidence Limits		Standard Error	p-value	Odds Ratio	95% Confidence Limits		Standard Error	p-value	Odds Ratio	95% Confidence Limits		Standard Error	p-value
		Lower	Upper				Lower	Upper				Lower	Upper		
Participant reported learning good reasons to eat healthy†	0.59	0.15	2.23	0.68	.43	4.59	0.87	24.16	0.85	.07	16.04	1.16	222.33	1.34	.04
Participant reported learning good ways to eat healthy†	2.14	0.50	9.28	0.75	.31	0.22	0.04	1.14	0.83	.07	0.02	<0.001	0.59	1.63	.02
Participant reported interest in making a change†	1.81	0.33	9.95	0.87	.50	7.76	1.42	42.32	0.87	.02	1.32	0.25	7.03	0.85	.75
Initial value for measure‡	1.43	0.47	4.39	0.57	.53	3.17	0.82	12.31	0.96	.10	0.02	0.001	0.28	1.36	.003
Child's age (months)‡	0.95	0.90	1.02	0.03	.15	0.96	0.89	1.04	0.04	.36	0.99	0.90	1.09	0.05	.83
Total amount of time participant and/or her children have been on WIC‡															
Less than 30 days	0.45	0.03	6.57	1.36	.56	0.08	0.004	1.52	1.50	.09	91.00	2.49	>999.99	1.84	.01
1 month to a year	0.48	0.06	3.80	1.05	.49	0.32	0.03	3.10	1.16	.32	0.11	0.002	6.54	2.09	.29
1–2 years	1.82	0.50	6.61	0.66	.36	0.67	0.14	3.26	0.81	.62	4.83	0.65	36.18	1.03	.13
3 or more years (reference group)	0.00					0.00					0.00				
Site‡															
Site A	0.08	0.01	0.70	1.09	.02	0.85	0.08	9.11	1.21	.89	1.77	0.09	35.94	1.54	.71
Site B	0.23	0.04	1.47	0.94	.12	8.11	0.48	136.85	1.44	.15	1.83	0.03	123.77	2.15	.78
Site C	0.07	0.01	0.52	1.04	.01	6.21	0.39	97.89	1.41	.19	23.22	0.88	611.80	1.67	.06
Site D	0.60	0.09	4.21	0.99	.61	0.44	0.05	3.87	1.12	.46	28.61	1.10	746.85	1.66	.04
Site E	0.19	0.02	1.52	1.06	.12	0.97	0.12	7.93	1.07	.97	28.36	1.08	745.66	1.67	.04
Site F (reference group)	0.00					0.00					0.00				
McFadden's pseudo R ²					.19					.25					.39

Source: Participant Surveys, Initial and Final

Notes: Estimated using logistic regression model (SAS PROC LOGISTIC). Two-sided *t* test used to identify variables associated with diet-related outcomes. Coefficients are statistically significant when *p*-value ≤ .05. Table row heads with a dagger (†) indicate predictors of interest. Table row heads with a double dagger (‡) indicate control variables.^a Dichotomous variable indicates the proportion responding "thinking about doing it," "planning on doing it next month," "have been doing it for less than 6 months," and "have been doing it for 6 months or longer" vs. "not thinking about doing it."^b Dichotomous variable indicates the proportion in the "high efficacy" category vs. "low efficacy" or "moderate efficacy."^c Dichotomous variable indicates the proportion responding "almost every day" or "every day" vs. "rarely or never," "some days," or "most days."

RQ9. How does the content of WIC nutrition education affect participants' dietary, physical activity habits, readiness to change behaviors, and other food-related behaviors?

To examine the impact of the content of WIC nutrition education on participants' behaviors, a series of dichotomous indicator variables for education content was created based on whether the participant reported discussing the health topic related to the behavior/measure in the past 6 months (e.g., whole grains for the child consumption of whole grain measure, physical activity for the screen time measure, shopping and preparing healthy foods for the caregiver cooks homemade dinner measure, and drinking water for the efficacy to limit SSBs measure and readiness to change to limit SSBs measure). For each outcome, the associated content indicator, an indicator variable for exposure (high exposure versus low exposure), and the content-by-exposure interaction term were entered into a regression model.

Participants who reported that consuming whole grains was a nutrition education topic reported different whole grain consumption for their children than participants who did not discuss this topic. However, this effect was modified by whether the participant was in the high-exposure group or the low-exposure group. Specifically, parents in the high-exposure group who received information on whole grains reported that their children consumed an average of 0.16 fewer ounces of whole grains per day than children of parents who did not receive information. By contrast, parents in the low-exposure group who received information reported that their children consumed 0.17 more ounces of whole grains per day than children who did not receive information. Although this finding is counterintuitive, the difference of 0.33 ounces per day was statistically significant. The content of WIC nutrition education, as measured, did not have a statistically significant effect on hours per day of child's screen time, caregiver cooks homemade dinners, caregiver SSB self-efficacy, or caregiver readiness to change for SSBs after controlling for the value of these behaviors at the initial period, time on WIC, site location, and child's age (results shown in **Exhibit 5-18** for continuous variables and **Exhibit 5-19** for binary variables).

Exhibit 5-18. Participant-Level Analysis for Continuous Variables: Effect of Content of WIC Nutrition Education on Participants' Behaviors (RQ9)

Variables	Child's Screen Time, hours per day (n = 144)				Child's Dietary Intake for Whole Grains, oz/day (n = 82)			
	High Exposure	Low Exposure	Impact (SE)	p-value	High Exposure	Low Exposure	Impact (SE)	p-value
Participant reported receiving information on topic†	0.30	-0.33	0.63 (0.75)	.41	-0.16	0.17	-0.33 (0.11)	.003
Variables	Coefficient Estimate		Standard Error	p-value	Coefficient Estimate		Standard Error	p-value
Initial value for measure‡	0.15		0.07	.03	0.33		0.09	.001
Child's age (months)‡	0.03		0.02	.05	0.004		0.003	.15
Total amount of time participant and/or her children have been on WIC‡								
Less than 30 days	-0.02		0.79	.98	-0.14		0.11	.20
1 month to a year	-0.48		0.53	.37	-0.09		0.08	.30
1-2 years	0.06		0.34	.86	-0.03		0.05	.53
3 or more years (reference group)	0.00				0.00			
Site‡								
Site A	1.04		0.47	.03	-0.03		0.08	.74
Site B	-0.02		0.45	.96	-0.07		0.06	.21
Site C	0.14		0.49	.78	-0.15		0.08	.06
Site D	0.51		0.43	.24	-0.09		0.06	.11
Site E	0.42		0.50	.41	-0.21		0.08	.01
Site F (reference group)	0.00				0.00			
Intercept	1.12		0.59	.06	0.24		0.13	.07
Adjusted R ²				.06				.21

Source: Participant Surveys, Initial and Final

Notes: Estimated using linear regression model (SAS PROC REG). Two-sided *t* test used to identify variables associated with diet-related outcomes. Coefficients are statistically significant when *p*-value ≤ .05. Table row heads with a dagger (†) indicate predictors of interest. Table row heads with a double dagger (‡) indicate control variables. McFadden's pseudo R-square is a statistical measure that explains how well the model fits the data. Each of the models is based on content-specific responses regarding the information received by participants.

SE = standard error

Exhibit 5-19. Participant-Level Analysis for Binary Variables: Effect of Content of WIC Nutrition Education on Participants' Behaviors (RQ9)

Variables	Caregiver Readiness to Change for Limiting SSBs ^a (n = 140)				Caregiver Efficacy for Limiting SSBs ^b (n = 141)				Caregiver Cooks Homemade Dinner ^c (n = 146)			
	High Exposure	Low Exposure	Impact (SE)	p-value	High Exposure	Low Exposure	Impact (SE)	p-value	High Exposure	Low Exposure	Impact (SE)	p-value
Participant reported receiving information on topic†	0.14	0.95	0.15 (.99)	0.05	0.08	0.83	0.1 (1.62)	.16	0.15	0.73	0.2 (1.41)	.26
Variables	Odds Ratio		Standard Error	p-value	Odds Ratio		Standard Error	p-value	Odds Ratio		Standard Error	p-value
Initial value for measure‡	2.67		0.39	.01	1.16		0.53	.79	0.04		0.78	<.0001
Child's age (months)‡	0.98		0.02	.26	0.99		0.03	.63	1.01		0.03	.6
Total amount of time participant and/or her children have been on WIC‡												
Less than 30 days	0.87		1.05	.89	0.05		1.17	.01	6.47		1.39	.18
1 month to a year	0.56		0.64	.37	0.37		0.80	.22	0.74		0.98	.76
1–2 years	1.47		0.48	.42	0.65		0.64	.49	3.27		0.58	.04
3 or more years (reference group)	0.00				0.00				0.00			
Site‡												
Site A	0.19		0.66	.01	2.47		0.81	.27	4.49		0.82	.07
Site B	0.48		0.60	.23	1.43		0.72	.62	0.90		0.94	.91
Site C	0.45		0.67	.24	1.92		0.84	.44	4.38		0.84	.08
Site D	0.66		0.62	.51	10.69		1.2	.05	0.74		0.92	.74
Site E	0.25		0.74	.06	1.66		0.94	.59	3.29		0.86	.17
Site F (reference group)	0.00				0.00				0.00			
McFadden's pseudo R ²				.09				.08				.18

Source: Participant Surveys, Initial and Final

Notes: Estimated using logistic regression model (SAS PROC LOGISTIC). Two-sided *t* test used to identify variables associated with diet-related outcomes. Coefficients are statistically significant when *p*-value $\leq .05$. Table row heads with a dagger (†) indicate predictors of interest. Table row heads with a double dagger (‡) indicate control variables. McFadden's pseudo R-square is a statistical measure that explains how well the model fits the data.

^a Dichotomous variable indicates the proportion responding "thinking about doing it," "planning on doing it next month," "have been doing it for less than 6 months," and "have been doing it for 6 months or longer" vs. "not thinking about doing it."

^b Dichotomous variable indicates the proportion in the "high efficacy" category vs. "low efficacy" or "moderate efficacy."

^c Dichotomous variable indicates the proportion responding "almost every day" or "every day" vs. "rarely or never," "some days," or "most days."

SE = standard error

5.5 Assessing the Influence of WIC Nutrition Education on Participant Behaviors: Methods and Results for Site-Level Models

The pilot study sought to understand whether different organizational/operational characteristics of the WIC site play a role in promoting or inhibiting the nutrition education process. Accordingly, sites were purposively selected to differ in terms of features such as number and length of contacts, mode of nutrition education offered, and the use of VENA/participant-centered practices in order to support comparisons. Multilevel models were used to examine the influence of site-level factors such as nutrition educator staff training, agency characteristics, and site-level features of nutrition education delivery on participant outcomes in the study sample (see equation [6] in Appendix M for the model specification). The participant's behavior at the final data collection period was the dependent variable. The independent variables specified in each model were based on each research question as detailed below and were derived from site-level data from the Phase I Site Survey, Nutrition Educator Survey, the POC Interviews, and the observations of nutrition education (see Appendix M for a description of the coding of the independent variables).⁵⁴ In addition, all site-level statistical models included control covariates that account for the baseline measure of the dependent variable, number of years on WIC, and the age of the target child. Site-to-site variation is modeled as a random effect. All analyses were conducted using SAS 9.4 (SAS, 2016). Hierarchical linear regression models were used for continuous variables (SAS PROC MIXED), and hierarchical generalized linear (i.e., logistic) models (SAS PROC GLIMMIX) were used for dichotomous variables, respectively. Because of the limited amount of data for pregnant women in the sample, it was not possible to estimate the site-level models for pregnant women's efficacy to increase consumption of brown rice.

The research questions examining impact (RQ3a and RQ3b) could not be addressed as stated because the required models would have been overfit, a condition that results when one specifies a statistical model that is too complex for the available data to support (see text box for additional explanation). Therefore, the analyses addressing these

Additional explanation: In an analysis with clustered data, the number of units at the cluster level (i.e., WIC sites) determines the degrees of freedom for statistical tests examining site-level characteristics because sites are assumed independent and persons nested within sites are assumed correlated. The pilot study included six WIC sites. These sites could, for example, be classified as “high exposure” and “low exposure” (a condition variable). A balanced design with three sites in each condition would result in 4 degrees of freedom available to estimate model parameters including fixed and random effects, based on the formula

$$c(g-1) = 2(3-1) = 4 \text{ degrees of freedom.}$$

where c indicates the number of conditions and g indicates the number of groups per condition. In general, assessing the impact of site on a given outcome requires a model that includes the following model terms: the site-level characteristic, the condition variable (high vs. low), and a (site-level characteristic)-by-(condition) interaction term. If the site-level characteristic is a categorical variable with two levels (e.g., VENA [yes/no]), the model requires the estimation of three parameters: one parameter for the binary site-level variable of interest, one parameter for the condition classification variable, and one parameter for the interaction term between the site-level variable of interest and the condition classification variable. Each estimated parameter requires 1 degree of freedom, resulting in a model with 1 degree of freedom left to estimate a parameter's variability. Models like this with few degrees of freedom are not only highly unreliable but also likely to show severe convergence issues.

⁵⁴ Appendix I, Exhibit I-17 provides a summary of the values of the independent variables by site.

research questions examine the influence of site-level variables on measures of interest from the final data collection period.

RQ3a. Does the impact vary by nutrition educator characteristics?

To address whether nutrition educator characteristics affect WIC participants' behaviors, a multilevel regression was created that included site-level, fixed-effect predictors of interest regressed on individual-level outcome data. Predictors of interest derived from responses to the Nutrition Educator Survey were:

- Mean number of years of experience providing WIC nutrition education for nutrition education staff at the site included as a continuous variable.
- Average age of nutrition education staff at the site included as a continuous variable.
- Percentage of staff at the site who have received training in at least one of the following in the past 12 months included as a continuous variable: VENA skills, participant-/learner-centered education, motivational interviewing, or emotion-based counseling (asked as separate items in the survey).
- Percentage of nutrition education staff at the site who have a bachelor's or graduate degree included as a continuous variable.
- Percentage of nutrition education staff at the site who are registered dietitians (RDs) or licensed dietitians/nutritionists (LDs/LNs) included as a continuous variable.
- Percentage of staff at the site who have received training in providing group facilitation in the past 12 months included as a continuous variable.

Because of the limited degrees of freedom problem noted above, each predictor of interest was regressed singularly in a series of multilevel regression models. Results indicate that none of the characteristics examined were significantly associated with nutrition-related behaviors (see **Exhibit 5-20**). As a caveat, it must be noted that having limited degrees of freedom constrained the predictive power of the statistical test.

Exhibit 5-20. Site-Level Analysis: Effect of Nutrition Educator Characteristics on Participant Outcomes (RQ3a)

Variable (Logistic Models)	Odds Ratio	95% Confidence Interval	Standard Error	p-value
Caregiver Self-Efficacy for Limiting SSBs ^a				
Years of experience	1.01	0.86–1.20	0.06	.84
Average staff age	0.93	0.72–1.19	0.09	.45
Received VENA training in past 12 months (%)	1.23	0.06–26.70	1.11	.86
College degree (%)	3.43	0.14–87.08	1.16	.35
RD or LD/LN (%)	0.88	0.04–19.36	1.11	.91
Received group facilitation training in past 12 months (%)	2.08	0.24–18.05	0.78	.40
Caregiver Readiness to Change for Limiting SSBs ^b				
Years of experience	1.04	0.85–1.26	0.07	.64
Average staff age	0.97	0.71–1.34	0.12	.83
Received VENA training in past 12 months (%)	0.39	0.01–11.75	1.23	.49
College degree (%)	0.91	0.02–47.26	1.42	.95
RD or LD/LN (%)	1.20	0.03–45.87	1.31	.90
Received group facilitation training in past 12 months (%)	0.30	0.05–1.65	0.62	.12
Caregiver Cooks Homemade Dinner ^c				
Years of experience	1.09	0.92–1.30	0.06	.23
Average staff age	1.02	0.78–1.33	0.10	.88
Received VENA training in past 12 months (%)	0.15	0.01–3.11	1.09	.16
College degree (%)	1.27	0.04–39.34	1.24	.86
RD or LD/LN (%)	0.18	0.01–3.82	1.11	.19
Received group facilitation training in past 12 months (%)	0.41	0.08–2.22	0.61	.22
Variable (Linear Models)	Coefficient	95% Confidence Interval	Standard Error	p-value
Child's Screen Time, hours per day				
Years of experience	-0.0300	-0.15–0.09	0.040	.48
Average staff age	-0.0003	-0.20–0.20	0.072	.98
Received VENA training in past 12 months (%)	1.0800	-0.80–2.96	0.680	.19
College degree (%)	-0.1900	-2.67–2.30	0.900	.85
RD or LD/LN (%)	1.0900	-0.76–2.94	0.670	.18
Received group facilitation training in past 12 months (%)	0.7800	-0.42–1.98	0.430	.15
Child's Consumption of Whole Grains, oz/day				
Years of experience	-0.0020	-0.02–0.02	0.008	.78
Average staff age	0.0200	-0.01–0.04	0.007	.10
Received VENA training in past 12 months (%)	0.0200	-0.39–0.43	0.147	.90
College degree (%)	-0.1500	-0.49–0.19	0.122	.29
RD or LD/LN (%)	-0.0070	-0.41–0.40	0.145	.97
Received group facilitation training in past 12 months (%)	0.0600	-0.21–0.33	0.097	.58

Sources: Participant Surveys, Initial and Final; Nutrition Educator Survey

Notes: Results based on multilevel linear and logistic regression models (PROC GLIMMIX) controlling for child's age and number of years participant has been receiving WIC benefits. The *p*-values are based on the Type III *F* test. Coefficients are statistically significant when *p*-value $\leq .05$. The analyses examined the influence of site-level variables on measures of interest from the final data collection period.

^a Dichotomous variable indicates the proportion in the "high efficacy" category vs. "low efficacy" or "moderate efficacy."

^b Dichotomous variable indicates the proportion responding "thinking about doing it," "planning on doing it next month," "have been doing it for less than 6 months," and "have been doing it for 6 months or longer" vs. "not thinking about doing it."

^c Dichotomous variable indicates the proportion responding "almost every day" or "every day" vs. "rarely or never," "some days," or "most days."

RQ3b. Does the impact vary by agency characteristics?

To examine whether agency characteristics affect WIC participants' behaviors, multilevel regression models were created that include site-level, fixed-effect predictors of interest regressed on individual-level outcome data. The predictors of interest derived from the Phase I Site Survey and updated in the POC Interviews were:

- Caseload (average number of food packages issued) for the site included as a continuous variable.
- Nutrition educator full-time equivalent (FTE)-to-client ratio included as a continuous variable.

Because of the limited degrees of freedom problem noted above, each predictor of interest was regressed singularly in a series of multilevel regression models. Specifically, site caseload (average number of participants served monthly) and nutrition educator FTE-to-client ratio were examined. Site caseloads ranged from 1,355 to 5,748, and FTE-to-client ratios ranged from 303 to 542. Site characteristics did not influence participant behaviors (see **Exhibit 5-21**). As previously noted, having limited degrees of freedom constrained the power of the statistical test relative to an analysis with more degrees of freedom.

Exhibit 5-21. Site-Level Analysis: Effect of Agency Characteristics on Participant Outcomes (RQ3b)

Variable (Logistic Models)	Odds Ratio	95% Confidence Interval	Standard Error	p-value
Caregiver Efficacy for Limiting SSBs ^a				
Caseload	1.00	1.00–1.00	0.0001	.78
FTE-to-client ratio	1.00	0.99–1.01	0.002	.84
Caregiver Readiness to Change for Limiting SSBs ^b				
Caseload	1.00	1.00–1.00	0.0001	.36
FTE-to-client ratio	1.00	0.99–1.01	0.003	.89
Caregiver Cooks Homemade Dinner ^c				
Caseload	1.00	1.00–1.00	0.0001	.39
FTE-to-client ratio	1.00	0.99–1.01	0.003	.58
Variable (Linear Models)	Coefficient	95% Confidence Interval	Standard Error	p-value
Child's Screen Time, hours per day				
Caseload	0.0001	–0.0002–0.0003	0.0001	.47
FTE-to-client ratio	–0.001	–0.01–0.004	0.002	.52
Child's Consumption of Whole Grains, oz/day				
Caseload	–0.00002	–0.00006–0.00003	0.00002	.34
FTE-to-client ratio	–0.0005	–0.001–0.0002	0.0003	.14

Sources: Participant Surveys, Initial and Final; Phase I Site Survey; POC Interview

Notes: Results based on multilevel linear and logistic regression models (PROC GLIMMIX) controlling for child's age and number of years participant has been receiving WIC benefits. The *p*-values are based on the Type III *F* test. Coefficients are statistically significant when *p*-value ≤ .05. The analyses examined the influence of site-level variables on measures of interest from the final data collection period.

^a Dichotomous variable indicates the proportion in the "high efficacy" category vs. "low efficacy" or "moderate efficacy."

^b Dichotomous variable indicates the proportion responding "thinking about doing it," "planning on doing it next month," "have been doing it for less than 6 months," and "have been doing it for 6 months or longer" vs. "not thinking about doing it."

^c Dichotomous variable indicates the proportion responding "almost every day" or "every day" vs. "rarely or never," "some days," or "most days."

RQ5. What attributes of individual nutrition education sessions are most effective in helping WIC participants improve their dietary and physical activity habits, readiness to change behaviors, and other food-related behaviors?

To address attributes of nutrition education sessions that may be effective in helping WIC participants improve their behaviors, multilevel regression models that include site-level, fixed-effect predictors of interest regressed on individual-level outcome data were estimated. Predictors of interest derived from POC Interviews were:

- Whether the site uses group sessions for 11% or more of participants included as a dichotomous variable.
- Whether the site uses technology-based education for 40% or more of participants included as a dichotomous variable.
- Extent to which VENA/participant-centered practices (index 0 to 100) are followed included as a continuous variable.

The two dichotomous variables were created based on responses to the POC Interviews. The index for use of VENA/participant-centered practices was created using the site-level observation data. The following attributes were used in the index: participants spoke 40% or more of the time, educator used open-ended questions frequently, educator provided general or specific affirmations, and participant's needs and interests determined the focus of discussion. Exhibit 3-14 shows the number and percentage of observations with this attribute by site. For each site, the percentages for the four items were summed and an average taken to provide the index.

Because of the limited degrees of freedom problem noted above, each predictor of interest was regressed singularly in a series of multilevel regression models. Specifically, the following were examined: whether technology-based education was used for 40% or more of participants, whether group education was used for 11% or more of participants, and the extent to which attributes of VENA/participant-centered practices were used in observed one-on-one sessions (an index ranging from 10.4% to 100% representing the average percentage of observations during which features of VENA were observed). As **Exhibit 5-22** indicates, these characteristics did not influence any of the participant behaviors examined. As previously noted, having limited degrees of freedom constrained the power of the statistical test relative to an analysis with more degrees of freedom.

Exhibit 5-22. Site-Level Analysis: Attributes of WIC Nutrition Education Delivery that are Most Effective in Helping WIC Participants Improve Behaviors (RQ5)

Variable (Logistic Models)	Odds Ratio	95% Confidence Interval	Standard Error	p-value
Caregiver Efficacy for Limiting SSBs ^a				
Technology-based education used for 40% or more of participants	1.36	0.33–5.68	0.515	.58
Index describing use of VENA/participant-centered practices in observed one-on-one sessions	0.99	0.97–1.01	0.007	.34
Group education used for 11% or more of participants	2.12	0.49–9.08	0.524	.23
Caregiver Readiness to Change for Limiting SSBs ^b				
Technology-based education used for 40% or more of participants	0.46	0.14–1.47	0.420	.14
Index describing use of VENA practices in observed one-on-one sessions	1.01	1.00–1.03	0.005	.06
Group education used for 11% or more of participants	0.42	0.15–1.14	0.364	.07
Caregiver cooks Homemade Dinner ^c				
Technology-based education used for 40% or more of participants	0.55	0.17–1.79	0.430	.23
Index describing use of VENA practices in observed one-on-one sessions	1.01	0.99–1.03	0.006	.29
Group education used for 11% or more of participants	0.58	0.18–1.82	0.410	.25
Variable (Linear Models)	Coefficient	95% Confidence Interval	Standard Error	p-value
Child's Screen Time, hours per day				
Technology-based education used for 40% or more of participants	0.470	–0.35–1.29	0.296	.19
Index describing use of VENA practices in observed one-on-one sessions	–0.003	–0.02–0.01	0.005	.62
Group education used for 11% or more of participants	0.190	–0.76–1.14	0.342	.60
Child's Consumption of Whole Grain, oz/day				
Technology-based education used for 40% or more of participants	–0.040	–0.21–0.14	0.063	.57
Index describing use of VENA practices in observed one-on-one sessions	0.000	–0.001–0.003	0.001	.30
Group education used for 11% or more of participants	0.130	–0.17–0.19	0.064	.85

Sources: Participant Surveys, Initial and Final; Phase I Site Survey; POC Interviews

Notes: Results based on multilevel linear and logistic regression models (PROC GLIMMIX) controlling for child's age and number of years participant has been receiving WIC benefits. The *p*-values are based on the Type III *F* test. Coefficients are statistically significant when *p*-value $\leq$.05. The analyses examined the influence of site-level variables on measures of interest from the final data collection period.

^a Dichotomous variable indicates the proportion in the "high efficacy" category vs. "low efficacy" or "moderate efficacy."

^b Dichotomous variable indicates the proportion responding "almost every day" or "every day" vs. "rarely or never," "some days," or "most days."

^c Dichotomous variable indicates the proportion responding "thinking about doing it," "planning on doing it next month," "have been doing it for less than 6 months," and "have been doing it for 6 months or longer" vs. "not thinking about doing it."

RQ6b. What skills and attributes of the nutrition educator (for group sessions) are most effective in helping participants improve their dietary and physical activity habits, readiness to change behaviors, and other food-related behaviors?

To address attributes of group nutrition education sessions that may be effective in helping WIC participants improve their behaviors, multilevel regression models that include site-level, fixed-effect predictors of interest regressed on individual-level outcome data were created. Predictors of interest derived from POC Interviews were:

- Average age of the site staff who provide nutrition education included as a continuous variable.
- Percentage of staff at the site who have received training in at least one of the following in the past 12 months included as a continuous variable: VENA skills, participant-/learner-centered education, motivational interviewing, or emotion-based counseling (asked as separate items in the survey).
- Percentage of nutrition education staff at the site who have a bachelor's or graduate degree included as a continuous variable.
- Percentage of nutrition education staff at the site who are RDs or LDs/LNs included as a continuous variable. Percentage of staff at the site who have received training in providing group facilitation in the past 12 months included as a continuous variable.
- Percentage of staff who have received training in providing group facilitation in the past 12 months.
- Mean number of years of experience providing WIC nutrition education at the site level.

Results for this analysis are not reported for any of the estimated models because very few individuals ($n = 4$) participated in only group sessions among the six pilot sites. Thus, it was not possible to calculate consistent model estimates.

5.6 Implications of the Results of the Pilot Impact Evaluation for Designing Future Evaluations

It is important to note that the lack of statistically significant findings for some research questions does not reflect on the quality of the nutrition education provided at the six pilot sites. While a priori power calculations were conducted, there was no information available to characterize the magnitude of the program effect because the amount of nutrition education differentiating “high exposure” and “low exposure” was not articulated. In other words, during the planning stage the difference in the amount of change between the two exposure groups was unknown.

As the findings demonstrate, the amount of time, frequency of visit, use of reinforcers, and types of follow-ups observed across the sample of participants were very similar. Accordingly, the exposure model amounts to a very weak intervention, and this could not be predicted at the beginning of the study. The inability to characterize the magnitude of the program effect may have contributed to the inability of the statistical models to detect change beyond chance. Further, a priori sample size calculations were not conducted to examine research questions addressing the effects of site-level characteristics on participant behavior or the contribution of participant characteristics.

Although the DiD models did not attain a level of statistical significance, the estimates provided are useful in determining the minimum detectable effects for future planning. For continuous variables, these

findings suggest minimum detectable effects of Cohen's $d^{55} = 0.13$, 0.19, and 0.25 for caregivers cooking homemade meals, child's dietary intake of whole grains, and child's number of hours per day of screen time, respectively. The minimum detectable effects for the dichotomous variables, readiness to limit SSBs and efficacy to limit SSBs, were larger: Cohen's $d^{56} = 0.52$ and 0.46, respectively.

In future evaluations, additional planning and consideration should be given to ways that research questions are translated into study designs. As a rule of thumb, research questions that involve the simple interaction of two dichotomous terms require sample sizes approximately four times as many observations for examining main effects, so planning for larger samples may be required. If research questions call for examining complex phenomenon (e.g., assessing "combinations of features"), evaluators need to think about research designs and statistical analyses that will allow for disaggregation of observed effects. One approach is to create multiple study conditions, with each condition including a specific and nonoverlapping subset of program components. Complex effects can also be examined using structural equation models, but this approach should be considered only when the intervention is based on a strong theory.

Results of the influence of participant-level predictors on behavioral outcomes are mixed and should be interpreted carefully. For most research questions, at least one predictor variable was observed to be significantly associated (i.e., $p \leq .05$) with at least one of the behavioral outcomes, but there is no clear pattern of results from which to draw any conclusions. For example, while interest in making a (healthy) change was associated with a stronger belief in one's ability (self-efficacy) to reduce the amount of SSBs offered to children, participating in goal setting was associated with lower self-efficacy to reduce the amount of SSBs provided to children. It is difficult to see how these findings fit together to explain participant behavior. Further, it cannot be ruled out that these associations may be spurious given the number of tests conducted and the fact that no measures to control for experiment-wise error rates were employed.

Sites were purposively selected to provide variation on site-level characteristics thought to influence participant outcomes (e.g., proportion of staff with advanced degrees or VENA training, average number of years of experience, average case load). Although some of these characteristics had significant site-to-site variation (see Chapter 3 for additional information), the impact analysis did not identify any site-level characteristics associated with participant outcomes. The lack of association between site-level characteristics and participant outcomes may be because participant outcomes exhibited greater variation within sites than between sites. This suggests that future evaluation efforts should only consider selecting sites based on the variation in site-level characteristics if this variation is likely to contribute to evaluation findings.

The aim of an impact evaluation is most commonly understood to be a test based on the expression of a counterfactual or comparative condition. In the most tractable scenarios, the comparison is known and can be operationalized. When a clear understanding of the difference between the conditions is lacking, it can be extremely difficult to draw valid and supportable inferences from the statistical tests used to assess

⁵⁵ Cohen's d is commonly used as a standardized measure of program effect estimated as the ratio of the observed effect to the pooled standard deviation of the measure.

⁵⁶ Through the transformation $d = \text{Log Odds Ratio} * (\sqrt{3/\pi})$.

comparisons. That is true of the present study, where the study's comparison variable (i.e., level of exposure) was defined post hoc based on participant self-report.

Additionally, the expression of exposure as a comparison leaves the findings of the impact analyses from the pilot open to plausible alternative explanations and the same would be true of a future study using the same approach. For example, exposure—operationalized by frequency and duration of contact—is confounded with a number of participant and contextual factors. If participants or their children are considered high risk, they may receive additional and longer nutrition education sessions. Participants with a high level of health consciousness or health motivation may choose to spend a longer amount of time in nutrition education sessions. In the first case, the additional exposure may not influence participants' behavior because of intervening health factors. In the second, the additional exposure may not influence participants' behavior because motivated participants are already highly engaged in their own health promotion.

The results of this pilot strongly suggest that it may not be feasible to classify participants based on exposure to nutrition education without accurate administrative data or data collection activities that may be unduly burdensome to WIC staff or to participants. Further, the Federal requirement to provide nutrition education to all participants, coupled with an increasing focus on participant-centered education, makes the possibility of random assignment unlikely. Accordingly, it may be necessary to consider an epidemiological evaluation approach such as the longitudinal cohort design (Kelsey, Whittemore, Evans, & Thompson, 1996) over an impact study for future evaluations of WIC nutrition education.

5.7 Limitations

The statistical models presented in this chapter highlight limitations that should be considered in the planning process for future evaluations of WIC nutrition education. The findings suggest that using a retrospective self-reported measure of exposure is not likely to lead to strong and supportable conclusions regarding the effects of nutrition education. Although the LCA approach used in the pilot study produced two distinct classes for the purposes of comparison, the difference between the low-exposure and high-exposure groups averaged approximately 2.25 minutes at the participant's most recent visit and less than 0.5 visits per 6-month period among the caregiver-with-child enrollment group. Whether the exposure groups defined by the LCA model truly differentiate levels of nutrition education requires further study and consideration. Evidence is not available that would support and answer the question "how much" exposure is sufficient to create a meaningful difference with respect to providing nutrition education. Further, the retrospective self-reported measure of exposure led to a highly uneven distribution of number of participants in each exposure group. This degree of imbalance can adversely influence the precision of a statistical model by inflating variances and standard errors. In other words, too much imbalance can increase the amount of "noise" related to the amount of "signal," making it difficult to detect meaningful differences as statistically significant. Taken together, these points highlight the central challenge of this study—the inability to assign treatment conditions to participants is likely to seriously impinge on a study planner's ability to conduct an impact evaluation.

The analyses conducted included general linear and generalized linear models to assess the influence of participant characteristics and participant-reported features of the delivery of WIC nutrition education,

hierarchical linear and hierarchical generalized linear models to assess the influence of site-level factors, and linear and generalized linear DiD models to assess the change over time between participants with differing levels of exposure to nutrition education. Each type of statistical model has strengths and limitations that planners for future evaluation studies should consider in parallel with the development and expression of the evaluation questions. Consider, for example, whether it is necessary to assess change over time within persons or whether it is more appropriate to measure change over time at the population level. These expressions represent two very different questions that would require two very different statistical approaches, yet both could be considered appropriate, depending on the interest of policy makers and other stakeholders.

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6. Conclusion

This chapter concludes the report by discussing lessons learned and providing recommendations for overcoming some of the challenges encountered in the pilot study to help study planners design future evaluations of WIC nutrition education. The results of the pilot study suggest that conducting a nationally representative impact evaluation of WIC nutrition education would present significant challenges as a means to assess the effectiveness of WIC nutrition education. As discussed in this chapter, other approaches may be more suitable for addressing some of the challenges associated with evaluating WIC nutrition education.

The pilot study used a longitudinal, exposure-response design. Six sites were purposively selected based on variation in exposure and other characteristics related to delivery of nutrition education. Site-level data were collected to describe delivery of nutrition education through interviews with the site point of contact (POC), a survey of nutrition educators, observations of nutrition education, focus groups and interviews with participants, and administrative data for a subset of participants. This information was summarized to provide a rich description of the delivery of nutrition education in the six sites (see Chapter 3), and some of the data were used in statistical models. Data were collected from participants at three periods (initial, interim, final) to measure exposure and participant attitudes and behaviors related to nutrition and physical activity. Participant-level data on exposure were collected to classify participants as high versus low exposure.

Analyses used responses to the Participant Surveys to examine within-person change between the initial and final periods in outcome measures describing participants' nutrition and physical activity attitudes and behaviors (see Chapter 4). Impact analyses assessed whether changes in a subset of measures (i.e., the measures of interest) varied significantly in relation to WIC nutrition education exposure (see Chapter 5). Difference-in-difference (DiD) models compared within-person change over time between a low- and high-exposure group for the measures of interest. Latent class analysis (LCA) was used post hoc to assign participants to the two exposure groups based on participant-reported data on number of nutrition education contacts, length of nutrition education contacts, use of reinforcers during contacts, and use of follow-ups between contacts. Models comparing high-exposure to low-exposure participants were estimated to determine the characteristics of WIC nutrition education delivery that are effective in achieving improvements in participant behaviors. Additionally, models comparing high-exposure to low-exposure participants were estimated to assess whether the impact of nutrition education on participant behaviors varies by participant demographic and household characteristics. Finally, site-level models examined the impact of site-level factors such as nutrition educator staff training and credentials, agency characteristics (e.g., caseload size), and site-level features of nutrition education delivery (e.g., extent of use of Value Enhanced Nutrition Assessment (VENA)/participant-centered education practices in one-on-one sessions).

Lessons learned have been noted throughout the report and centered on modifying the data collection procedures for the Participant Surveys to maximize the response rate and improve data quality (see Section 2.12), modifying the site-level data collection procedures (see Section 3.11), refining the measures used in the Participant Surveys based on the results of the outcome analysis (see Section 4.5),

and exploring alternatives to the exposure-response design to address the limitations of this approach (see Sections 5.5 and 5.6). Additional information on lessons learned, implications, and issues that would need to be considered more fully in the design of future evaluations is summarized below and organized by components of the study design. This chapter is also informed by findings from a meeting with the study's Advisory Panel and representatives from FNS in which the study team presented the results of the pilot study and lessons learned and then facilitated a discussion on factors to consider for the design of future evaluations of WIC nutrition education.⁵⁷

6.1 Site Selection

Section 2.4 describes the procedures used to select the six sites for the pilot study. The original study design specified a systematic approach in which 80 sites would be assessed on a number of characteristics such as number and length of contacts and use of VENA or participant-centered education practices and each site rated as low, medium, and high, and two sites selected from each category. This systematic approach was designed to yield six sites that were very different in terms of the characteristics considered. However, time and study limitations necessitated selecting six State agencies with streamlined Institutional Review Board procedures and then selecting one site in each State. Sites were selected to provide variation in caseload, the inclusion of one rural site, and the inclusion of one site that had some Spanish-speaking participants. Additionally, selections were made to yield two sites that generally rated low, two sites rated as medium, and two sites rated as high for factors describing number and length of contacts, use of VENA/participant-centered education practices, and other characteristics.

The purposive approach used to select sites for the pilot study provided a mix of sites with varying characteristics; however, the six selected sites did not support the approach of using natural variation across sites to have comparison groups. Applying a systematic selection procedure as originally specified and selecting sites to include in the evaluation from a larger pool of sites than was done for the pilot (limited to a pool of about 12 sites) may have yielded greater diversity in the characteristics of interest (e.g., number of contacts and use of VENA/participant-centered practices).

It is noteworthy that although the sites selected were significantly different with regard to the characteristics of nutrition educators (e.g., percentage of educators who are a registered dietitian or licensed dietitian/nutritionist and mean years of WIC experience) and use of VENA/participant-centered education practices based on the site-level data collected in Phase II, these differences did not translate into observed effects on participant behaviors (see Exhibits 5-20 and 5-22 in Chapter 5). One explanation for this finding may be that there was little change in participant behaviors between the initial and final periods. And, in fact, the pilot study findings indicate that many variables showed little variation over time.

It is also important to note that the distribution of exposure based on participant self-report data (see Exhibit 5-4) was similar across sites. This finding highlights two important conclusions. First, it indicates that the classifications of high and low exposure based on site-level information do not agree with the classifications based on participant data. It was anticipated that the data examining the relationship between site and participant-level exposure would have shown that more participants in sites considered

⁵⁷ Appendix N provides a memo with a summary of the Advisory Panel meeting that was conducted in August 2017.

to be high-exposure sites reported high exposure based on duration, frequency, follow-ups, and reinforcers; this was not the case. Second, it indicates the classification of exposure at the site and participant levels involves some level of subjectivity. With respect to classification at the participant level, issues with measurement and problems with self-report have been discussed. With respect to classification at the site level, future evaluation efforts should consider clearly defined, a priori benchmarks for distinguishing high-performing sites from low-performing sites, develop objective measures to assess these benchmarks, and continue to monitor site performance to ensure that sites assigned to a particular category do not cross over. If responses to the Phase I Site Survey are used to select sites for future evaluations, then selected sites should be rescreened to ensure that the features of the site have not changed because nutrition education practices are not static. The pilot study found that sometimes the data reported in the 2014 Site Survey (collected in 2014 and 2015) were no longer accurate based on information collected in the POC Interviews conducted in 2015 through 2016.

6.2 Site-Level Data Collection

The site-level data collection comprised interviews with a site POC, a survey of nutrition educators, observations of nutrition education delivery, participant focus groups and interviews, and administrative data. As described in Chapter 3, these data sources, along with data from the Participants Surveys, were used to provide a detailed narrative describing the delivery of nutrition education in the six sites, highlighting the differences and similarities. Some of the data were also used in statistical modeling to assess the effect of site-level characteristics on participant behaviors.

As noted in Chapter 3, in some cases results from different data sources were consistent; for example, responses about nutrition education methods used on the Nutrition Educator Survey aligned with observations of these staff providing education to participants and data on experiences with nutrition education reported by participants in focus groups and interviews were consistent with practices observed at the sites for some features of nutrition education. However, in other cases, inconsistencies were found between different data sources; for example, the site-level information on number of nutrition education contacts obtained from administrative data and participant reports on number of contacts did not line up. Observation data pertaining to attributes of nutrition education associated with VENA or participant-centered education were often consistent within a site. Additionally, multiple counseling attributes or strategies associated with VENA or participant-centered education were often observed being used by the same nutrition educator. For example, nutrition educators who frequently use open-ended questions also use more affirmations of positive behaviors and individualized the education to the needs and interests of participants. These findings suggest that the site-level data collection could be streamlined, thus reducing the burden on sites.

Recommendations regarding site-level data collection for future evaluations are summarized below:

- Conduct interviews with the site POC over the course of the evaluation period because activities at the site may change over time. This information can be collected via an interview at the initial time period with follow-ups via a short online survey to collect information on site characteristics that may change over time (e.g., staff training).

- Conduct a Web-based survey of nutrition educators at each site. The survey should be limited to collecting information on nutrition educator qualifications and demographics and to gathering information on topics educators frequently discuss, reinforcers commonly used, referral resources available, and personal opinions about nutrition education delivery. To improve data quality and to reduce burden, data on nutrition education practices (e.g., approach to goal setting, use of participant-centered practices, number of minutes spent on nutrition education) should be collecting during onsite observations of nutrition education delivery.
- Conduct onsite observations of one-on-one and group nutrition education sessions and customize the length and timing of these visits based on the number of nutrition educators at the site, the modes used, and the scheduling approach used by the site.⁵⁸
- For the onsite observations of nutrition education, modify the data collection forms to streamline the data collection on attributes of nutrition education sessions and analysis for the onsite observations. Recommended attributes for observations include whether the participants' needs and interests determine the focus of the nutrition education discussion, the level of engagement of the participant in the goal-setting process, and if the nutrition education supports a positive approach with affirmations of participant strengths and positive behaviors. Attributes that can be omitted from observations include strategies for sharing education materials, asking permission before sharing unsolicited nutrition advice, and whether the seating arrangement facilitates conversation.
- For collection of qualitative information from participants, use interviews rather than focus groups because interviews would be less burdensome for participants and can be conducted at a lower cost than focus groups.

6.3 Study Populations

The inclusion criteria for the pilot study did not limit enrollment to participants who were receiving WIC benefits for the first time. The percentage of pilot study participants whose families had been receiving WIC benefits for less than 30 days (used as a proxy for the first time the family ever received WIC benefits) was 23% for the pregnant-at-enrollment group, 17% for the postpartum-at-enrollment group, and 4% for the caregiver-with-child enrollment group. Thus, many of the pilot study participants, particularly caregivers, had prior experience with WIC nutrition education, making it difficult to establish an optimal baseline of no exposure to WIC nutrition education. To address this limitation, future evaluations should enroll participants who are receiving WIC benefits for the first time and follow them longitudinally to assess the effect of WIC nutrition education on participant behaviors. Such an approach would establish a better baseline for the purpose of examining the effects of WIC nutrition education.

6.4 Research Questions, Outcome Measures, and Measurement

The pilot study sought to answer a large number of research questions: 13 questions for the process evaluation and 9 questions for the impact evaluation (with some questions addressing multiple items). Additionally, some of the research questions expressed very complex concepts that could not be easily translated into statistical models. To address the research questions for the impact evaluation, the pilot study included about 40 different outcome measures. The large number of outcome measures resulted in a

⁵⁸ The pilot study protocol specified one 16-hour onsite visit with two to three observations of each educator conducting one-on-one sessions and one to three observations of group sessions.

lengthy survey instrument (up to 37 minutes, instead of 15 minutes as intended in the study design), which may have contributed to the lower than anticipated cooperation rate and could lead to respondent fatigue and response error. For future evaluation studies, it will be important to prioritize and, perhaps, limit the number of research questions and corresponding outcome measures. The driving force of an evaluation is the research question; it is an expression of the problem of interest; it defines the target population; and it identifies the setting, the intervention, and the outcomes. However, presenting too many research questions can undermine the evaluation. First, a long list of research questions may suggest a lack of clarity of purpose if the research questions are too broad. Second, a long list of research questions and hypotheses can also threaten the validity of statistical conclusions (i.e., the trust we have in the observed associations). To support the claim of statistically significant results, evaluators need to take steps to limit potential criticism of capitalizing on chance association. That means controlling the nominal Type-I error rate (typically $\alpha = .05$) across the number of statistical tests conducted.

For each category of outcome measure included in the pilot study, Exhibit 4-26 provides a summary of the findings and recommendations to retain, modify, or remove each measure in future evaluations. Additional recommendations regarding outcome measures and their measurement are summarized below.

- More valid and reliable findings may result from including fewer outcomes using valid scales (i.e., multiple items) than from including many outcomes using fewer questions per outcome as was done for the pilot. For example, for self-efficacy it may be useful to use the recently developed and validated 8-item Self-Efficacy for Healthy Diet Scale (Simmonds et al., 2016) instead of asking separate questions about self-efficacy for fruit, vegetables, whole grains, low-fat milk, and sugar-sweetened beverages, as was done for the pilot.
- Most pilot study participants already exhibited the desired behavior for some outcome measures (enjoyment of foods, eating breakfast every day, limiting the number of times per week eat out, and limiting the number of times per week eat fast food). Because there is limited opportunity for change, these measures should be excluded from future evaluations.
- Consideration needs to be given to match the measured outcomes to the specific topics addressed (i.e., content) in the nutrition education offered by the sites included in the evaluation study. This matching of outcomes to topics may be challenging because WIC nutrition education is tailored to meet the needs of individual participants. Although attempted in the pilot study, the information collected was not specific enough; for example, information was collected on whether participants received information on “shopping for and preparing healthier foods” but not on whether participants received messaging on planning meals ahead of time and using the Nutrition Facts on food labels to choose foods, which were the two specific measures included in the study.
- It appears that completing Part 1 of the initial survey after the participant’s appointment (instead of before their appointment) did not have a priming effect on collection of self-reported behaviors. Thus, for future evaluations, completing all of the initial survey after the participant’s appointment may help facilitate the logistics of recruiting and enrolling participants into the study and help minimize burden on site staff and participants.

6.5 Research Design and Impact Analyses

As previously noted, impact evaluation requires a priori identification of a specific intervention and the application of that intervention to a sample of individuals with data collected contemporaneously on a similar group of individuals not exposed to the intervention (i.e., the control or comparison group). Because it was not possible to have a true comparison group due to Federal WIC regulations, an exposure-response design was used that attempted to capitalize on natural variation in nutrition education exposure across sites and individual-level variation in participants' exposure. The pilot study identified a number of limitations of an exposure-response design.

One limitation was that the use of Participant Surveys to collect information on nutrition education exposure for a 6-month retrospective history may not have yielded accurate information because of concerns about recall and problems with the question wording and skip patterns. Furthermore, analyses comparing responses for a sample of participants from the Participant Surveys with administrative data on the number of nutrition education contacts identified inconsistencies. Without a "gold standard" it is not known which data source is more accurate. To address the limitations of these data sources, electronic real-time data collection is recommended. The study team could work with sites to collect information from site staff on number and length of contacts in real time and use tablets or other electronic data collection at WIC sites to collect information from participants on other features of nutrition education, including participant satisfaction. Additionally, for future evaluations it may be useful to collect administrative data on the number of nutrition education contacts and other participant outcomes (e.g., food package redemption, body mass index, breastfeeding status) from all participants. The pilot study sites did not find it burdensome to provide administrative data, and most were able to access the required data electronically rather than manually.

A second limitation of the exposure-response design used for the pilot is that the exposure groups defined by the LCA model may not have truly differentiated levels of nutrition education. Results of the pilot make it clear that using exposure or dosage is highly problematic and not recommended. Without the ability to operationally define the type and amount of nutrition education provided, evaluators will be left with a post hoc approach such as the LCA that relies on summarizing observed behavior. The expression of dosage or exposure as a comparison leaves the findings of the pilot study's impact analyses open to plausible alternative explanations and the same would be true of a national study. Accordingly, a series of smaller, quasi-experimental studies that examine specific aspects of nutrition education or epidemiological evaluation approaches such as a longitudinal cohort design (Kelsey et al., 1996) should be considered instead of conducting an impact evaluation.

6.6 Enrollment and Data Collection Procedures for Participant Surveys

The pilot study demonstrated that it is feasible to recruit and enroll participants at WIC sites without interrupting or interfering with scheduled services at the sites and minimizing burden on WIC site staff. Early engagement of a POC at each site; ongoing communication with the POC during the enrollment period; the use of highly trained, skilled data collectors who are flexible to the needs of each site; and the offer of monetary incentives to participants were factors leading to successful study participant recruitment. The cooperation rate for enrollment and completion of the initial survey was 84%, which

slightly exceeded the target rate of 80%. Future evaluations should duplicate these engagement and study participant recruitment methods.

Data collection for the follow-up surveys provided information on expected cooperation rates for designing future evaluations. Based on the study team's experience conducting surveys of other low-income populations, the expected completion rate between the initial and final surveys was 75%; however, the actual rate for the pilot was 54%. It is not known to what extent drop out was due to attrition from WIC versus nonresponse to the survey. For future evaluations, enrolling twice as many participants may be necessary to ensure a sufficient number of completed surveys at follow-up using the same data collection procedures or the procedures should be modified to enhance cooperation and minimize attrition. Based on the results of the attrition analysis, future studies should oversample younger participants, participants with lower levels of education, and non-White participants to account for higher loss to follow-up among participants with these characteristics. For the pilot study, attrition over time among some of the WIC participant subgroups, particularly among women who were pregnant at the initial survey, limited the ability to model some measures of interest, reiterating the need to modify the data collection procedures to enhance cooperation.

The pilot study identified several refinements to the data collection procedures that may help increase response to the follow-up surveys:

- Use a recruitment model that employs site liaisons (such as has been used in the FNS WIC Infant and Toddler Feeding Practices Study [USDA, FNS, 2017]) to maintain relationships with participants over the course of the study or work with sites to request updated contact information for participants during the evaluation period (including information on participants who stop receiving WIC benefits), although consideration needs to be given to the additional burden on sites.
- Review the current literature to determine the optimal incentive structure for surveys of low-income populations, because new research may be available that was not available when the pilot study was designed over 5 years ago.
- Use technology for data collection given increased access to smartphones among the WIC population. Using a self-administered computerized survey will help improve data quality and may increase cooperation rates because Web-based surveys may be easier and more convenient to complete. For the initial survey, participants could self-administer the questionnaire using a tablet or laptop. For the follow-up surveys, participants could complete the surveys using Web-based data collection, for example, by having participants receive a text message with a URL to the survey to complete online (optimized for use on smartphones) or by providing them an application (app) that can be accessed on a smartphone or other electronic device. Additionally, an immediate feedback response loop and increased contact (texting, email) during the study period would help remind participants about upcoming surveys.

In conclusion, the results of the pilot study suggest that conducting a nationally representative impact evaluation of WIC nutrition education would present significant challenges as an approach for assessing the effectiveness of WIC nutrition education on participant behaviors. Other approaches, such as a series of smaller, quasi-experimental studies that examine specific aspects of nutrition education or epidemiological evaluation approaches such as a longitudinal cohort design, may be more suitable for

addressing some of the challenges associated with evaluating WIC nutrition education. This report discussed lessons learned and provided recommendations for addressing some of the challenges confronted in the pilot study to help study planners design future evaluations of WIC nutrition education.

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