

## 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;<sup>1</sup> 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,<sup>2</sup> 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.

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<sup>1</sup> Participants did not have to complete the interim survey to be eligible for the final survey.

<sup>2</sup> 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.<sup>3</sup>

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,

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<sup>3</sup> 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 <sup>a</sup>	1,836	1,355	2,923	5,748	3,268	1,882
Electronic benefits transfer for food benefit delivery	•		•		•	
Qualifications of Nutrition Educators <sup>b</sup>						
Professional	•	•	•	•	•	•
Paraprofessional	•		•		•	•
Secondary Education Modes (other than one-on-one, face-to-face) <sup>c</sup>						
% group	40%	<10% <sup>d</sup>	20%	<10% <sup>d</sup>	10%	10% <sup>d</sup>
% technology-based	40%		5%		40%	
% other					25%	70%
Number and Length of Nutrition Education Contacts						
Nutrition education contacts above average for certification period <sup>e</sup>		•		•		
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 <sup>f</sup>	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 <sup>g</sup>	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

<sup>a</sup> 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.

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

<sup>c</sup> 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.

<sup>d</sup> Breastfeeding groups only.

<sup>e</sup> 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.

<sup>f</sup> 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.

<sup>g</sup> 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.<sup>4</sup> The actual differences between the two exposure groups were quite modest: the high-exposure group reported approximately 17<sup>5</sup> 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.

<sup>4</sup> 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.

<sup>5</sup> 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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