



United States Department of Agriculture

*Supplemental Nutrition Assistance Program
Education and Evaluation Study (Wave II)*

*University of Kentucky Cooperative Extension
Service's Literacy, Eating, and Activity for
Primary Youth Health (LEAP2) Program*

Volume I: Report

Nutrition Assistance Program Report
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Supplemental Nutrition Assistance Program Education and Evaluation Study (Wave II)

University of Kentucky Cooperative Extension Service's Literacy, Eating, and Activity for Primary Youth Health (LEAP2) Program Volume I: Report

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Table of Contents

Executive Summary	i
A. Background on SNAP-Ed	ii
B. Overview of the LEAP2 Program	ii
C. Study Methodology	iv
D. Process Evaluation Findings.....	vi
E. Impact Evaluation Findings.....	viii
F. Findings From the Assessment of LEAP2 Self-Evaluation	ix
G. Recommendations.....	x
Chapter I • Introduction	1
A. Selection of Wave II Demonstration Projects.....	2
B. Overview of the LEAP2 Program	3
C. Organization of the Report	5
Chapter II • Process Evaluation Methods and Results	6
A. Process Evaluation Methods.....	6
B. Program Development and Design.....	9
C. How the Demonstration Project Was Implemented	12
D. Factors Affecting Program Implementation and Opportunities for Improvement.....	23
Chapter III • Impact Evaluation Methods and Results	41
A. Conceptual Framework for the Impact Evaluation	41
B. Methodology	42
C. Impact Analysis Results	47
Chapter IV • Assessment of UKCES’ Self-Evaluation	55
A. Methodology	55
B. Description of UKCES’ Self-Evaluation	56
C. Assessment of the Quality of UKCES’ Self-Evaluation.....	62
D. Comparison of Evaluation Methods and Results for the UKCES and Independent Evaluations	64
E. Lessons Learned	71
Chapter V • Conclusions and Discussion	77
A. Key Process Evaluation Findings: Factors Supporting Implementation	77
B. Key Process Evaluation Findings: Challenges to Implementation	78
C. Key Impact Evaluation Findings.....	78
D. Key Findings from the Assessment of UKCES’ Self-Evaluation	79
E. Recommendations.....	79
F. Key Areas for Program Improvement	80
G. Suggestions for Improving Evaluations.....	81

List of Exhibits • Figures • Tables

List of Exhibits

Exhibit I-1. Research Questions	2
Exhibit I-2. Scoring Criteria Used for Demonstration Project Selection	3
Exhibit II-1. Secondary Data Collected for the Process Evaluation of the LEAP2 Demonstration Project	7
Exhibit II-2. LEAP2 Respondent Types, Data Collection Methods, and Number of Respondents	8
Exhibit II-3. Summary of UKCES LEAP2 Learning Objectives and Suggested Activities, by Lesson.....	11
Exhibit II-4. Planned Implementation Timeline for the LEAP2 Program Intervention.....	12
Exhibit II-5. Summary of LEAP2 Project Staff Roles and Responsibilities.....	13
Exhibit II-6. Key Facilitators and Challenges to LEAP2 Implementation.....	24
Exhibit III-1. Primary and Secondary Outcome Measures for the LEAP2 Program Impact Evaluation	44
Exhibit III-2. Summary of Instruments Used to Develop Impact Instruments for the LEAP2 Impact Evaluation.....	45
Exhibit IV-1. Description and Use of Data Sources for the Assessment of UKCES' Self-Evaluation.....	56
Exhibit IV-2. Objectives for the UKCES LEAP2 Program	57
Exhibit IV-3. Instruments and/or Measures for UKCES' Self-Evaluation	59
Exhibit IV-4. Summary of Strengths and Weaknesses of UKCES' Self-Evaluation.....	64
Exhibit IV-5. Comparison of Study Designs for the UKCES and Independent Evaluations.....	66

List of Figures

Figure ES-1. LEAP2 Program Components.....	iii
Figure ES-2. Conceptual Framework for the LEAP2 Program Impact Evaluation.....	v
Figure ES-3. Changes in Daily At-Home Consumption of Fruits and Vegetables ($p = 0.6071$)	viii
Figure ES-4. Changes in Availability of Fruits and Vegetables in the Home ($p = 0.0393$)	ix
Figure II-1. Percentage of Parents Who Reported Reading the LEAP2 Newsletters.....	19
Figure II-2. Percentage of Parents Who Reported Using Recipes to Make a Snack or Meal for Their Child.....	19
Figure II-3. Percentages of Parents Who Reported That Their Child Mentioned That the Book Was Read at School.....	20
Figure II-4. Teachers' Perception of the Effectiveness of the Extension Educator in Teaching the LEAP2 Lessons.....	25
Figure II-5. Percentage of Parents Who Reported That Their Child Mentioned the Food Tasting at School	28
Figure II-6. Parents' Level of Understanding of the Newsletters Sent Home	30
Figure II-7. Parents' Perception of the Usefulness of the LEAP2 Newsletters in Helping Their Child Eat Healthier Foods	31
Figure II-8. Teachers' Responses to the Question, "Were you able to complete the daily fruit and vegetable calendar with your students?"	34
Figure III-1. Conceptual Framework for the LEAP2 Program Impact Evaluation.....	42
Figure III-2. Baseline Distribution of Cups of Fruit Consumed at Home by Children Who Participated in the LEAP2 Program, by Condition.....	49
Figure III-3. Baseline Distribution of Cups of Vegetables Consumed at Home by Children Who Participated in the LEAP2 Program, by Condition	50

List of Tables

Table II-1.	LEAP2 Program Reach	17
Table II-2.	Summary of UKCES Costs Associated With LEAP2 Program Development	21
Table II-3.	Summary of Costs for Implementation of LEAP2 Program	22
Table II-4.	Costs per Child and per Classroom for the LEAP2 Program.....	23
Table III-1.	Baseline Demographic Characteristics for Parent Respondents and Their Children Who Participated in the LEAP2 Program Evaluation Study, by Condition.....	48
Table III-2.	Child’s Dietary Intake: Primary Impacts for the Evaluation of the LEAP2 Program	52
Table III-3.	Child’s Other Dietary Behaviors: Secondary Impacts for the Evaluation of the LEAP2 Program	53
Table III-4.	Parent Offerings and Fruit and Vegetable Availability in Households: Secondary Impacts for the Evaluation of the LEAP2 Program.....	54
Table IV-1.	Summary of UKCES Costs for Evaluation of LEAP2 (FY 2012)	62
Table IV-2.	Assessment Scores for UKCES’ Self-Evaluation.....	63
Table IV-3.	Results for UKCES Photographic Assessments: Average Fruit and Vegetable Servings Consumed	67
Table IV-4.	Results for Daily Fruit and Vegetable Calendars: Reported Weekly Fruits and Vegetables Consumed	67
Table IV-5.	Comparison of Results for the Independent Evaluation and the UKCES Self-Evaluation.....	70

List of Appendices (available in Volume II at www.fns.usda.gov)

- Appendix A. Process Evaluation Data Collection Instruments
- Appendix B. Process Evaluation Data and Supplemental Information
- Appendix C. Participant Survey Instruments
- Appendix D. Parent Survey Supplemental Materials
- Appendix E. Impact Evaluation Methodological Analyses
- Appendix F. Instruments for Assessment of Demonstration Project’s Evaluation
- Appendix G. Process Evaluation Methodology
- Appendix H. Impact Evaluation Methodology
- Appendix I. Methodology for Assessment of the Demonstration Project’s Evaluation
- Appendix J. References

Executive Summary

This executive summary presents the background, methods, and highlights key findings from one of three case study reports produced for the *Models of SNAP Education and Evaluation, Wave II*. This report is specific to the evaluation of the Literacy, Eating, and Activity for Primary Youth Health (LEAP2) program of University of Kentucky's Cooperative Extension Service (UKCES) Supplemental Nutrition Assistance Program-Education (SNAP-Ed) demonstration project. The evaluation, which was sponsored by the Food and Nutrition Service (FNS) of the U.S. Department of Agriculture (USDA), included three components: a process evaluation of the program's implementation, an evaluation of the program's impact on nutrition behaviors, and an assessment of the methods and results of UKCES' evaluation of its program.

The LEAP2 program, which targets children in the first, second, and third grades, highlights lessons featuring children's storybooks. The program is delivered in a school setting and aims to increase children's knowledge and consumption of fruits and vegetables and increase physical activity. The focus of the FNS evaluation was on changes in at-home fruit and vegetable consumption.

Based on models describing changes over time between the intervention and control groups, there is no indication that the LEAP2 program had a statistically significant impact on children's average daily at-home consumption of fruits and vegetables based on parental reports. There was, however, a statistically significant impact on availability of fruits and vegetables among households with children exposed to the LEAP2 program compared with those not exposed to the program. This availability, if sustained, holds the potential to lead to increased fruit and vegetable consumption, although we did not see evidence of that at this point.

UKCES' own evaluation reported that intervention students ate more fruits and vegetables than the control students based on self-reported data from daily fruit and vegetable recall calendars, where students circled the number of fruits and/or vegetables they had eaten the prior day (whether in the school or at home). In contrast, UKCES' evaluation data from the subset of four schools where the school lunch consumption photographic assessment was completed did not demonstrate a significant difference between groups in fruit and vegetable consumption. Because the school lunch consumption photographic assessment findings are based on only a small subset of the schools and not representative of all schools in the study, it is possible that consumption at lunch increased (but evidence for it did not emerge in this subsample) but did not translate into changes outside of the school setting (as shown in the independent evaluation). However, it is also possible that the LEAP2 program helped students become more aware of their consumption of fruits and vegetables, and awareness can be an important step toward increasing consumption.

The process evaluation revealed a high degree of satisfaction with the program by teachers, principals, parents, and caregivers. These stakeholders, as well as program staff members, attribute this to the relevance of the nutrition education messages, the quality of the program materials, and the caliber of the UKCES direct educators. The process evaluation revealed several challenges related to implementation and opportunities for improvement. Most notable, perhaps, is the need to enhance the awareness and engagement of parents and caregivers in LEAP2 activities.

A. Background on SNAP-Ed

Under subcontract agreements with State SNAP agencies, a variety of organizations partner to implement SNAP-Ed within States. The goal of these programs is to improve the likelihood that SNAP participants and persons eligible for SNAP nutrition assistance will make healthy food choices within a limited budget and choose physically active lifestyles. FNS' SNAP-Ed Guiding Principles call for interventions that are evidence-based and behaviorally focused. FNS also requests that States' SNAP-Ed efforts be consistent with the current (2010) Dietary Guidelines for Americans, including the following¹:

- Eat fruits and vegetables, whole grains, and fat-free or low-fat milk products every day;
- Be physically active every day as part of a healthy lifestyle; and
- Balance caloric intake from food and beverages with calories expended.

SNAP-Ed Guidance also encourages all States to evaluate the effectiveness of their SNAP-Ed interventions. These can include formative, process, outcome, and impact evaluations. In Federal Fiscal Year (FY) 2004, 74 percent of SNAP-Ed implementing agencies (IA) reported that they did conduct outcome evaluations on at least some aspects of services. However, based on interviews with 17 IAs, these evaluations were focused to a greater extent on process outcomes, such as program use, than on participant behavior change (FNS, 2006). SNAP-Ed is one of the largest Federal funding sources for nutrition education, so FNS, States, and local IAs have a significant stake in ensuring that SNAP-Ed meets FNS' goals.

This study, *Models of SNAP Education and Evaluation, Wave II*, is the second of two FNS-initiated independent evaluations designed to identify potential models of effective SNAP-Ed nutrition education and impact evaluation. The overarching goal of this evaluation is to determine whether the selected projects can serve as good examples of effective nutrition education and promotion activities within SNAP-Ed by meeting the following criteria:

- ▲ Positively affecting the nutrition and health behaviors of SNAP clients while adhering to FNS SNAP-Ed Guiding Principles,
- ▲ Exhibiting the potential to serve as models of effective nutrition intervention for large segments of the SNAP audience that can be replicated by other IAs, and
- ▲ Providing methodologically robust yet logistically practical examples of project-level SNAP-Ed evaluation efforts.

FNS also sought to understand the factors influencing the implementation of these nutrition education programs and lessons learned from these projects' experiences. In December 2009, an FNS study review committee competitively selected three SNAP-Ed IAs to participate in this study, including UKCES' LEAP2 program. All three agencies implemented their demonstration programs between November and May 2012 and conducted their own evaluations.

B. Overview of the LEAP2 Program

The principal goal of the LEAP2 Program is to increase consumption of fruits and vegetables among primary school-age children in the first, second, and third grades. The LEAP2 program is an expansion

¹ See the SNAP-Ed Plan Guidance at <http://www.nal.usda.gov/fns/Guidance/FY2012SNAP-EdGuidance.pdf> and the SNAP-Ed Connections Web site at <http://snap.nal.usda.gov>.

of the popular Literacy, Eating, and Activity for Preschool Youth Health (LEAP) program, which was developed in 2004 through a collaboration of partners including the Kentucky Department of Education, the Kentucky Cabinet for Health and Family Services, and UKCES. The LEAP program was developed to address three risk factors among preschool youth in Kentucky: low education levels, low consumption of fruits and vegetables, and physical inactivity. The program was extremely popular with preschoolers, and a curriculum appropriate for primary grades was requested by teachers and Family and Consumer Sciences extension agents. In 2008, the LEAP program was modified to include 12 lessons designed for students in primary school (LEAP2). The intervention evaluated for this demonstration project consisted of 8 of the 12 LEAP2 lessons that were focused on fruit and vegetable consumption.

The two project-level goals of the LEAP2 program follow:

- Increase primary students' willingness to try fruits and vegetables.
- Increase primary students' consumption of fruits and vegetables.

To achieve these goals, the LEAP2 program targets students through the program's classroom components and parents and caregivers through a take-home newsletter that is designed to increase their involvement in supporting fruit and vegetables consumption. The LEAP2 program is based on Social cognitive theory, which acknowledges the influence of environment and personal experience to explain learning. Social cognitive theory asserts that humans learn behaviors through observation, modeling, and motivations such as positive reinforcement (Bandura, 1986). The LEAP2 program uses storybooks depicting positive experiences with fruits and vegetables as well as tasting and other reinforcing activities to impact student's intake of fruits and vegetables. The use of stories to model behavior has been shown to enhance fruit and vegetable consumption (Byrne & Nitze, 2002).

The program includes three components (see Figure ES-1).

Figure ES-1. LEAP2 Program Components

- **Eight direct education lessons delivered in the classroom setting.** Eight 30-minute weekly classroom lessons based on children's storybooks are taught by UKCES county-based Nutrition Education Program (NEP) assistants. Each lesson includes three components: a storybook reading, a reinforcing physical activity, and a recipe tasting featuring fruits and/or vegetables. Throughout the lesson, educators use discussion questions to engage the children and reinforce the LEAP2 messages.
 - **Daily fruit and vegetable recall calendar.** Children participating in the intervention complete a daily log to record the number of fruits and vegetables that they consumed on the previous day. The fruit and vegetable calendar activity is facilitated daily by the classroom teacher and designed to focus students' attention on their fruit and vegetable intake.
 - **Indirect education provided through take-home materials.** A parent newsletter is sent home with each child following the lesson. The LEAP2 newsletter contains information for parents and caregivers that is relevant to the key messages of each lesson. The newsletter is designed to help parents and caregivers support messages received by children during the classroom lessons and to help parents and caregivers increase at home offerings and consumption of fruits and vegetables.
-

C. Study Methodology

1. Evaluation Design

The LEAP2 program evaluation was designed to examine the implementation and impact of the program in schools in Laurel and Perry Counties, KY. The evaluation included eight matched pairs of schools. Schools were matched within county on school size (number of anticipated first- through third-grade students) and percentage of students receiving free and reduced-price meals. Eight schools received the LEAP2 program and were included in both the impact and process evaluations. The eight schools in the control group did not receive the intervention but did receive four LEAP2 lessons on topics other than fruits and vegetables (e.g., food safety, healthy bones and teeth). The intervention was conducted from November 2011 to February 2012. Baseline data were collected prior to the start of the intervention in September and October 2011, and follow-up data were collected after the intervention was concluded (February–March 2012).

2. Process Evaluation Methods

The LEAP2 process evaluation began by creating a baseline description of the objectives, approach, and components of the design, administration, and implementation of the program. This information was obtained from interviews with program-level staff members and from secondary documents.² Once the intervention was implemented, information on factors influencing the implementation and the lessons learned for program improvement and replicability was collected through interviews with program-level staff, direct educators who taught LEAP2, teachers, and principals. To supplement the interviews, onsite observations of direct education at four schools were conducted to assess how well direct educators followed the curriculum and to document any environmental factors that may have supported or impeded program implementation.

Another important component of the process evaluation was the assessment of the experience and satisfaction of the parents and caregivers with the intervention. Information was collected on factors such as program awareness, perceived goals of the program, ways in which the program helped them change their children's nutrition behaviors, and potential barriers faced in trying to increase fruit and vegetable intake. These data were collected through a post-intervention parent survey and focus groups with a subset of parents and caregivers who responded to the survey.

Program administrative data were used to assess the project's reach and the amount of exposure that children had to the LEAP2 intervention. Through the process evaluation, the resources and costs that UCKES reported for implementation and evaluation of the LEAP2 demonstration program were also determined. From the implementation costs and reach data, the study also estimates the program's cost per child participant.

The analysis approach for the process evaluation was primarily qualitative, encompassing the triangulation of information collected from secondary data sources, interviews with key informants, and parent and caregiver focus groups. Key-informant responses to each interview or questionnaire item were compiled into a master Microsoft Word 2007 document and organized by broad process evaluation research questions and process indicators. This approach helped to organize the extensive amount of information that was available and allowed for the identification of broad themes (e.g., implementation

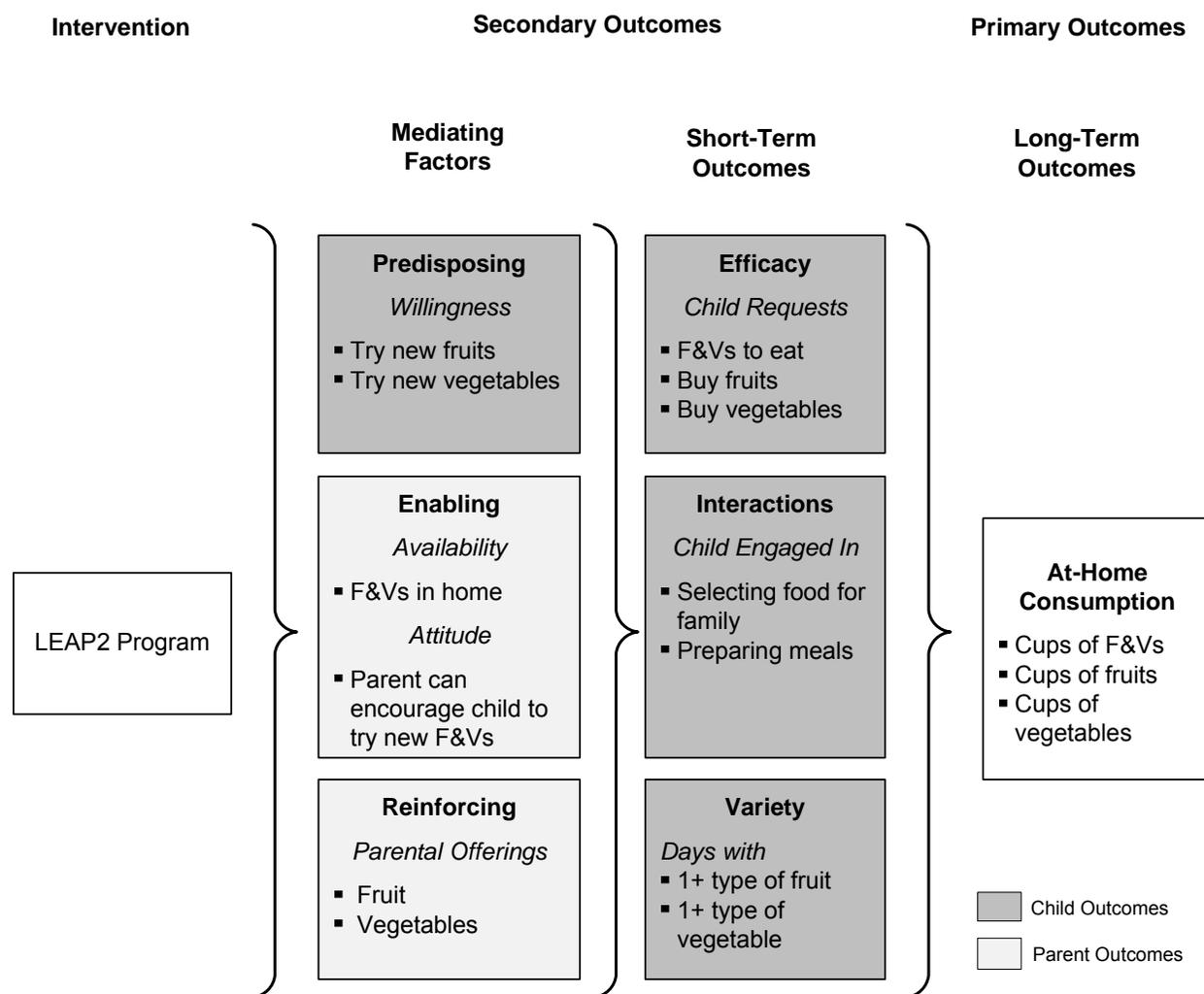
² Documents included UKCES' application to FNS for this study, UKCES program reports, and the LEAP2 curriculum.

facilitators and challenges) and specific topics (e.g., lesson plan scheduling) as well as agreement and disagreement amongst respondents. Quantitative analysis was conducted on program reach, dosage, cost, and the parent follow-up survey responses.

3. Impact Evaluation Methods

To better understand the factors affecting behavioral change, the analysis included an examination of potential program effects. The framework shown in Figure ES-2 enabled the evaluation of the effects of the LEAP2 program through the specification of secondary outcomes that link the intervention to the long-term outcome of the child's average daily at-home consumption of fruits and vegetables. The secondary outcomes capture in greater detail some of the complexity of the behavior change process. The greater the number and strength of the changes seen among the secondary outcomes, the greater the likelihood of observing change in fruit and vegetable consumption.

Figure ES-2. Conceptual Framework for the LEAP2 Program Impact Evaluation



Source: Green, L. W., Kreuter, M. W., Deeds, S. G., & Partridge, K. B. (1980). *Health education planning: A diagnostic approach*. Palo Alto, CA: Mayfield Publishing Co.

The independent evaluators assessed the impact of the program on the primary measure of children’s average daily at-home consumption of fruits and vegetables. Based on FNS’ interest in observing a minimum increase in children’s dietary intake of 0.30 standard deviation units, it was hypothesized that children participating in the program would increase their average daily at-home consumption of fruits and vegetables combined by approximately 0.30 cups per day compared with children not participating in the program (see Appendix H for more details on sample size estimation).

The impact analysis considered the following secondary outcome measures:

- ▲ Variety—eating more than one type of fruit and vegetable each day,
- ▲ Willingness—willingness to try new fruits and vegetables,
- ▲ Choosing healthy foods—asking a parent to buy certain fruits or vegetables,
- ▲ Meal preparation—selecting foods or helping to prepare meals for the family,
- ▲ Availability—average weekly at-home availability of fruits and vegetables, and
- ▲ Parental offerings at home—frequency of parental offerings of fruits or vegetables as a snack and at dinner.

Parents and caregivers were surveyed at baseline and follow-up to collect information on children’s at-home consumption and other dietary behaviors. Mail and telephone surveys were used to collect the baseline data (the response rates were 78 percent for the intervention group and 77 percent for the control group among those agreeing to participate in the study) and follow-up data (the response rates were 83 percent for the intervention group and 86 percent for the control group). The potential impact of attrition from the evaluation study on generalizability of the impact analysis findings was assessed by comparing the pre-intervention similarity of study participants who provided follow-up data with those who did not. There were differences between the two groups with regard to respondent age and race and/or ethnicity.

General linear mixed models (continuous impact variables) and generalized linear mixed models (dichotomous impact variables) were used to evaluate the impact of the program while accounting for the clustering of children within schools. These models were estimated via difference-in-difference estimates of program effect, comparing change across time (baseline and follow-up) in the intervention group with change across time in the control group. Covariates in the model included child age, child sex, household size, respondent race and/or ethnicity, respondent age, and respondent sex.

4. Methods for the Assessment of UKCES’ Self-Evaluation

This study also examined the soundness of UKCES’ self-evaluation. This assessment included a detailed description of UKCES’ evaluation methodology, including the management, staffing, and costs of the evaluation; an assessment of the quality of UKCES’ evaluation; an identification of strengths, weaknesses, and areas for improvement; and a comparison of UKCES’ evaluation results with those of the independent impact evaluation.

D. Process Evaluation Findings

During the intervention period, a total of 42 first-, second-, and third-grade classrooms across eight schools in two Appalachian counties in Kentucky received the LEAP2 program. LEAP2 was implemented between November 1, 2011, and February 3, 2012, and reached 889 children. The mean

intervention classroom size across both counties, derived from program administrative data, was approximately 20 students. From this potential reach, we estimate that it cost \$30.96 per participant to implement the LEAP2 program. Analysis of the LEAP2 program data also shows that on average, children in the intervention classrooms received a total of 240 minutes of nutrition education through the LEAP2 program (classroom lessons were 30 minutes each). There was some additional reinforcement of messages by classroom teachers outside of the classroom time.

1. Key-Informant Perspectives on Program Implementation

Overall, program administrators, direct educators, teachers, and principals involved with the LEAP2 demonstration project reported that many factors in the program’s design make it a highly relevant and enjoyable program to implement with the selected target audience. Program administrators, educators, parents, caregivers, and school staff noted that the LEAP2 program reinforced learning in multiple ways and that the passion and quality of the direct educators, the NEP assistants, were instrumental in engaging the children. The most commonly reported facilitators to program implementation were the fun and experiential nature of the program, the ease of the curriculum and facilitator’s guides, and the strong relationship between the schools and the UKCES program staff in the two counties.

At the same time, interviews with key stakeholders and onsite observations of the LEAP2 lessons in a sample of the intervention schools identified several challenges to implementing this program. The most commonly reported barriers to program implementation were parent and caregiver awareness and engagement in the program, the implementation timeframe (e.g., disruption of class schedule by winter holidays and school closings), completion of the daily fruit and vegetable calendars in the classrooms as planned, and the training provided to the direct educators and teachers prior to the intervention.

2. Parent and Caregiver Satisfaction and Use of Program Materials

Overall, there was a relatively limited awareness of the program by parents and caregivers. Only 7 percent of parents and caregivers surveyed reported receiving all eight newsletters, with the majority of parents reporting receiving between one and four newsletters. Less than half of parents and caregivers reported that their child mentioned either a particular book or the food tasting components of the LEAP2 program.

Those participants who were aware of the in-school program, however, reported a high level of satisfaction with the program. Of the parents and caregivers that received a newsletter, 92 percent said that it was “easy” or “very easy” to read. Seventy-one percent of surveyed parents and caregivers “agreed” or “agreed strongly” with the statement, “I used information from the newsletters to help my child eat healthier meals.” Parents and caregivers participating in the focus groups reported a high level of satisfaction with the goals of the program and thought LEAP2 messages were very relevant to the needs of their children. When asked about their children’s reaction to the program, the two most common responses noted by parents and caregivers in the focus groups were that children were asking for new and different fruits and vegetables and were less picky about trying new foods. Parents and caregivers cited willingness to try new foods as one of the primary benefits of the LEAP2 program for them.

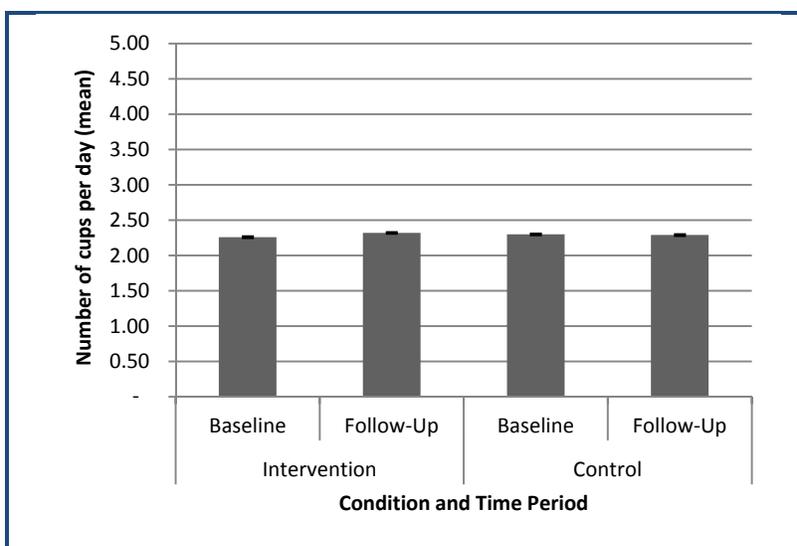
E. Impact Evaluation Findings

1. Primary Impact Results

The baseline analysis included 849 parent and caregiver respondents: 450 for the intervention group (parents and caregivers of children attending eight schools) and 399 for the control group (parents and caregivers of children attending eight schools). At baseline, the demographic characteristics of children and their parent and caregiver respondents and households were similar for the intervention and control groups, although a significantly greater proportion of households in the intervention group had at least one member currently receiving the Special Supplemental Nutrition Program for Women, Infants, and Children benefits compared with the control group. In addition, households in the control group reported greater availability of fruits and vegetables at baseline compared with the intervention group.

Based on the results of the impact analysis, one cannot conclude that the LEAP2 program had a statistically significant impact on children's daily at-home consumption of fruits and vegetables (see Figure ES-3). Despite small increases in the mean number of cups of fruits consumed at home each day among children in the intervention group, there was little evidence to support the assumption that changes in consumption were related to the program. Children's daily at-home vegetable consumption did

Figure ES-3. Changes in Daily At-Home Consumption of Fruits and Vegetables ($p = 0.6071$)



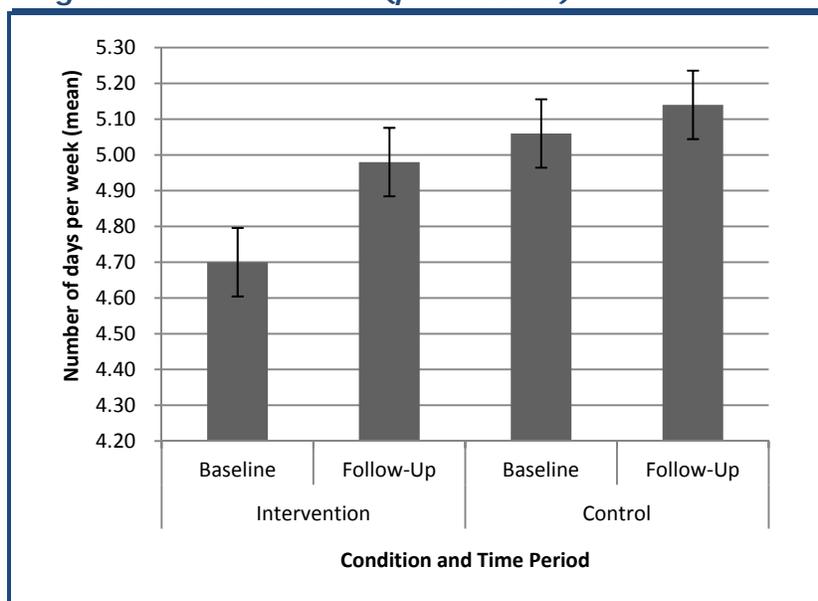
not change for the intervention group and the control group saw a small, non-significant decrease over the study period (see the full report for details). The lack of statistically significant findings may have been influenced by ceiling effects that limited the ability to detect significant changes. As reported by parents and caregivers, children's combined fruit and vegetable consumption in the home at baseline was quite close to USDA's Food Guidance System recommendations for this age group (2.26 cups for the intervention group and 2.30 cups for the control group).³ This may suggest that there was less room to improve children's diets than was initially anticipated. Alternatively, it may be that parents and caregivers expressed an upward bias (e.g., social desirability) in reporting their children's diet. Either of these would have limited the ability to detect self-reported changes.

³ USDA's Food Guidance System recommends that children aged 2–5 years eat about 1–2 cups of vegetables each day and 1–1.5 cups of fruit each day, depending on the child's gender and activity level (USDA, 2011).

2. Secondary Impact Results

The LEAP2 program had a statistically significant impact on the household availability of fruits and vegetables (see Figure ES-4). Household availability is one factor expected to enable increased at-home fruit and vegetable consumption (Cullen et al., 2003). There were no observed impacts of the LEAP2 program on children's other dietary behaviors, parents' and caregivers' behaviors, or other household variables. Although there were small increases in most secondary outcomes, the differences in the changes between the two groups were not statistically significant.

Figure ES-4. Changes in Availability of Fruits and Vegetables in the Home ($p = 0.0393$)



F. Findings From the Assessment of LEAP2 Self-Evaluation

The UKCES evaluation used the same experimental design as the independent evaluation. Strengths of UKCES' evaluation included the use of a viable comparison strategy and the use of an observed measure of fruit and vegetable consumption, in addition to self-reported measures, namely the school lunch consumption photographic assessment; and the collection of data on intervention dosage, which served as a measure of intervention implementation that provides greater confidence in program results and feedback for improving the program. Weaknesses included the procedure of having control school children complete daily fruit and vegetable calendars, which could have attenuated the difference between the intervention and the control groups, because the control group was exposed to one aspect of the intervention; not taking into account the clustering of individuals within schools in all data analyses; and limiting the school lunch consumption photographic assessment subsample to only two schools per county (one intervention and one control).

UKCES reported that students at intervention schools ate more fruits and vegetables than students at the control schools based on self-reported student data from the daily fruit and vegetable calendars. However, data from the subset of schools where the school lunch consumption photographic assessment was completed did not demonstrate a significant difference in fruit and vegetable consumption between intervention and control students. The UKCES evaluation report concluded that perhaps the increased consumption took place outside of the school setting, as self-reports included consumption throughout the day, not just during school lunch. However, the independent evaluation did not show an impact in parents' and caregivers' reports of their child's consumption of fruit and vegetables at home.

Based on lessons learned through their evaluation of the LEAP2 program, UKCES will continue to improve upon its current evaluation methods for the LEAP2 program and reported that this project has revealed an overall need to improve the evaluation capacity of the cooperative extension service as a

whole and the importance of partnering with experienced evaluators early in the program planning process. UKCES intends to maintain the daily fruit and vegetable calendar as a learning activity with more comprehensive training for teachers but will test using a validated tool administered by the NEP assistants at multiple points during the intervention to measure changes in consumption. Based on feedback from the NEP assistants, UKCES also plans to expand the number of storybooks and corresponding lessons to include multiple choices appropriate for different age levels and classroom situations.

G. Recommendations

Based on the findings from the independent evaluation, the LEAP2 intervention did not result in a measurable increase in daily at-home consumption of fruits and vegetables. There was, however, a statistically significant impact on availability of fruits and vegetables among households with children exposed to the LEAP2 program compared with those not exposed to the program. Additionally, LEAP2 program staff and school administrators reported that LEAP2 program implementation went very well and was relatively easy and straightforward, while teachers as well as parents and caregivers of children receiving the intervention reported high satisfaction with the program overall. For these reasons, with the improvements described below, the LEAP2 program could serve as a potentially promising example of SNAP nutrition education in the primary school setting.

▲ Key Areas for Program Improvement

Overall, input from program staff, school staff, parents and caregivers suggests that revisions could further enhance the effectiveness of the LEAP2 program. The process evaluation findings suggest the following recommendations for program improvement:

- **Maximize parent and caregiver awareness and knowledge about the LEAP2 program to encourage involvement.** To increase the awareness of parents and caregivers about the LEAP2 program, stakeholders suggested holding an introductory session or event for parents and caregivers to explain the program and to suggest ways that parents and caregivers can increase the offering of fruits and vegetables in the home environment. During the intervention, offering a cooking class to share creative and easy recipe ideas may sustain parent and caregiver involvement in the program. An online resource, such as a Web site, was another suggestion offered by parents and caregivers to increase their involvement in the program and use of LEAP2 messages with their children.
- **Provide clear guidance to the teachers on completion of the daily fruit and vegetable calendar.** During interviews, program administrators shared plans to continue using the fruit and vegetable calendar as a teaching tool. Several teachers reported that if they were provided with more guidance on completing the calendar, they may have completed it more frequently. Due to the challenge of getting in-service time for teachers, they could instead be provided with a handout explaining how to introduce the calendar with children along with additional support or instruction from the NEP assistants. One program administrator shared that more thorough fidelity checks during the intervention would offer the opportunity to identify any issues and correct them early in the intervention.
- **Add an interactive component to the training for direct educators.** NEP assistants and county extension agents suggested a more ideal preparation for implementing the LEAP2 program which would include an interactive component to allow NEP assistants to practice with the material and the lessons prior to teaching in the classrooms. They also suggested engaging an educator that had taught the lessons previously to demonstrate successful strategies for implementing the LEAP2

lessons in the classroom. Another suggestion offered by NEP assistants and teachers was adding some content about classroom management for all direct educators.

Some of these suggested program improvements would require additional resources and may not be feasible for LEAP2 to implement. However, adopting one or more of these recommendations could improve program implementation and give the LEAP2 program an increased potential to impact behavior change.

▲ **Suggestions for Improving Evaluations**

Based on the independent contractor's assessment of UKCES' self-evaluation, there is room for improving the evaluation particularly related to designing the data collection approach and conducting data analyses:

- **Designing the data collection approach.** Future evaluations would benefit from having only the intervention group students complete the daily fruit and vegetable calendars, rather than all students. Completion of the calendars serves as a self-monitoring tool, provides education on behaviors, and may facilitate behavior change, which is not an ideal activity for control group students, who should not receive any intervention. Instead of using the calendars as a measurement tool, UKCES should use another published measure that has been validated with children in this age range. With the calendars, it is unclear exactly what the number of fruits and vegetables means; the cognitive ability of children in this age range to recall and count prior consumption is also a concern. The school lunch consumption photographic assessment should be administered in as many of the schools as feasible in order to avoid design effects, even if this requires limiting the data collection to only a pretest and an immediate posttest.
- **Conducting data analyses.** The assessment of UKCES' evaluation identified several areas where the data analysis approach could be improved:
 - Using statistical techniques to control for group differences in baseline levels of consumption of fruits and vegetables,
 - Collecting demographic data at the individual level and using them in statistical analyses to determine whether there were differences between attriters and completers on key outcome variables, and
 - Employing a mixed-modeling approach that accounts for potential correlation among individuals within the same school for all analyses.

Chapter I • Introduction

Nutrition education is an optional component of the Supplemental Nutrition Assistance Program (SNAP) known as SNAP-Education or SNAP-Ed. The goal of SNAP-Ed is to improve the likelihood that SNAP participants and persons eligible for SNAP will make healthy food choices within a limited budget and choose physically active lifestyles consistent with the current (2010) Dietary Guidelines for Americans (U.S. Department of Agriculture (USDA), Center for Nutrition Policy and Promotion, 2011).

The USDA Food and Nutrition Service's (FNS) official SNAP-Ed Guidance not only provides information to help States in designing and implementing SNAP-Ed programs but also specifically encourages States to evaluate the effectiveness of their SNAP-Ed programs (FNS, 2012). In fiscal year (FY) 2004, 74 percent of SNAP-Ed implementing agencies (IA) reported that they conducted outcome evaluations on at least some aspects of services. However, based on interviews with 17 IAs, these evaluations were focused to a greater extent on program use than they were on participant behavior change (FNS, 2006). As one of the largest Federal funding sources for nutrition education, FNS, States, and local IAs have a significant stake in ensuring that SNAP-Ed nutrition education meets FNS' goals.

This study, *Models of SNAP Education and Evaluation (Wave II)*, is the second of two FNS-initiated independent evaluations designed to identify models of effective SNAP-Ed nutrition education and models for SNAP-Ed impact evaluation. The overarching goal of this evaluation is to determine whether the selected projects can serve as good examples of SNAP-Ed delivery by meeting the following criteria:

- Positively affecting the nutrition and health behaviors of SNAP participants while adhering to FNS SNAP-Ed Guiding Principles,
- Exhibiting the potential to serve as models of effective nutrition intervention for large segments of the SNAP audience while requiring levels of resources that are manageable by a large percentage of SNAP-Ed IAs, and
- Providing methodologically robust yet logistically practical examples of project-level SNAP-Ed evaluation efforts.

To accomplish the study goal, three complementary types of assessments were conducted: a process evaluation, an impact evaluation, and an assessment of the demonstration project's own outcome or impact evaluation. Exhibit I-1 lists the broad research questions framing the design and the measures used in each component of the evaluation.

Exhibit I-1. Research Questions

Process Evaluation

- What were the demonstration project's overall objectives and approach?
- How was the intervention implemented and administered?
- How many people did the intervention reach, and how much exposure did participants have to it?
- What resources and costs were needed for to design (when relevant) and implement the intervention?
- What were the facilitators, challenges, and lessons learned regarding implementation and administration of the intervention?
- What feedback did participants have about the implementation of and their satisfaction with the intervention?

Impact Evaluation

- What was the intervention's impact on primary nutrition behavioral outcomes (cups of fruits and vegetables consumed on a typical day)?
- What was the intervention's impact on secondary outcomes (e.g., eating a variety of fruits and vegetables each day)?

Assessment of the Demonstration Project's Self-Evaluation

- How did the demonstration project's actual evaluation compare with its ideal planned evaluation?
- What were the resources needed and costs of the evaluation?
- What were the results of the self-evaluation, and how do these compare with the independent impact evaluation?
- What were the lessons learned?

A. Selection of Wave II Demonstration Projects

In FY 2009, FNS issued a request for applications to states to propose models for SNAP-Education and evaluation and participate in the FNS-funded independent evaluation for Wave II. This request for applications expanded the variety of intervention types and target audiences. Applicants proposed various program and evaluation designs with different target audiences. Numerous applications were received, including ongoing SNAP-Ed programs, modifications to existing programs, and new programming models. Each application was competitively scored and ranked by an independent technical review panel, chaired by FNS. The criteria used for scoring are shown in Exhibit I-2. The highest scoring applicants were selected as finalists and asked to respond to clarification questions. Based on these responses, the review panel selected three projects to participate in the study:

- ▲ **The Iowa Nutrition Network's Building and Strengthening Iowa Community Support for Nutrition and Physical Activity Program;**
- ▲ **The University of Kentucky Cooperative Extension Service's (UKCES) Literacy, Eating, and Activity for Primary School-Age Children (LEAP2) Program; and**
- ▲ **The University of Michigan Cooperative Extension's Eat Smart, Live Strong Program.**

All three agencies implemented their model SNAP-Ed programs in FY 2012. All demonstration projects conducted their own evaluations, supported by SNAP-Ed administrative funds and other non-SNAP-Ed funding resources. Each demonstration project received a \$100,000 incentive to offset expenses directly

incurred as a result of their participation in this evaluation project, such as those associated with facilitating access to SNAP-Ed participants, participating in interviews, record keeping, and providing documents describing the implementer’s SNAP-Ed intervention and evaluation processes.

Exhibit I-2. Scoring Criteria Used for Demonstration Project Selection

Criterion	Specific Requirements
Quality of intervention plan (35 points)	<ul style="list-style-type: none"> • Incorporates SNAP-Ed guiding principles • Budgets are provided as per SNAP-Ed annual guidance
Intervention schedule fits the proposed FNS data collection period (10 points)	<ul style="list-style-type: none"> • Intervention planned to begin and end sometime between October 2011 and June 2012
Suitability for an FNS evaluation using a rigorous impact evaluation design (30 points)	<ul style="list-style-type: none"> • Can support the random assignment of multiple units (e.g., person, classes) to treatment and control conditions or the quasi-experimental, nonrandom assignment of matched units to both treatment and control groups • If other nutrition education or promotions are delivered to the target audience, they are delivered to both the treatment and control groups during the course of the project
Promise for replication (15 points)	<ul style="list-style-type: none"> • Does not require unusually high levels of resources and technical expertise • Materials and curricula are or can be made readily accessible to other nutrition educators
Quality of staff and staffing plan (10 points)	<ul style="list-style-type: none"> • Individuals with key project responsibilities are identified, and their allocated hours are indicated and adequate • Proposed staff members are well-qualified, and plans are in place to provide training

The evaluation of UKCES’ LEAP2 demonstration project is the focus of this case study report. Similar case study reports have been prepared for the other two Wave II demonstration projects. Key evaluation findings and cross-cutting themes from all three Wave II demonstration projects are presented in a separate final report.⁴

B. Overview of the LEAP2 Program

The overall goal of the LEAP2 Program is to increase consumption of fruits and vegetables by primary school-age children. The LEAP2 program is an expansion of the popular Literacy, Eating, and Activity for Preschool Youth Health (LEAP), which was developed through a collaboration of partners, including the Kentucky Department of Education, the Kentucky Cabinet for Health and Family Services, and UKCES in 2004. The LEAP program was developed to address three risk factors among preschool youth in Kentucky: low education levels, low consumption of fruits and vegetables, and physical inactivity. The program was extremely popular with preschoolers and a curriculum appropriate for primary grades was requested by teachers and Family Consumer Sciences (FCS) extension agents. In 2008, the LEAP program was modified to include 12 lessons designed for students in primary school (LEAP2).

The two project-level goals of the LEAP2 program follow:

⁴ The individual case studies and integrated final report are published separately and are available at www.fns.usda.gov/ora.

- Increase primary students' willingness to try fruits and vegetables.
- Increase primary students' consumption of fruits and vegetables.

To achieve these goals, the LEAP2 program targets students through the program's classroom components and parents and caregivers through a take-home newsletter that is designed to increase parent and caregiver involvement in supporting fruit and vegetables consumption. The LEAP2 program is based on Social cognitive theory, as described by Bandura (1986) and others, which acknowledges the influence of environment and personal experience to explain learning. Social cognitive theory asserts that humans learn behaviors through observation, modeling, and motivation such as positive reinforcement. The LEAP2 program uses storybooks depicting positive experiences with fruits and vegetables as well as tasting and other reinforcing activities to impact student's intake of fruits and vegetables. The program comprises three components:

- **Eight direct education lessons delivered in the classroom setting.** Eight 30-minute weekly classroom lessons based on children's storybooks are taught by UKCES county-based Nutrition Education Program (NEP) assistants. Each lesson includes three components: a storybook reading, a reinforcing physical activity, and a recipe tasting featuring fruits and/or vegetables. Throughout the lesson, NEP assistants use discussion questions to engage the children and reinforce the LEAP2 messages.
- **Daily fruit and vegetable recall calendar.** Children participating in the intervention complete a daily log to record the number of fruits and vegetables they consumed on the previous day. The fruit and vegetable calendar activity is facilitated daily by the classroom teacher and is designed to focus students' attention on their fruit and vegetable intake (the instrument can be found in Appendix F).
- **Indirect education provided through take-home materials.** A parent newsletter is sent home with the students after each lesson. The LEAP2 newsletter contains information for parents and caregivers that is relevant to the key messages of the lesson. The newsletter is designed to help parents and caregivers support the messages received by the children during the classroom lessons and to help them increase at-home offerings and consumption of fruits and vegetables.

The LEAP2 program is administered by UKCES campus-based faculty and cooperative extension staff based in county offices. Schools and school systems with 50 percent or higher participation in free or reduced-price school meals are eligible for the SNAP-Ed programming through UKCES. The target audience for this intervention was children in the first through third grades in eight public elementary schools in Perry and Laurel counties in the Appalachian region in eastern Kentucky, a traditionally impoverished geographic area. UKCES staff delivered the eight lessons from October 31, 2011, to February 3, 2012, reaching 889 students in 42 classrooms across the eight intervention schools. Eight schools in Perry and Laurel counties that were also eligible to participate in the LEAP2 program served as comparison sites.

C. Organization of the Report

This report provides a detailed summary of the findings and conclusions of, as well as the specific methods used in, the evaluation of the UKCES demonstration project. Outlined below are the topics addressed in each of the remaining chapters of this report:

- Chapter II: Process Evaluation Methods and Results,
- Chapter III: Impact Evaluation Methods and Results,
- Chapter IV: Assessment of UKCES' Self-Evaluation, and
- Chapter V: Conclusions and Discussion.

Following these chapters is a series of appendices that include data collection instruments, supplemental data, and detailed descriptions of the methods employed for each of the three components of the evaluation (process evaluation, outcome evaluation, and evaluation of the demonstration project's self-evaluation). Appendix J provides a complete list of all cited references within this report.

Chapter II ● Process Evaluation Methods and Results

This chapter describes the findings of the process evaluation of the UKCES LEAP2 demonstration project. The overall goal of the process evaluation is to describe the design and implementation of the intervention as well as to examine successes of the implementation process from the perspectives of the program managers, direct educators, intervention site staff, and program participants. The data sources, data collection methods, and analysis approach for the process evaluation are summarized below and described in detail in Appendix G.

A. Process Evaluation Methods

The broad process-focused research questions described in Chapter I guided the design of the LEAP2 evaluation. To address the research questions, it was necessary to gather both objective and subjective information. The process evaluation team acquired and assessed data from secondary and primary data sources using multiple methods, including data abstraction, in-depth, open-ended interviews with stakeholders, direct nutrition education observation, online and paper questionnaires, and focus groups.

1. Data Sources

The secondary data sources that were collected and reviewed at various stages of the evaluation are described in Exhibit II-1. These served as rich sources of descriptive, objective information on key aspects of the demonstration project's design and implementation. The data sources that were collected and reviewed by the evaluation team can be categorized into four types:

planning and reporting documents, implementation documents, administrative data on program reach and dosage, and program costs.

Key Findings

- **Program Reach and Cost:** The LEAP2 demonstration project reached 889 children and their caregivers across 42 classrooms at an estimated cost of \$30.96 per child.
- **Ease of Implementation:** Program administrators and direct educators reported that the program's simple structure and multiple ways to reinforce nutrition messages, along with easy-to-follow facilitator's guides made the program straightforward to implement.
- **Participant Satisfaction:** Direct educators and teachers reported a high level of engagement and enjoyment by children involved in the intervention. Caregiver focus groups revealed a high level of satisfaction with the newsletter designed to reinforce program messages.
- **Program Fidelity and Teacher Engagement:** Administration of the daily fruit and vegetable recall component of the program varied from what was planned. Teachers reported challenges in completing the daily fruit and vegetable recall calendar and questioned the ability of children this young to complete the activity.
- **Caregiver Engagement:** Program administrators, caregivers, and teachers suggested that greater caregiver awareness of and engagement in the program may have improved the likelihood of changes in fruit and vegetable consumption in the home.

Exhibit II-1. Secondary Data Collected for the Process Evaluation of the LEAP2 Demonstration Project

Document Category	Specific Documents Reviewed
Planning and reporting documents	<ul style="list-style-type: none"> • Demonstration project application • FY 2012 SNAP-Ed Plan
Implementation documents	<ul style="list-style-type: none"> • LEAP2 Facilitator’s Guides (eight lessons) • Parent newsletters (eight total) • Fruit and vegetable recall calendar • Implementation schedules
Administrative data on program reach and dosage	<ul style="list-style-type: none"> • Demographic information on participants at each intervention site • Planned and actual number of children in the direct education interventions at each site • Activity logs documenting lesson duration and implementation schedule by classroom
Program costs*	<ul style="list-style-type: none"> • Standardized cost tables consistent with FNS SNAP-Ed expenditure reporting requirements

*The evaluators provided a form for LEAP2 to complete to ensure that cost data were collected in a standardized way (see the completed Resource and Expenses Tracking Form in Appendix A).

Primary data were collected from three categories of key informants: program-level staff members, intervention site key contacts, and program participants. Descriptive information about the types of respondents and timing of data collection are presented in Exhibit II-2.

Key-informant interviews were conducted with UKCES staff involved in the planning, design, and implementation of the LEAP2 program as well as principals and teachers from four intervention schools. Interviews with county extension agents, as well as NEP assistants, who served as the direct educators, were conducted approximately 1 month prior to the start of the intervention in October 2011 and immediately following completion of the intervention in February 2012. UKCES administrators and evaluation staff were interviewed approximately 1 month prior to the start of the intervention in October 2011 and following the UKCES self-evaluation in July 2012. School principals and teachers were interviewed immediately following completion of the intervention in February 2012.

Another important component of the process evaluation was the assessment of the experience and satisfaction of the parents and caregivers with the intervention. This information was collected through a post-intervention parent survey and focus groups with a subset of parents and caregivers of children who participated in the intervention. Information was collected on factors such as program accessibility, perceived goals of the program, ways in which the program helped parents and caregivers change their children’s nutrition behaviors, and potential barriers faced in trying to increase fruit and vegetable intake. Descriptive statistics on the demographics of focus group participants are provided in Appendix B. For simplicity, the term “caregiver” will be used throughout this chapter to refer to both parents and caregivers.

During the intervention period, evaluation team members observed several LEAP2 lessons. In total, 13 classes were observed in four schools. Evaluators documented elements including the classroom setting and presence of the classroom teacher, lesson length in minutes, participants’ level of engagement in the lessons, and a description of how implementation was consistent with or deviated from the lesson plan.

Evaluators also spoke briefly with each NEP assistant after the observation to identify facilitators and challenges to implementation of the lesson plan in the observed setting.

Exhibit II-2. LEAP2 Respondent Types, Data Collection Methods, and Number of Respondents

Type of Respondent	Data Collection Method	Number of Respondents	
		Pre-intervention	Post-intervention
Program Staff			
Program administrator	Interview	5	4
County extension agent	Interview	3	3
District director	Interview	1	1
NEP assistant	Interview	5	6
Program evaluators	Interview	2	3
Intervention School Staff			
School principals	Interview	n/a*	4
Classroom teachers	Interview	n/a	12
	Online survey	n/a	39
Program Participants			
Primary caregivers of children who participated in LEAP2 program nutrition education	Focus group	n/a	4 groups (28 adults)
	Survey (process questions included in parent follow-up survey)		395

*n/a = not applicable.

2. Instrumentation

For the process evaluation, data collectors used a set of standardized secondary data abstraction tools and primary data collection instruments. The wording of many questions in each key-informant interview guide and the focus group discussion guide was tailored to the specific characteristics of the LEAP2 program. All data collectors were trained on the use of these approved instruments to collect information essential to answering the process-related research questions and queries. In addition, key-informant interviews included relevant, probing questions to allow for in-depth discussions of important issues or topics. Copies of the instruments are provided in Appendix A. The caregiver follow-up survey instrument, which was also used for the impact evaluation, is included in Appendix C.

3. Analysis Approach

The evaluation team applied an analysis approach to the data that takes into account the range of data and respondent types used in the process evaluation. Key-informant responses from UKCES staff, school principals, and teachers were compiled into a master Microsoft Word 2007 document and organized by broad process evaluation research question and process indicators. This approach helped to organize the extensive amount of information that was available and allowed for the identification of broad themes (e.g., implementation facilitators and challenges) and specific topics as well as agreement and disagreement among respondents. Direct quotations were also identified where relevant and used to support key findings.

Transcripts from focus groups with caregivers of nutrition education recipients were coded in QSR International NVivo version 8, which allowed the evaluation team to systematically organize, process, and summarize information provided by this key stakeholder group. This process also allowed the evaluation team to capture the breadth of opinions offered by caregivers while identifying common themes and issues. Again, direct quotations were identified and used to support key findings.

Quantitative process data were primarily used to describe objective aspects of the LEAP2 program, such as those related to dosage, reach, and costs. With the exception of cost data, which were provided through a series of standardized tables, these data were received in or entered into Microsoft Excel spreadsheets. Excel was then used to conduct basic frequencies and mean tabulations. The survey for teachers was created using Checkbox version 5.4.5, an online survey creation and reporting tool. Quantitative process data collected from caregivers through the follow-up survey were analyzed using SAS 9.3. Frequencies of responses to each process question are reported in Appendix B and incorporated with the qualitative findings that follow in this chapter.

B. Program Development and Design

1. Program Development

The LEAP program was developed in 2004 by a coalition that included registered dietitians and educators with representatives from the Kentucky Cabinet for Health and Family Services, the Kentucky Department of Education, and UKCES. Designed to address three risk factors in Kentucky including low education levels, limited consumption of fruits and vegetables and physical inactivity, the LEAP program was pilot tested through the cooperative extension program, revised, and has been implemented by FCS extension agents and NEP assistants in 78 of the 120 Kentucky counties. LEAP sessions have been conducted in several settings including childcare centers, libraries, head start centers and churches. The program was extremely popular with preschool youth, and units appropriate for primary grades were requested by teachers and FCS extension agents.

In 2008, the LEAP program was modified to include 12 lessons designed for primary students in the first, second, and third grades and became LEAP2. The format of the program, which includes storybooks, lesson activities designed to support the key messages of the story, and caregiver newsletters, was updated to be appropriate for the young primary student and to align with Kentucky Core Academic Standards (Kentucky Department of Education, 2010). Targeted health behaviors were expanded to include behaviors such as sleep, tooth brushing, and hand washing. The storybooks and facilitators guides were pilot tested in four counties in May 2008 by FCS agents and NEP assistants. In 2009, the LEAP2 program was rolled-out as a UKCES featured program in 78 counties across Kentucky.

Program developers drew on social cognitive theory to develop the LEAP2 curriculum, which acknowledges the influence of environmental and personal experience to explain learning. Social cognitive theory asserts that humans learn behaviors through observation, modeling, and motivations such as positive reinforcement (Bandura, 1986). LEAP2 program developers predicted that being shown positive and fun experiences of eating fruits and vegetables through the use of storybooks, as well as tasting and enjoying new foods and participating in reinforcing activities during lessons, would have a positive effect on students' intake of fruits and vegetables. They also theorized that indirect education aimed at the caregivers would impact the environment of the children and encourage healthy eating patterns at home. Program developers noted that the use of stories and characters to model good nutrition habits has been shown to enhance fruit and vegetable consumption in studies (Byrne & Nitzke, 2002;

Cornell University Food and Brand Lab, 2009). The primary units of the LEAP2 program are based on 12 storybooks. Eight lessons from the LEAP2 curriculum that featured storybooks focused on fruit and vegetables consumption were taught in the intervention classrooms during the implementation period.

2. Description of the Curriculum

The LEAP2 curriculum that was implemented included eight lessons with the following key components: a storybook reading, a food tasting, and a reinforcing physical activity. The eight lessons were delivered by NEP assistants in each classroom on a weekly basis. Lessons were scheduled for a 30-minute period. In addition, daily fruit and vegetable recall calendars were completed by students (with the teachers' help), and indirect education for caregivers was provided weekly in the form of a take-home newsletter. This section describes each of the three main program components as well as any related materials.

a. Direct education lessons delivered in the classroom setting

During each lesson a storybook is read to the children. Throughout the lesson, NEP assistants incorporate discussion questions from the facilitator guides to engage the children and reinforce key messages. The NEP assistants then lead the students in a reinforcing physical activity. Facilitator guides offer suggestions for additional reinforcing activities that may be used during the lesson. A snack containing fresh fruits or vegetables and coordinated with the theme of the book is offered to each student at the end of the lesson. Exhibit II-3 summarizes the core nutrition messages and activities of each lesson.

b. Daily fruit and vegetable recall calendar

Children participating in the intervention complete a daily log to record the amount of fruits and vegetables they consumed on the previous day. This fruit and vegetable calendar activity is facilitated daily by the classroom teacher and is designed to focus students on their fruit and vegetable intake. Due to the challenge of having children in this age range calculate particular serving sizes, the intent of the fruit and vegetable calendar is to track the number of different fruits and vegetables eaten. Students circle the number (one to five) of fruits and/or vegetables they have eaten the prior day and are encouraged to write in a higher number if necessary. During the demonstration project, the calendars were also used as part of UKCES' evaluation of the intervention to measure a change in the amount of fruits and vegetables eaten by the children during the intervention. The intervention classrooms completed a baseline calendar prior to the start of the LEAP2 program and two 4-week calendars were provided for each child for the 8-week intervention period. Manila folders were used to store calendars for each child.

c. Indirect education provided through take-home newsletters for caregivers

A caregiver newsletter is sent home with each child following the lesson. The LEAP2 newsletter contains information relevant to the key messages of each lesson and includes the name of each storybook along with a simple, low-cost recipe that uses fruits and vegetables. The newsletter is designed to promote nutrition discussions and activities between children and their caregivers and increase at-home offering and consumption of fruits and vegetables. The caregiver newsletters are designed to be visually appealing and written at a fifth-grade reading level. Some NEP assistants gave the newsletters to the teachers to distribute to the children and some educators passed the newsletter directly to the children. The NEP assistants reported that the age of the students and the preference of the teacher determined how the newsletters were distributed. Some NEP assistants reported reviewing the newsletter with the students during the LEAP2 lesson.

Exhibit II-3. Summary of UKCES LEAP2 Learning Objectives and Suggested Activities, by Lesson

LEAP2 Lesson	Learning Objectives	Suggested Activities for Direct Educators
Blueberries for Sal	<ul style="list-style-type: none"> • Eat a variety of foods • Identify two safety skills 	<ul style="list-style-type: none"> • Read the <i>Blueberries for Sal</i> book and incorporate discussion questions • Allow students to sample a blueberry or prepare and sample a healthy snack that includes blueberries (blueberry smoothie) • Participate in the physical activity rhyme, “Here We Go Round the Blueberry Bush” • Distribute parent newsletters
Bread and Jam for Frances	<ul style="list-style-type: none"> • Eat a variety of foods • Name at least three food groups • List how different food groups help bodies stay healthy and strong 	<ul style="list-style-type: none"> • Read the <i>Bread and Jam for Frances</i> book and incorporate discussion questions • Prepare tea sandwiches (with broccoli and carrots) • Jump rope to Frances’ rhyme “Jump for Jam” • Distribute parent newsletters
Clarabella’s Teeth	<ul style="list-style-type: none"> • Practice proper brushing • Practice regular brushing • Eat a variety of foods • Be active each day 	<ul style="list-style-type: none"> • Read the <i>Clarabella’s Teeth</i> book and incorporate discussion questions • Sample a fruit that may be unfamiliar to students (mango or tangerine) • Participate in the Tooth Obstacle Course activity • Distribute parent newsletters
I.Q. Gets Fit	<ul style="list-style-type: none"> • Eat a variety of foods • Be physically active each day 	<ul style="list-style-type: none"> • Read the <i>I.Q. Gets Fit</i> book and incorporate discussion questions • Prepare a healthy snack such as fiesta mix with raisins • Participate in the physical activity, “Just Be Active”, set to music • Distribute parent newsletters
Tops and Bottoms	<ul style="list-style-type: none"> • Identify a variety of vegetables and how they grow • Eat a variety of foods • Be physically active each day 	<ul style="list-style-type: none"> • Read the <i>Tops and Bottoms</i> book and incorporate discussion questions • Have children smell, touch, and taste pickled beets • Participate in the activity, “Mr. Hare’s Harvest” • Distribute parent newsletters
Happy Healthy Monsters	<ul style="list-style-type: none"> • Identify two or more ways to be physically active • Demonstrate how to wash hands correctly • Classify ingredients into food groups 	<ul style="list-style-type: none"> • Read the <i>Sesame Street Volume 2: Happy Healthy Monsters</i> book and incorporate discussion questions • Act out the physical activities that the monsters enjoy • Prepare Monster Faces with grapes, raisins, and peas • Distribute parent newsletters
The ABC’s of Fruits and Vegetables and	<ul style="list-style-type: none"> • Eat a variety of foods • Be physically active each day 	<ul style="list-style-type: none"> • Read the book <i>The ABC’s of Fruits and Vegetables and Beyond</i> and incorporate discussion questions

Beyond

- Prepare a tomato salsa for sampling
- Be active by dancing the Mango Tango or Russian Radish Hop
- Distribute parent newsletters

More Spaghetti, I Say

- Be physically active each day
- Eat a variety of foods; introduce whole-grain pasta
- Read the *More Spaghetti, I Say* book and incorporate discussion questions
- Introduce students to whole grain by creating a veggie pasta salad with tomatoes, carrots, peas, onion, celery, cucumber, corn, and black beans
- Be physically active with the Spaghetti Jump activity
- Distribute parent newsletters

Exhibit II-4. Planned Implementation Timeline for the LEAP2 Program Intervention

Timeline	Intervention component
Week 1	Baseline fruit and vegetable calendars
Week 2	Lesson 1: Blueberries for Sal
Week 3	Lesson 2: Bread and Jam for Frances
Week 4	Lesson 3: Clarabella's Teeth
Week 5	Lesson 4: I.Q. Gets Fit
Week 6	Lesson 5: Tops and Bottoms
Week 7	Lesson 6: Happy Healthy Monsters
Week 8	Lesson 7: The ABC's of Fruits and Vegetables and Beyond
Week 9	Lesson 8: More Spaghetti, I Say

UKCES LEAP2 evaluators hypothesized that intervention participants will develop a relationship with the NEP assistants conducting the lessons. To increase confidence that differences found between the two groups were due to the nutrition education lessons provided and no other confounding variables, such as a relationship with the NEP assistants, the control group children and caregivers received the storybook intervention and caregiver newsletters for the four LEAP2 lessons that did not include a fruit and vegetable component and instead focused on food safety and healthy bones and teeth. The original plan specified that the control group would not participate in the fruit and vegetable calendar and food tasting activities.

C. How the Demonstration Project Was Implemented

1. Program Management and Oversight

UKCES, within the School of Human Environmental Services, administers Kentucky's nutrition education programs, which encompasses the Expanded Food and Nutrition Education Program (EFNEP) and SNAP-Ed. The director of the School of Human Environmental Sciences supervises all programming related to the FCS Extension Program. The assistant director for family and consumer science field programs is responsible for the day-to-day operation of the FCS program, which supports approximately 35 staff members. She works closely with the director of NEP and two extension specialists to administer

the LEAP2 program. One of these extension specialists was a primary author of both LEAP programs and is responsible for training and curriculum development for the LEAP2 program. Together, this group managed the overall planning, development, and implementation of the program at the state level.

County extension agents in each of Kentucky’s 120 counties work directly in the community and are supported by NEP assistants and other support staff. Seven district directors supervise staff in the counties. The district director for both Laurel County and Perry County provides general supervision and evaluation for staff members in 16 counties. Within the two counties selected for this study, three extension agents were responsible for planning, scheduling, and day-to-day administration of the intervention. They also served as direct supervisors for the NEP assistants who administered the classroom lessons. Exhibit II-5 provides an overview of the key LEAP2 team members and their respective roles or involvement with the program. The titles used in this exhibit will be used when referencing these individuals throughout the report.

Exhibit II-5. Summary of LEAP2 Project Staff Roles and Responsibilities

Position	Summary Responsibilities	Program Administration	Design and Development	Planning	Implementation	Evaluation Design and Planning	Data Collection	Data Tabulations
Program administrators	Generally administered program; assisted in design, development, and planning; provided program oversight during implementation and evaluation phases of the project	•	•	•	•	•	•	
County extension agents	Assisted in program planning and staffing; provided daily oversight for program implementation; supervised the NEP assistants; provided training to data collectors	•		•	•		•	
District director	Provided general supervision and guidance to county extension staff	•		•	•			
NEP assistants	Assisted with scheduling and preparing program materials; provided direct nutrition education; collected and reported program fidelity data	•		•	•		•	
Program evaluators	Helped design and implement the program evaluation; conducted data analysis and reporting		•	•		•	•	•

2. Partnerships

Several partnerships across the university and within the two counties facilitated the implementation of the LEAP2 program. The cooperative extension faculty is housed within the larger School of Human Environmental Sciences and strategic partnerships among the different departments and faculty allowed sharing of expertise and resources for the LEAP2 program. Faculty members from the College of Public Health were also involved in the planning and implementation of the evaluation.

"[The assistant director for FCS field programs] has worked very hard to build relationships across areas and make sure this is a success.... They have different areas of expertise that have come together on the project to make it successful."

—director of the School of Human Environmental Science

Another important source of partnerships reported by program administrators is a council infrastructure that allows for stakeholder input across the State to prioritize programming and identify areas of focus. Each county extension agent organizes a program council made up of representatives from the community who come together two to three times a year to provide input into the program needs of the community. Representatives from each program council then collaborate as part of the county extension council, which is made up of representatives from all areas of cooperative extension and provides input for the county programming and overall work plan. Issues from county cooperative extension councils are reported to a district forum and to the State advisory council made up of various representatives from the counties and community partners. Representatives from each of the seven districts are included. This council system helps the cooperative extension program at the State level focus its efforts while maintaining input from the local stakeholders.

Within the two counties selected for this study (Laurel and Perry Counties), the county extension agents and NEP assistants described positive relationships established with the school systems. Both cooperative extension offices involved in the LEAP2 program have done several programs in the schools and were able to use the positive relationships to recruit schools to participate in the evaluation of LEAP2. Each school in Kentucky has a family resource coordinator, a staff member designated to be a resource for family programming and support. The county extension agents and NEP assistants used these coordinators, with varying levels of reported success, for communication and scheduling. In one county, there was a wellness coordinator for the schools and she became an important partner in planning the implementation of the program within the school system. Food service coordinators were also essential partners in UKCES' evaluation of the program.

3. Direct Educators and Their Training

Six NEP assistants were involved in delivering the LEAP2 program for this demonstration project. While five NEP assistants began the intervention, one NEP assistant took a new position as an extension agent in another county and was replaced during the implementation period. NEP assistant responsibilities included the following:

- Communicating with school personnel regarding scheduling,
- Training teachers on completing the fruit and vegetable calendar,
- Implementing LEAP2 lessons,
- Preparing snacks and materials needed for each lesson, and

- Completing administrative and reporting functions.

UKCES NEP assistants must have a high school degree. Program administrators reported looking for experience in teaching (e.g., Sunday school, 4-H⁵ work) and ties within the community. During the hiring process, at least two interviews are scheduled with each NEP assistant and applicants are able to demonstrate their teaching ability.

“A paraprofessional is someone grounded in the community who also can be trained in basic nutrition education.”

—program administrator

The six NEP assistants had various levels of education and experience in the nutrition field. Four had bachelor’s degrees, one was a nurse with a master’s degree in pediatric nursing, and one was in the process of completing her bachelor’s degree. Four NEP assistants had less than 4 years’ experience in the field, and two had 7 or more years’ experience. The majority of the NEP assistants had experience teaching other cooperative extension programs in the community. Several NEP assistants reported working with children in their personal time in community organizations and reported that such experience helped them implement the LEAP2 program.

“For 2 years, I was our children’s director at our church, so [I am] very used to implementing lessons and being in front of classrooms and teaching them. . . and I still do that weekly at our current church.”

—NEP assistant

After being hired, all NEP assistants receive 2 weeks of orientation training by extension NEP specialists and associates. The subject matter covered includes basic nutrition, curricula, program implementation and evaluation, and reporting. Two days of orientation are dedicated to youth development, nutrition needs, and curriculum. LEAP is one of the curricula covered during the youth portion of the training. Veteran assistants are brought in to demonstrate lessons and provide advice on strategies for organization and preparation. In addition to new employee training, there are 2 days of training during the year for all assistants to update them on any new curricula and other health and nutrition topics. Input from the assistants is collected to determine training topics offered. Every other year, assistants are brought to the University for the training; during opposite years, regional trainings are scheduled. In addition to the training, there is a mentoring program. NEP assistants are allowed up to 10 days per year to shadow other, more experienced, assistants. Two of the six NEP assistants had been through this initial training process. The others were hired for this project or to fill positions of staff members on leave and received special training at the county level. For the LEAP2 demonstration project, NEP assistants received the training and preparation described below.

For this intervention, training for the NEP assistants was handled differently for each county. A cooperative extension specialist from Lexington attended a meeting in the Laurel County Cooperative Extension Office, meeting with the county extension agent and NEP assistants. They discussed the curricula and books as well as the process for the intervention, including the fruit and vegetable calendars and the reporting process. The NEP assistants also reported that another NEP assistant in the Laurel County Cooperative Extension Office had taught the original LEAP curriculum and offered support and advice. After one NEP assistant in Laurel County resigned during the intervention, the replacement NEP assistant was trained by the county extension agent and other NEP assistants.

⁵ 4-H is a national youth development program administered through the cooperative extension program.

In Perry County, where two NEP assistants had not attended the initial orientation training in Lexington, the county extension agents and NEP assistants attended a session in late August conducted by a cooperative extension specialist. The training consisted of a PowerPoint and discussion, addressing the intervention, lesson guides, foods, and activities. In addition to the training, one NEP assistant in Perry County practiced some lessons in schools that were not part of the demonstration project. He reported that this was a valuable component of his preparation for implementing the LEAP2 program. NEP assistants reported that there were additional meetings in each extension office to discuss the LEAP2 lesson plans and program components. They found these meetings to be a valuable component of their preparation.

In the two counties, there were different models for the implementing the LEAP2 intervention and control lessons. In Laurel County, one NEP assistant was responsible for teaching the intervention lessons and had a larger role in planning and scheduling, while another was responsible for teaching the control lessons. In Perry County, all three NEP assistants taught lessons in both the intervention and control schools.

4. Classroom Teachers and Their Training

The primary role for the classroom teachers in the LEAP2 intervention was completing the daily fruit and vegetable calendars with the children. The process for training the teachers differed in the two counties. In Laurel County, a cooperative extension specialist from Lexington attended a meeting of superintendents, principals, and teachers to provide a broad overview of the intervention, which included describing the role of the classroom teachers. NEP assistants in Laurel County visited the teachers to distribute the daily fruit and vegetable calendars and discuss the procedure for completing it. The NEP assistants reported that they were able to speak with nearly half of the classroom teachers. They then sent an email to the remaining teachers describing the calendars. In Perry County, the family resource coordinators were used to communicate with the teachers. A Perry County extension agent reviewed the calendar and the process for completing them with the family resource coordinators, who then were responsible for delivering the calendars and describing the process to each teacher.

5. Recruitment of Elementary Schools

UKCES initiated recruitment of SNAP-Ed-eligible elementary schools in 2009, prior to submitting their demonstration project application to FNS. At this time, UKCES staff contacted superintendents in two counties to ask if they would be willing to participate. Eligible schools in Perry and Laurel Counties were identified that were SNAP-Ed eligible and had students who had not participated in previous LEAP and LEAP2 interventions. After UKCES was notified of their selection as a demonstration project in fall 2010, UKCES staff again contacted superintendents to confirm their willingness to participate. In May and June 2011, school principals were contacted, given more information about the study, and asked to participate. In Laurel County, a county extension agent attended the monthly principals meeting to explain the program. In Perry County and East Bernstadt Elementary School (an independent school in Laurel County), the principals were contacted individually by the county extension agents, who confirmed their participation in the demonstration project and provided an overview of the process.

6. Methods for Quality Assurance and Tracking Program Fidelity

Methods for tracking quality and program fidelity included onsite observation by UKCES program administrators and online tracking forms completed by NEP assistants after each lesson. Onsite observations were conducted by an extension specialist and a Ph.D. graduate student with prior experience teaching in primary schools with SNAP-Ed-eligible populations. Each NEP assistant was observed teaching one lesson from the curriculum. These quality control visits focused on program implementation, student receptivity to

the lesson, and administration of the evaluation instruments. They also tracked the length of each lesson, the number of students, and any modifications or adaptations that were done by the educator. The extension agent in Laurel County also conducted an observation of the intervention lesson at a separate time.

After each lesson, an online form was completed by the NEP assistant. In one county, NEP assistants filled out paper forms that were entered into the online database by one NEP assistant. In the other county, each educator was responsible for entering their own data. The forms documented details about each class, including the date, teacher, number of students, length of the lesson in minutes, lesson title, and a confirmation that classroom teachers were completing the daily calendar activity with the children. An additional field in the online form captured any comments, challenges, or modifications made to the planned intervention. These online forms were then reviewed by the program administrators in Lexington.

7. Program Reach

LEAP2 was implemented between November 1, 2011, and February 3, 2012. In the eight schools selected as intervention sites for this evaluation, LEAP2 classes reached 889 children in 42 classrooms. Based on program administrative data, the mean intervention classroom size across both counties was approximately 20 students (see Table II-1).

Table II-1. LEAP2 Program Reach

Elementary Schools	Number of Classrooms Where Intervention Took Place	Total Number of Children Participating in Intervention*	Mean Size (Number of Children) of Intervention Classrooms
Laurel County			
East Bernstadt Independent	5	113	22
Camp Ground	5	107	21
Keavy	5	101	20
Sublimity	5	107	20
Wyan-Pine Grove	6	135	21
Laurel County Only Total	26	563	21
Perry County			
Chavies	6	99	16
Dennis C. Wooton	5	114	22
Robert W. Combs	5	113	21
Perry County Only Total	16	326	20
OVERALL TOTAL	42	889	20

*Participation was defined as attendance in at least one LEAP2 lesson; participation was based on student enrollment numbers for each intervention classroom as reported by the NEP assistants.

Source: UKCES Outcomes and Process Evaluation Report.

8. Program Dosage and Exposure

a. Classroom lessons

In addition to knowing the program's reach, it is important to determine the exposure level that participants have to the program. In this section, we present analysis of available data on exposure to the program classes. Class exposure is defined as the number of classes each child attended and the number of minutes spent in the LEAP2 lessons.

On average, most lessons were 30 minutes in length, for a total potential exposure for each child to the intervention of 240 minutes. To indicate which lessons each child received, colored stickers that included the name of the particular lesson being taught that week were placed on the fruit and vegetable calendars of the children that were in attendance during the lesson. Program administrators reported that this system for assessing lesson dosage worked well for the first 4–5 weeks of the intervention. Problems encountered in the remaining weeks were attributed to the winter holidays. In total, fruit and vegetable calendars with attendance records were collected for 765 participating students.⁶ Analysis of the UKCES program dosage data shows that 99 percent of children ($n = 754$) attended at least the first four of eight total intervention lessons. Class dosage did not vary significantly by county.

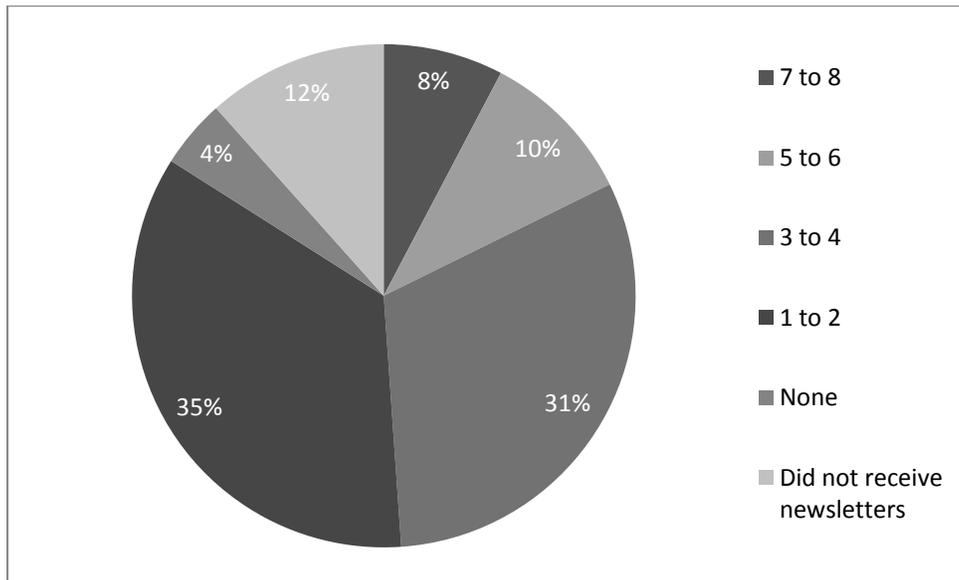
In addition to the 30-minute weekly lessons taught by the NEP assistants, 74 percent of the classroom teachers in the intervention classrooms reported incorporating some of the LEAP2 nutrition messages in their classrooms, resulting in additional LEAP2 message exposure per child. Among those classroom teachers that used the LEAP2 messages in their classroom, 56 percent reported using the messages a couple of times, 32 percent reported using them once a week, and 12 percent reported using them a few times a week or more than a few times a week. When classroom teachers were asked how they incorporated the LEAP2 messages in their classroom, they reported a range of responses including discussing the importance of good nutrition and making healthy choices before or after lunch or during snack time.

b. Parent and caregiver exposure to take-home materials and activities

Data on caregivers' receipt and use of the LEAP2 take-home newsletters indicated varying amounts of exposure to the program's messages through the newsletters. As depicted in Figure II-1, when surveyed caregivers were asked whether they received and read the LEAP2 newsletters that were distributed to their child after each lesson, 35 percent reported reading one or two newsletters, 31 percent reported reading three or four, and 18 percent reported reading five or more. Meanwhile, 12 percent of caregivers reported that they did not receive the newsletters, and 4 percent reported that they did not read any. Caregivers' limited exposure to the newsletters may be related to whether or not the newsletter made it home with the student which may have limited overall awareness about the program.

⁶ Of the 889 children reached in the intervention, 765 completed the fruit and vegetable calendars for a discrepancy of 124 calendars. Problems associated with the completion and collection of the fruit and vegetable calendars, described in later sections, account for the lower number of fruit and vegetable calendars than students reached through the intervention.

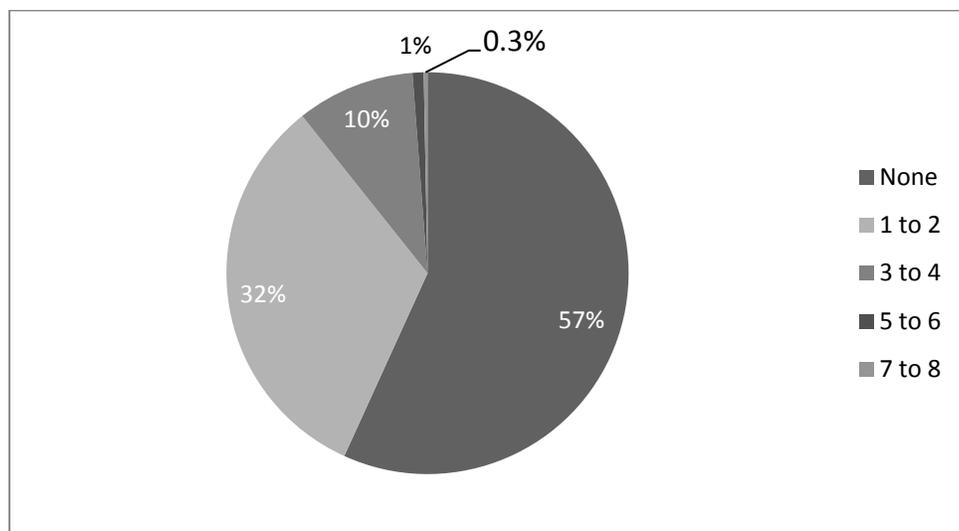
Figure II-1. Percentage of Parents Who Reported Reading the LEAP2 Newsletters



N = 388; this number excludes the seven respondents who answered “Don’t know” or had no response to this question.
Source: Parent Follow-Up Survey, Appendix C.

Caregivers who received the LEAP2 newsletters reported some moderate use of the recipes in the newsletters. As depicted in Figure II-2, 32 percent of survey respondents reported using one or two recipes found in the LEAP2 newsletters to make a snack or meal for their child and 10 percent reported using three or four recipes. Meanwhile, less than 2 percent of caregivers reported using five to eight recipes, and 57 percent reported using none of the recipes.

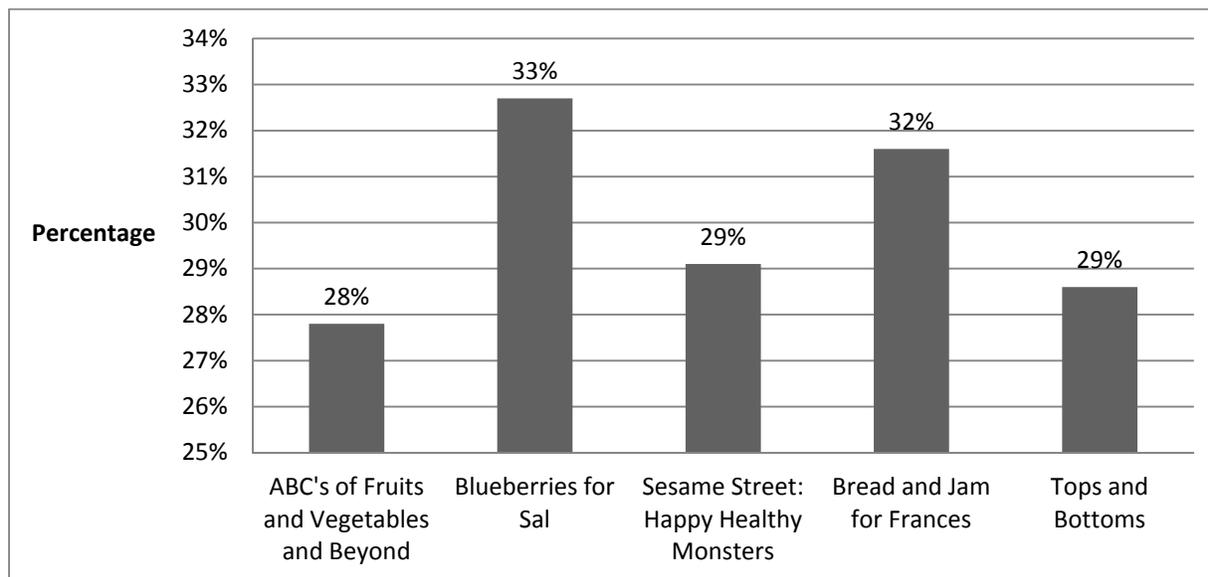
Figure II-2. Percentage of Parents Who Reported Using Recipes to Make a Snack or Meal for Their Child



N = 338; this number excludes the five respondents who answered “Don’t know” or had no response to this question.
Source: Parent Follow-Up Survey, Appendix C.

When surveyed, caregivers were asked whether their child mentioned the food tasting at school, 61 percent reported that their child did not mention the tasting. Similarly, when surveyed caregivers were asked whether their child mentioned the book that was read at school, less than 33 percent of caregivers reported that their child mentioned any one of the five specific books listed in the survey.

Figure II-3. Percentages of Parents Who Reported That Their Child Mentioned That the Book Was Read at School



N = 395; source: Parent Follow-Up Survey, Appendix C.

c. Exposure in school environment

Exposure to LEAP2 messages in the schools was confined to participating classrooms. When asked about other exposure to nutrition messages in the school, school staff mentioned USDA’s Fresh Fruit and Vegetable Program, Backpack Buddies, and other programs. One of the control schools and three of the intervention schools reported taking part in the USDA’s Fresh Fruit and Vegetable Program. The Backpack Buddies program provides backpacks of food each Friday for children at risk for hunger. An example of another program mentioned by the principals and teachers included a wellness grant that provided bags of fruits and vegetables for any interested person.

“Through our lunch program, we give out free vegetables/fruit. We very rarely have any left over. Through our wellness grant, we have two students that come out on the mornings that we get the fruits/vegetables and will give out the bags.”

—school principal

“They have a weekend backpack program in many of the schools. The School Food Program provides breakfast and lunch, but many kids don’t have food on the weekend, so the [Family Resource Center] sends food home with some kids for the weekend, accommodating at least two meals a day for the weekend.”

—NEP assistant

9. Resources and Costs of Program Design and Implementation

This section includes a description of the costs associated with developing and implementing the LEAP2 program. The detailed budget tables UKCES provided for this evaluation, including a breakout of non-Federal and Federal funding for each budget category, are included in Appendix B. Costs associated with UKCES' self-evaluation are reported separately in Chapter IV.

a. Costs for program design

Costs associated with the design of the LEAP2 program, which includes direct and indirect costs, totaled \$19,189.31. Of the funds used for planning and design of the LEAP2 program, 90 percent of the direct costs were covered with non-Federal funds. The indirect rate for all expenses related the LEAP2 program was 10 percent, below the usual University of Kentucky indirect rate of 32 percent.

The direct costs for the LEAP2 program planning and design fall into four primary categories: salary and benefits, materials, travel and building and space. Salaries and benefits were the most substantial cost center in terms of resources needed to develop the LEAP2 program, accounting for 64 percent of direct costs. The types of expenditures that UKCES included in these areas are described below.⁷

- **Salary and benefits.** This expense includes the salaries or hourly wages for the one project advisor that oversaw the curriculum development and eight nutrition professionals responsible for conceptualizing, developing and piloting the LEAP2 program.

<u>Position</u>	<u>Number of FTEs</u>
Project advisor (1 person)	0.01
<u>Curriculum development and piloting (8 people)</u>	<u>0.17</u>
Total	0.18

- **Materials.** This expense includes storybooks for review for inclusion in the LEAP2 program, printing materials for 36 pilot classrooms and 23 sets of LEAP2 books.
- **Travel.** The program travel expenditures include costs for attending six planning and design meetings.
- **Building and space.** This includes rent space for the LEAP2 extension specialist primary responsible for program curriculum development, training, and program oversight.

Table II-2 shows the actual expenditures UKCES reported as the costs of developing the LEAP2 program.

Table II-2. Summary of UKCES Costs Associated With LEAP2 Program Development

Budget Category	Expenditures	Percentage of Total Costs
Salary and benefits	\$11,146.40	58.1
Materials	\$3085.60	16.1
Travel	\$2,425.21	12.6
Building and space	\$787.62	4.1
Total Direct Costs	\$17,444.83	90.9
Indirect costs	\$1,744.48	9.1
Total	\$19,189.31	100.0

Source: Cost data provided by UKCES (see the completed Resource and Expense Tracking Form in Appendix B).

⁷ Budget justification language was provided by UKCES to Altarum Institute, and full-time equivalent (FTE) information was extracted from the UKCES LEAP2 Resources and Expenses Tracking Form (included in Appendix B).

b. Costs for program implementation

Costs associated with the implementation of the intervention totaled \$27,521.01. Of this amount, 100 percent of expenditures were paid with federal funds. Salaries and benefits were the most substantial cost center in terms of resources needed to implement the LEAP2 program, accounting for nearly 50 percent of the direct costs. The resources needed for the LEAP2 program implementation fall into four primary cost categories: salary and benefits, materials, travel and building and space. The types of expenditures that UKCES included in these areas are described below.⁸

- **Salary and benefits.** This expense includes the salaries or hourly wages for the program administrators, nutrition educators, and extension agents.

<u>Position</u>	<u>Number of FTEs</u>
Project advisor (1 position)	0.02
NEP assistants (5 positions)	0.32
<u>County extension agents (3 positions)</u>	<u>0.03</u>
Total	0.37

- **Materials.** This expense includes the cost of the LEAP books, printing newsletters, office supplies, and costs of food.
- **Travel.** Program travel expenditures include the costs for county extension staff to travel to and from the schools, and trips to obtain supplies (e.g., food for demonstration purposes).
- **Building and space.** This includes rent for the LEAP2 extension specialist responsible for program curriculum development, training and program oversight.

Table II-3 shows the actual expenditures UKCES reported as the costs of LEAP2 implementation.

Table II-3. Summary of Costs for Implementation of LEAP2 Program

Budget Category	Expenditures	Percentage of Total Costs
Salary and benefits	\$12,400.00	45.0
Materials	\$10,566.26	38.4
Travel	\$1,650.00	6.0
Building space and rent	\$402.84	1.5
Total Direct Costs	\$25,019.10	90.9
Indirect costs	\$2,501.91	9.1
Total	\$27,521.01	100.0

Source: Cost data provided by UKCES (see the completed Resource and Expense Tracking Form in Appendix B).

c. Per-participant program cost

Calculating costs per program participant presents some challenges. Depending on the type of intervention, costs per program participant can be calculated based on the number of participants who receive a single intervention dose, complete the entire intervention, or are enrolled in a “site” where interventions are being conducted, regardless of their receipt of education or materials. In addition, estimating costs associated with

⁸ Budget justification language was provided by UKCES to Altarum, and FTE information was extracted from the UKCES LEAP2 Resources and Expenses Tracking Form (included in Appendix B).

indirect education of caregivers through the distribution and use of take-home materials is not straightforward, making it difficult to develop costs per program participant by participant type.

Because LEAP2 is a school-based program, the number of children that received at least one of the LEAP2 intervention lessons was used as the basis of the cost per participant calculation. Using the total implementation expenditures (\$27,521.01) and the total number of children reached through direct education ($n = 889$), the estimated cost per child participant was \$30.96.

Additionally, because LEAP2 is a school-based program, it is important to note that there are economies of scale with practical implications on the resources required to replicate the program elsewhere. For example, the costs associated with implementing the program in a school with 10 children per classroom might not be substantially different from the costs associated with implementing the program in a school with 25 children per classroom, yet the reach of the program would be substantially greater for the latter scenario. For this reason, cost per classroom (\$655.26), which was derived by using the same formula described above but with 42 classrooms as the denominator, was also estimated.

Table II-4. Costs per Child and per Classroom for the LEAP2 Program

Implementation Costs	Number of Children	Cost per child
\$27,521.01	889	\$30.96
Implementation Costs	Number of Classrooms	Cost per Classroom
\$27,521.01	42	\$655.26

Source: Cost data provided by UKCES (see the completed Resource and Expense Tracking Form in Appendix B).

D. Factors Affecting Program Implementation and Opportunities for Improvement

Overall, program administrators, NEP assistants, principals, and caregivers of children participating in the LEAP2 program reported a high degree of satisfaction with the program, describing it as relevant and enjoyable. Both the county cooperative extension staff and school principals reported that the strong relationship between the schools and the extension program contributed to the overall ease of implementation. All stakeholders agreed that the passion and effectiveness of the NEP assistants were instrumental in engaging the children.

At the same time, the process evaluation identified several challenges to implementing this program, particularly in reaching and engaging caregivers. Stakeholders offered recommendations for how the program could be modified to improve its reach or effectiveness.

The most commonly reported facilitators and challenges to program implementation are shown in Exhibit II-6. They are described in more detail below along with recommendations for addressing the challenges identified. Quotes from key informants are included to highlight themes.

Exhibit II-6. Key Facilitators and Challenges to LEAP2 Implementation

Facilitators:

- High degree of satisfaction with the LEAP2 lessons
- Highly effective NEP assistants
- Easy-to-implement curriculum and lesson guides
- Food tasting well-received by children and teachers
- High degree of satisfaction with indirect education materials
- Strong community partnerships and successful recruitment of schools

Challenges:

- Training for NEP assistants
 - Difficulty of implementing daily fruit and vegetable calendar in the classroom
 - Maximizing caregiver involvement and engagement in the program
 - Choosing age-appropriate books for the target audience
 - Implementation timeframe
 - External factors reported to inhibit the potential for behavior change
-

1. Facilitators of Program Implementation

a. High Degree of Satisfaction With the LEAP2 Lessons

The LEAP2 program was designed to reinforce learning in three ways: listening to storybooks, tasting foods, and engaging in physical activity. Program administrators, NEP assistants, caregivers, and school staff noted that the LEAP2 program's ability to reinforce learning in different ways was instrumental to its effectiveness. Principals, teachers, and NEP assistants reported that the intervention was enjoyable and interactive and noted that when children are involved in the process of learning and have fun during the lesson, it is more likely that they will remember and act on the messages provided. Stakeholders also discussed the importance of addressing nutrition and the importance of fruits and vegetables in early childhood.

"If the kids are having fun, that is something that they will remember; and if it is something they can be involved in, it is something they will carry with them too."

—school principal

"And I know with students, if you tell them, they're probably going to forget; but if you show them, it's totally different. So I thought that was the best part about it."

—classroom teacher

During focus groups, caregivers were asked about their children's reaction to the intervention. The two observations most often mentioned by caregivers were that their children were asking for new and different fruits and vegetables and seemed to be less picky about trying new foods. Several caregivers shared that their children had been asking them to shop for and prepare the new and different fruits and vegetables experienced in the classroom. Caregivers also cited willingness to try new foods as one of the primary benefits of the LEAP2 program for them.

“Sarah loved the mangoes She did ask if I could get her some of those the next time I went grocery shopping.”

—caregiver focus group participant

“Since she’s been going through this program, she likes her vegetables now. All she would ever eat was chicken nuggets—that’s it, just chicken nuggets—but now she eats healthy; she eats whatever I fix.”

—caregiver focus group participant

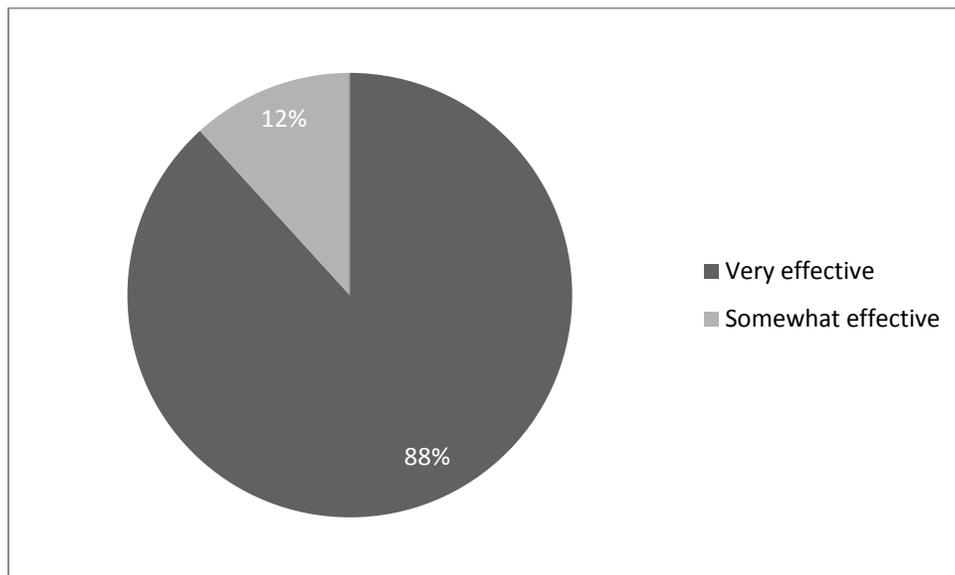
b. Highly Effective NEP Assistants

An important facilitator noted by all stakeholders was the effectiveness of the NEP assistants. Principals, teachers, and program administrators all commented on the professionalism and dedication of the NEP assistants. The most often cited reasons for the effectiveness of the NEP assistants were their ability to engage the students throughout the lesson and their level of preparation. Eighty-eight percent of the teachers surveyed ($n = 34$) felt that the NEP assistants were “very effective.” Teachers reported that children responded to the energy and enthusiasm of the NEP assistants. During onsite observations, children appeared fully engaged in the lesson and appeared to relate well to the NEP assistants. Most teachers reported staying in the classroom during the LEAP2 lessons. Seventy-one percent of teachers surveyed ($n = 38$) reported attending all eight LEAP2 lessons.

“Both educators that came were so personable and fun and engaged the children. They were excellent. Their enthusiasm for the program was impressive. I can’t say enough about them.”

—classroom teacher

Figure II-4. Teachers’ Perception of the Effectiveness of the Extension Educator in Teaching the LEAP2 Lessons



$N = 34$; this number excludes the one respondent who answered “Don’t know” to this question.

Source: Teacher Follow-Up Survey, Appendix C.

During focus groups, several caregivers talked about the importance of adults besides themselves giving positive messages about fruits and vegetables to their children. They shared that children are sometimes more apt to listen to guidance from another “outside” person than from their caregivers. Caregivers also reported that children are more likely to change their behavior if positive messages are reinforced at school and at home.

“They’ll listen more to other people than they do their own parents. You can sit and drill it in their head, yet if somebody else is telling it, then they do a lot better. They tell you more about it too.”

—caregiver focus group participant

“And it’s one more person. It’s not just the parents, not just the teacher. It’s one more outside influence person coming in to tell them something.”

—caregiver focus group participant

Teachers reported that NEP assistants were well-prepared when they arrived for the lessons. NEP assistants shared that being organized was one of the most important factors in administering the number of lessons needed during the intervention period. Snacks were prepared in advance and stored in easy to distribute containers, and NEP assistants reported that this preparation was essential for completing the lesson in the 30-minute timeframe.

“I think that they had the food prepared; there was no time or chaos during the distribution of the snack, and I thought that went very well, having it already prepackaged in his cooler, and then he could just hand those out individually. So I think he did a very good job.”

—classroom teacher

As part of the intervention, the NEP assistants would engage the children with questions about the book and about fruits and vegetables during the lesson. Teachers reported that this was an effective method for keeping the children engaged. During the onsite observations, NEP assistants tailored the questions to the age group of the children. For example, one NEP assistant stressed role modeling for the third-graders and the importance of setting a positive example for the younger children.

“I don’t think I would change anything with the lessons because they worked very well with my students. I feel that they learned from them and enjoyed them at the same time. Also, I liked the fact that he asked them questions about the stories.”

—classroom teacher

In order to improve the effectiveness of the NEP assistants, some teachers suggested providing them instruction in classroom management skills. Program administrators and NEP assistants also mentioned this as a possible area of improvement for training. During onsite visits, observers also noted that some NEP assistants were occasionally challenged with maintaining control in the classroom.

“I don’t know what kind of training they had as far as classroom management. Sometimes they wouldn’t set forth rules and standards before they got started, and he was soft spoken, so sometimes it would get real wild, and they had a hard time getting the class under control. Maybe if they had more training on classroom management...”

—classroom teacher

“Again, it’s all about maintaining control, which is another thing that would be great in the training—how to maintain control during activities, because you can’t be overly bearing on them—that doesn’t work. But you can’t just go, ‘Oh, here are some jump ropes; go jump rope’”

—NEP assistant

c. Easy-To-Implement Curricula and Lesson Guides

NEP assistants found the LEAP2 program easy to teach and felt that the lesson guides were simple and straightforward. They felt comfortable following the lesson guides and reported making very few modifications to the lessons.

“The lesson plans are written in a way that is easy to convey. The books are not very complicated or hard. It can be done without a lot of stress or worry.”

—NEP assistant

“It was really simple to teach; it was great The facilitator’s guide was very clear cut. You go in, you read the book, you do the activity, you ask questions, you give the snack That was it.”

—NEP assistant

NEP assistants and some teachers reported that the physical activity section of the LEAP2 lesson was sometimes challenging due to space constraints. Most modifications to the lessons reported by NEP assistants were made to the activity portion of the lesson. As an example, one lesson, *More Spaghetti, I Say*, involved using a jump rope. Some educators modified the activity to work in the smaller classrooms by having the children jump in place or pretend using imaginary jump ropes.

“And so we’d grab imaginary jump ropes, and then we would jump. And that worked beautifully; nobody was injured, everybody had enough room, but we still hopped to our hearts content and I think we jumped for a minute straight to the Spaghetti Hop.”

—NEP assistant

Seventy-five percent of surveyed teachers said they were able to incorporate nutrition messages from the LEAP2 program in their classroom. Teachers described different ways of sharing the information and commented that often the students would connect something in class to the LEAP2 lessons or educators. Some teachers requested activities or materials that they could incorporate in the classroom to help reinforce the LEAP2 messages.

“Across the curriculum, as the subject came up, we incorporated what we had learned in LEAP2.”

—classroom teacher

“Maybe if they gave us more resources to go along with the program—maybe hands-on activities you could do in the classroom—that would help.”

—classroom teacher

d. Food Tasting Well-Received by Children and Teachers

Teachers, NEP assistants, and caregivers cited the food tasting as an essential and favored component of the LEAP2 lessons. When teachers were asked in the online survey what worked well in the LEAP2 program, the books, activities, and food tasting were all mentioned, but the component most often cited

was the food tasting. Teachers and caregivers shared that the food tasting allowed children to experience foods that they had never tried before. While only 39 percent of caregivers surveyed reported that their child mentioned the food tasting at school, caregivers in the focus groups shared that the food tasting was the aspect of the program most often mentioned by their children.

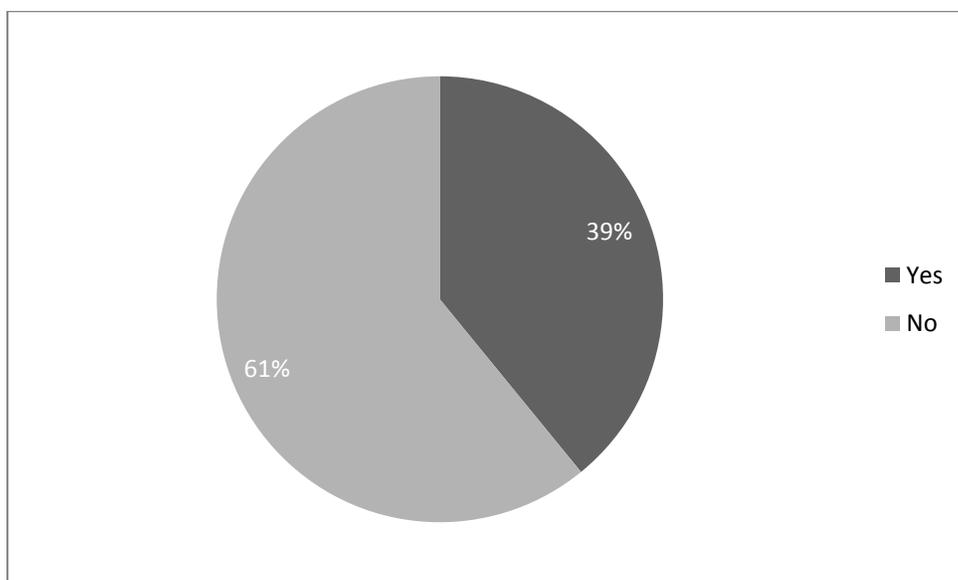
“The one thing that my daughter keeps bringing up is tasting food, getting to taste food.”

—caregiver focus group participant

“Their favorite thing, without a doubt, is the snack, the eating part. They were just overjoyed to see that surprise and what that bag held each day.”

—NEP assistant

Figure II-5. Percentage of Parents Who Reported That Their Child Mentioned the Food Tasting at School



N = 391; this number excludes the four respondents who answered “Don’t know” or had no response to this question.

Source: Parent Follow-Up Survey, Appendix C.

NEP assistants reported that as the intervention continued, children became less resistant to trying the foods. Teachers credited the NEP assistants’ approach for the number of children willing to try the snack. The NEP assistants offered several suggestions for motivating the children to try the snack, including establishing rules for commenting on the taste (e.g. no negative comments allowed) and having the all children try the snack at the same time. Although most NEP assistants felt that all the snacks worked well, they believed that the snacks where the children were included in the preparation were the most successful.

“From observing myself, at the beginning of the curriculum lots of students were resistant to trying new foods and by the end of the curriculum very few were resistant to trying new foods.”

—NEP assistant

“No, they really enjoyed trying the foods and testing and everything—some of the kids had never tried things like that—and the way the presenters would say, ‘Just nibble it; if you don’t like it, you don’t have to eat it.’ But we didn’t want any ‘oohs’ or ‘nasties’ or anything like that. [They would say] ‘Try it; if you don’t like it, just wrap your napkin up,’ and that’s it.”

—classroom teacher

NEP assistants reported that preparing snacks took a great deal of time and effort and everyone in the office was involved in the process. There were a few incidents reported where snacks assembled the night before the class had lost their consistency and had to be prepared again the morning of the class. NEP assistants stated that the challenge of preparing the food would be one barrier to implementing the program on a large scale throughout the school system.

“If it wasn’t for half of this office working together as a team, it would not have happened; there’s no way, because, I mean, you’ve seen how my days went—just hustle and bustle, and you don’t have time to do anything.”

—NEP assistant

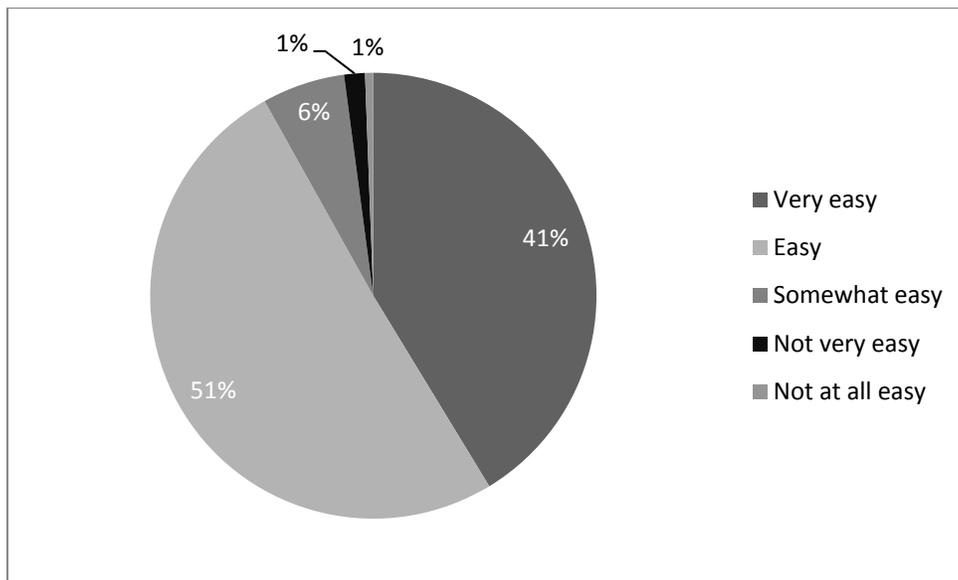
e. High Degree of Satisfaction With Indirect Education Materials

Several aspects of the newsletters appealed to both teachers and caregivers, including the appearance of the newsletters, the fact that they reinforced the messages in the lesson, and the recipes that incorporated fruits and vegetables. Of the caregivers surveyed that reported receiving the newsletter, 92 percent found the newsletter “easy” or “very easy” to read. Newsletters were written at a fifth-grade reading level with short, easy-to-read sections reinforcing key messages from the lesson. Caregivers in the focus groups commented that the bright and colorful design, along with the glossy texture of the newsletter, made it more likely that they would notice them among their child’s papers.

“Well, for one thing, if we got this in the backpack, we probably wouldn’t just toss it because of the texture of this. It doesn’t look like a runoff sheet, so that would be your first thing to reach parents—the quality of the paper and the color. We don’t hardly ever get things sent home using color because of the cost.”

—caregiver focus group participant

Figure II-6. Parents' Level of Understanding of the Newsletters Sent Home



N = 332; this number excludes the 63 respondents who answered "Don't know" or had no response to this question.

Source: Parent Follow-Up Survey, Appendix C.

Teachers shared that they thought that students may not always communicate what they had learned in the classroom to their caregivers and that the newsletters are an effective way to do that. They also felt that the newsletters would give caregivers opportunities to reinforce messages at home. Seventy-one percent of surveyed caregivers "agreed" or "strongly agreed" with the statement, "I used information from the newsletters to help my child eat healthier meals." In focus groups, caregivers reported that the newsletter helped them communicate with their children around the topic of nutrition and health.

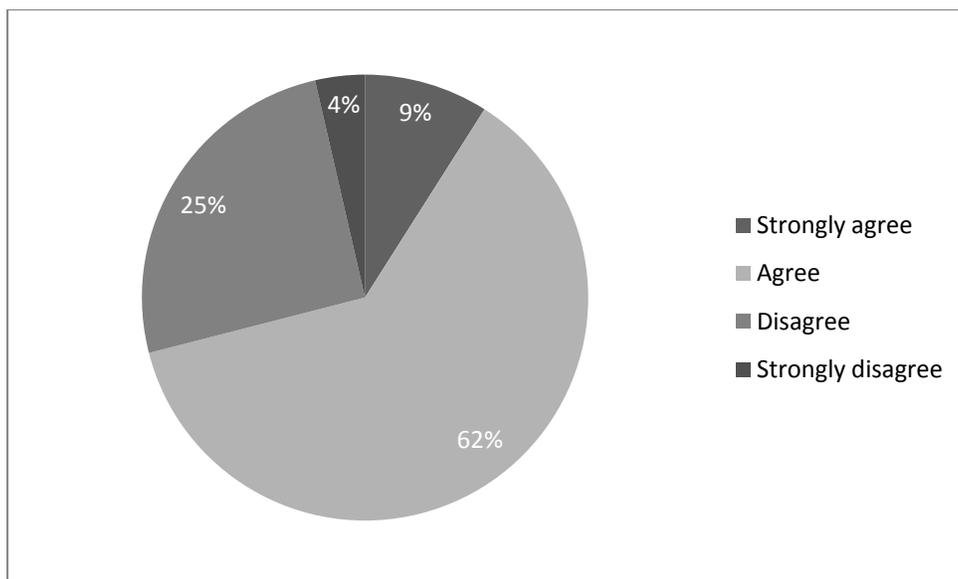
"I've already reached almost the teenager stage with them, where 'Mom's just not important to talk to anymore; forget it,' but this opens a door of communication."

—caregiver focus group participant

"Well, I just liked that it gave an overview of what the kids did that week in LEAP2 and how it just related nutrition with the book and with the recipe that it gave, and it did give parents some ideas of how they can continue at home with nutrition. I did enjoy that."

—classroom teacher

Figure II-7. Parents' Perception of the Usefulness of the LEAP2 Newsletters in Helping Their Child Eat Healthier Foods



N = 335; this number excludes the 60 respondents who answered "Don't know" or had no response to this question.
Source: Parent Follow-Up Survey, Appendix C.

Included in each newsletter is a low-cost recipe featuring fruit and vegetables. In interviews and focus groups, the recipes were reported to be the most valuable feature of the newsletters. Some caregivers reported that children would ask to make the recipes in the newsletter.

"My oldest was excited. Was there one day you sent out a recipe for pancakes or a muffin or something like that, maybe with using pumpkin? I can't remember, but she was so excited. She was like, 'We've got to make this!'"

—caregiver focus group participant

"I liked the recipes that were always on the back of the papers. Some of the students said they would go home and make them with their parents. We would talk about whether or not they liked the recipe."

—classroom teacher

Several caregivers were not aware that the newsletter was connected to the LEAP2 lessons their children were receiving in school. Some said that they would have looked at the newsletters more closely if they had known they were connected to the lesson. Suggestions from caregivers about how to inform them about the program are offered in the challenges section below.

"I had no idea that it had anything to do with a program that you were teaching at school. I was seeing these things come home; I had no idea that the two were correlated."

—caregiver focus group participant

Suggestions for improving the newsletters included making it more child-friendly to encourage the students to take it home, including the recipe for the snack that was distributed in class, adding activities

for caregivers and children to complete together, and offering ideas for quick easy snacks that caregivers could make with their children or send to school on snack day.

"Maybe on the back, instead of [having] every time a recipe—like, once a month, put a star chart maybe with vegetables, activities, and things like that and maybe something that they can keep track of and they can get rewarded for doing—for eating vegetables and eating the right foods and doing an activity."

—caregiver focus group participant

f. Strong Community Partnerships and Successful Recruitment of Schools

Both the county extension and school staff described how the relationship between the schools and the cooperative extension program facilitated initial recruitment and engagement of the schools during the intervention. NEP assistants reported that other curricula they had implemented in the schools were well-received by classroom teachers and administrators. The LEAP2 curriculum was developed to support the Kentucky Core Academic Standards, and both the school and cooperative extension staff reported that this was a facilitator to successful recruitment of schools.

"The nutrition content lends itself well to the Kentucky core content. It deals with practical living and health and corresponds to the core content, so it fit right into our program of studies."

—school principal

School principals offered a suggestion for implementing the program in their schools. Some principals interviewed had designated one person to be primarily responsible for program coordination in the school and felt that this helped the program run smoothly and improved communication during the LEAP2 program. Some principals designated a teacher, while, in other schools, the family resource center director was selected.

"Find someone who has the dedication to the program; someone who values nutrition. Our resource center director is just wonderful. I can't say enough about her."

—school principal

When asked about challenges to implementing the LEAP2 program, most NEP assistants cited scheduling as the biggest challenge. They described dealing with shifting schedules and the need to be flexible when working with schools. Several NEP assistants reported working through family resource coordinators to help with scheduling. In Perry County, the family resource coordinators were used to coordinate the schedules in most schools. NEP assistants shared that it was easier for them to coordinate the schedules through the coordinators than to arrange the schedules with each teacher individually. The NEP assistants reported different levels of engagement and responsiveness from different family resource coordinators.

"It is easier for her [the family resource coordinator] to coordinate onsite with 12 teachers than for me to e-mail 12 teachers individually and try to coordinate a schedule. Not all the schools are doing it this way, but the majority of schools are working through the family resource centers on this project."

—NEP assistant

2. Challenges to Implementation and Opportunities for Improvement

Key stakeholders reported several challenges faced during the implementation of the LEAP2 program. This section provides a description of the challenges identified followed by recommendations for program improvement to specifically address some of the challenges or barriers cited.

a. Training for NEP Assistants

NEP assistants and county extension agents reported that the training and preparation offered by the State extension staff prior to the program was not as extensive as they would have liked. Although the form of preparation and training offered to educators in Laurel County and Perry County differed because of disparity in previous training and field experience, NEP assistants in both counties expressed dissatisfaction with the preparation they received to implement the LEAP2 curriculum. NEP assistants and extension agents in Perry County, who reported having less experienced NEP assistants, shared more negative feedback about the preparation they received than extension staff in Laurel County.

"I feel like we should have been given some sort of training, face to face or hands on. To some degree, you'll go in and wing some of this. It can be done, but I'd feel more confident about the program if I had some training."

—NEP assistant

"They went and it was a PowerPoint presentation with very little information about implementation of the project."

—extension agent

▲ Opportunities for improvement

NEP assistants and county extension agents offered suggestions for improving the preparation that they received to implement the LEAP2 program, including adding some interactive practice and inviting educators who have administered the LEAP2 program in the classroom to attend the training and offer best practice tips.

"Probably the best way [to prepare] would be hands-on activities—actually going through the lessons [and] trying some of the activities out in a controlled environment in the training room."

—NEP assistant

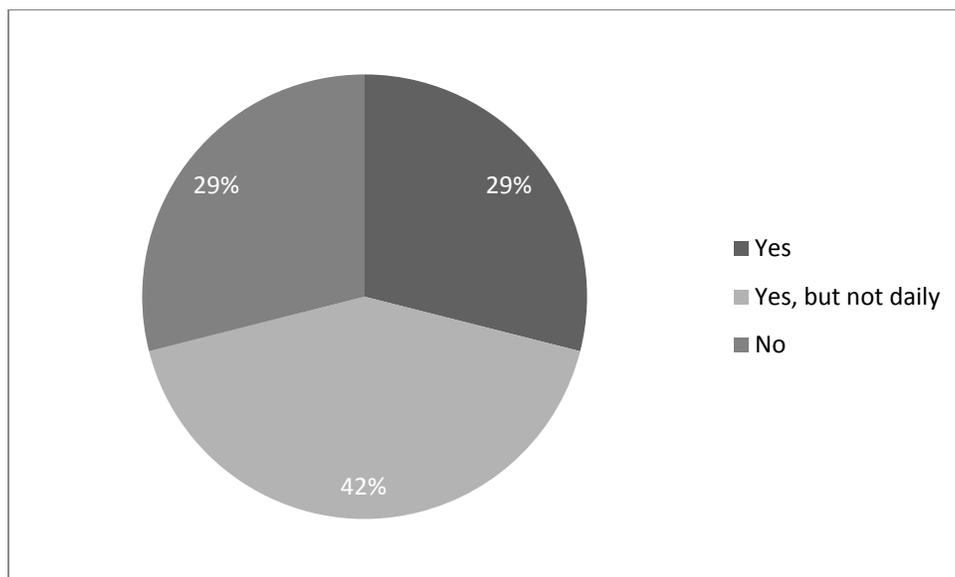
"Bring in someone who is actually in the classroom as well as someone who has the program information."

—NEP assistant

b. Difficulty of Implementing a Daily Fruit and Vegetable Calendar in the Classroom

The greatest challenge to LEAP2 implementation cited by both teachers and NEP assistants was completing the daily fruit and vegetable calendar. Although some teachers indicated that the fruit and vegetable calendar was useful to help the children think about what they were eating, only 29 percent of teachers reported being able to utilize the fruit and vegetable calendars with the children each day. Time and inability of children in primary school to complete the food recall were cited by teachers as the two greatest barriers for completing the calendars.

Figure II-8. Teachers' Responses to the Question, "Were you able to complete the daily fruit and vegetable calendar with your students?"



N = 38. Source: Teacher Follow-Up Survey, Appendix G.

Many teachers cited time as a barrier to completing the fruit and vegetable calendars. They shared that due to their busy schedules, they frequently did not complete the calendars, often for several days at a time. Teachers described the difficulty of trying to have children go back and remember several days of what they had eaten and felt that this detracted from the purpose of the using the calendars as a learning experience and resulted in inaccurate data.

"I didn't get to do it very regularly with them. It was on the backburner with all the lessons taught and everything else. We maybe pulled it out once every 3 weeks. They were not good at all at remembering what they ate. The calendar was ineffective."

—classroom teacher

Teachers and NEP assistants both questioned the ability of students in the first, second, and third grades to remember what they had eaten the previous day. This was most cited by the first-grade teachers, but the second- and third-grade teachers also questioned the ability of their students to remember accurately what they had eaten. One challenge mentioned frequently by teachers and educators was that children so young are still learning about what fruits and vegetables are, which made it difficult for them to complete the calendar.

"That was a disaster. With primary kids, they can't remember. If they don't do it right then, they are not going to remember tomorrow what they ate today. So it really wasn't accurate. It would be nice if they could come up with a better way to do that."

—classroom teacher

"Many children do not have an understanding of which foods are fruits and vegetables. They definitely do not understand the concept of servings."

—classroom teacher

▲ Opportunities for improvement

Several suggestions were offered for improving the fruit and vegetable calendars. Teachers suggested having the calendars completed at home with the help of the caregivers or NEP assistants during the weekly lessons. The teachers shared that at this age, caregivers would need to be involved to track meals eaten in the home. Other suggestions included the following:

- Removing weekend days,
- Creating a child-friendly way to identify fruits and vegetables such as pictures that the children could circle to indicate what they had eaten,
- Designating a consistent time to complete the calendars each day (e.g., after lunch)
- Creating a bound log book that children can carry with them to record fruits and vegetables, and
- Offering an incentive for completing the calendar.

"I think maybe even just sending something home with the parents and having the parents help them track it [would help], just maybe one meal a day—just do how many they ate for breakfast or how many they ate for dinner."

—classroom teacher

"If there was [a calendar] maybe made into a little booklet, so they can just kind of keep it and just kind of flip through it, instead of having to pass out the folders with the loose leaf, because they can't ever get the papers back in—the little ones can't."

—classroom teacher

Teachers stated that more training might have helped them use the fruit and vegetable calendars more effectively as part of the intervention. County extension staff cited challenges in getting the teachers together for in-services, with some schools charging for in-service time. Suggestions for further engaging teachers included providing an informational document or an online training option.

"I really didn't do a whole lot with the fruit and vegetable calendar. Maybe if I had been trained more on it, I would have known really what to do with it; I really didn't use it that much in the classroom."

—classroom teacher

c. Maximizing Caregiver Involvement and Engagement in the Program

Program administrators, school staff, and caregivers themselves discussed the need to further involve caregivers in the LEAP2 program beyond just the provision of the newsletter. Two reasons for engaging caregivers in the program were cited: (1) caregivers are the primary shoppers and are responsible for the cooking and feeding of their primary school-age children, and (2) engaging caregivers early would allow them to support the messages of the LEAP2 program in the home. Caregivers commented that if they had known that their children would come home asking for certain fruits and vegetables or certain recipes, they would have been better prepared to respond appropriately.

"I know the material was good. The kids were excited. The only part I question is the parent education part of it. Students had buy-in, teachers had buy-in, but I think we all lacked a little by not getting the parent involvement at the beginning."

—school principal

"It works really well, especially with this type of program, because the child can't do the nutrition on their own. They can't."

—caregiver focus group participant

▲ Opportunities for improvement

Several ideas for engaging caregivers were offered by caregivers, school staff, and NEP assistants. The most common suggestions included providing an introductory session or event for caregivers to explain the LEAP2 program, offering lessons or classes for caregivers, and creating a Web site with information about the LEAP2 program and other resources for caregivers.

School staff and caregivers involved in the focus groups suggested an introductory session for caregivers to explain the LEAP2 program and to offer ideas to reinforce messages children were receiving in the classroom. Some caregivers suggested having a family night where they could be involved in tasting some of the snacks and participating in some of the learning activities. When asked about the best time for an event, the two most common suggestions were directly after school and after dinner. Some teachers suggested having two sessions to accommodate different caregiver schedules. An introductory letter sent home to caregivers was an alternative approach offered to those who could not attend an in-school event.

"Something I might just suggest is, maybe next year, if we do this program again, maybe have a parent day with the parents at the very beginning . . . and then that way, parents are educated on actually what's going on before it ever starts, so everybody is on the same page."

—caregiver focus group participant

"What might have been good is to have an introductory program: 'Here is what will be offered to your children. Here is what to expect.' Parents might have some initial buy-in to the program and have a greater awareness of what to expect."

—school principal

Another suggestion was to offer a class for caregivers. Caregivers discussed the need to change their own behaviors and requested ideas about incorporating fruits and vegetables into their meals and snacks. They suggested cooking classes or a fitness group for caregivers and their children to participate in together.

"Maybe a class or two on a particular topic or cooking, or maybe ways to try different foods or to incorporate the different things—something along those lines could be a very useful tool for a parent. Maybe offer an adult nutrition class at the same time."

—caregiver focus group participant

Teachers and caregivers suggested providing an online resource tied to the LEAP2 program. In all focus groups, caregivers indicated that they would be interested in a Web site where they could go to get more information. Caregivers mentioned several elements that would be useful on a Web site, including the LEAP2 newsletters, recipes, a listing of the LEAP2 books, photos of children involved in the LEAP2 program, materials or activities to do with children, and interactive online games for children.

"I think, if there's going to be a Web site set up, that it should be—'LEAP to It' should be the name of it . . . and it should have, like, different categories—like she said, little activities to do—and then different recipes and then different stages of stuff, like in this book"

—caregiver focus group participant

"I think getting a Web site would probably be a really helpful tool. After my kids go to bed, after I relax, that's where I have my Facebook page open, and I have whatever else that I'm doing, and it would help—and maybe even an app."

—caregiver focus group participant

d. Choosing Age-Appropriate Books for the Target Audience

Although there was a high degree of satisfaction with the selection of books overall from stakeholders, several NEP assistants and county extension agents reported that some of the books were too young for the age group targeted. They described a significant intellectual and developmental gap between first- and third-graders. At the close of the program, some educators reported being surprised by the reception of the older students to the books, while others still felt that some books were more suited to younger students while other books were more appropriate for the older students.

"There's a big difference between a first-grade reading level and a third-grade reading level, so if you're using the same ones for both of those ages, it might be something that would need to be a little more tailored to them."

—district director

"Some of the books are too young for third-graders and too old for first-graders. If they would have worked with a childhood librarian, there are some more updated/popular books that could have been used. I would use different books for different grade levels."

—extension agent

The majority of teachers, however, felt that the books were appropriate for the children in their classrooms. Several teachers commented that the books tied in well to the lesson and reinforced the central messages and goals of the LEAP2 program. Some NEP assistants described how they would approach the book differently for the different age groups and modify the discussion questions to engage the students at their developmental levels.

"The literature was very age appropriate, and the children enjoyed hearing them."

—classroom teacher

"The stories that they picked were excellent for kindergarten and third grade. They could have picked books where they would have said, 'Oh, that's a baby's book,' but they were really good about the books they chose and how they read and how they tied it into the lesson."

—classroom teacher

▲ Opportunities for improvement

One suggestion offered by several NEP assistants and extension agents was to have a selection of books available for each lesson. Some books would be chosen to appeal to the younger children; others would target the older children. A suggestion offered to improve the reading experience in the classroom, regardless of the age group, was to project the book onto a large screen. Educators shared that having the students be able to see the pictures in the book was integral to conveying the message.

"But if we can take IQ Gets Fit and Happy Healthy Monsters and do Happy Healthy Monsters with kindergarten and first grade and IQ Gets Fit with the second and third, because they cover the same subject—they're both about getting active and stretching and stuff, but IQ Gets Fit is a little bit more advanced, and Happy Healthy Monsters is a little bit less advanced—more for that younger age group. So those two books work well together, and the lesson plans are very interchangeable as well."

—NEP assistant

"I figured out at the end that you could project the book on a large screen whenever the book illustrations were small. That was a great help. It would be wise to incorporate that into the in-service system, and it'd be wise to ensure they had the expertise to use that system."

—NEP assistant

e. Implementation Timeframe

Multiple themes about time emerged from the process evaluation, including the time of year for the implementation to take place, the appropriate length of each individual lesson, and the length of the program intervention overall. All stakeholders discussed the challenge of providing school programming in Kentucky during the winter months. Historically rough winters and difficult travel conditions in rural Kentucky have led to frequent school closings. UKCES program administrators reported planning for the intervention to start in early fall but having to shift the schedule to start in November to complete the necessary independent evaluation data collection. Program administrators felt that the breaks in the curriculum due to the winter holidays may have affected the effectiveness of the implementation and negatively affected the completion of the fruit and vegetable calendars. The recommendation of several stakeholders was to conduct LEAP2 early in the school year to avoid potential winter weather, holiday breaks, and school testing that occurs in the spring.

"The middle of winter is not a good time to do a steady weekly schedule in Perry County. And schools won't let you in after March because of the testing."

—NEP assistant

"November was just a bit too late to start this in order to finish it and not run into problems with the weather and all those sorts of things. So I would have started it earlier."

—extension agent

Several stakeholders described concerns about the length of time allotted for each lesson. Teachers and NEP assistants were divided evenly on their opinion about the length of the class. Some felt that 30 minutes was the appropriate length of time, while others felt that 45 minutes would be more appropriate. The most common reason cited for keeping the lesson to 30 minutes was the attention span of the children. The most common reason cited for extending the lesson to 45 minutes was that the NEP assistants were rushed to complete some of the lessons in the 30-minute timeframe.

"Sometimes it was a little rushed, because by the time that she would get in, get her things set up, and try to get the lesson—so 45 minutes may work better; that way it would give her a little extra time."

—classroom teacher

"Because you don't...you want to keep them wanting more, and so I think 30 minutes is just enough time to get them interested, to get them excited And so I think that if you did it any more, it would be maybe too much of a good thing; and then if you did it less, it would be impossible to get the information in."

—NEP assistant

Several surveyed and interviewed teachers requested that LEAP2 program last for more than 8 weeks. They spoke of the disappointment of the children at the end of the intervention. Teachers also commented that influencing children's eating behaviors may take longer than 8 weeks.

"I'd make it last longer. The sessions were perfect. It only ran for a couple months. I would have it run at least half the school year or longer—the full year. Eating healthy is something that takes a long time to get planted."

—classroom teacher

"I think they could have maybe gone a couple of lessons longer. I mean, the kids—they were kind of just getting into knowing what fruit and vegetables were when it was about time for it to end."

—classroom teacher

▲ Opportunities for improvement

One suggestion offered for having time to implement all the components of the LEAP2 lessons was combining classes and extending the timeframe to 45 minutes. Although some NEP assistants stated that they felt that joint classrooms would not work in the LEAP2 framework, others thought that joint classrooms may allow more time with the material. School staff shared that this would also allow more teachers to be in the room to assist with classroom management.

"It may be beneficial to have larger groups and extend the time to 45 minutes. Sometimes I felt the instructor was a little bit rushed to get all the materials presented in that segment. With a bigger group, they would have more support staff in the room, more collaboration, and more interaction."

—school principal

"We could gain a little more time by combining classes. I don't think it significantly affected the students in terms of their enjoyment of the lesson. Joint classes would have been back to back, and joining them expanded the time I had; and with the longer books, sometimes it was an advantage to do that. I don't like to rush through everything. I owe it to the children to do the best I can...."

—NEP assistant

f. External Factors Reported To Inhibit the Potential for Behavior Change

Cooperative extension staff, school staff, and caregivers described several barriers for increasing children's intake of fruits and vegetables. The four most common barriers cited by caregivers in the focus groups were time, children's preferences, cost, and caregivers' own habits and behaviors. The lack of time to prepare fresh fruits and vegetables was cited by many caregivers as a challenge, and several described busy schedules with sports and other activities that left little time to prepare family meals. Caregivers also cited the children's preferences and pickiness as a barrier to incorporating more fruits and vegetables and shared that it is often easier to fix something the child will like rather than fighting with them to try something new. Several caregivers stated that it is wasteful and costly to buy foods that the

child will refuse to eat. They discussed their own habits and food preferences and the challenge of setting an example for their children.

“And really, as a society, we have lost nutrition because of how busy we are, because we do not sit down as a family anymore and cook. We stay on the run; we go through fast food. And so I think this kind of program is especially good for this day and age because of the fact that we do not get blueberries at the drive-thru. You only get them when you purchase them and bring them home.”

—caregiver focus group participant

“You get certain things that you know they’ll eat, and you stick with it, with the picky child. I mean, when you’re trying to throw a dinner together for six people and you got one that doesn’t like anything, it’s hard to do that...”

—caregiver focus group participant

▲ Opportunities for improvement

Caregivers offered several suggestions for encouraging children to eat fruits and vegetables at home. The most commonly offered suggestion was letting children help prepare or shop for the foods. They explained that if children help to prepare meals, they are more likely to eat them. Caregivers also talked about sneaking vegetables into their child’s favorite foods, offering choices, and setting an example by eating fruits and vegetables themselves.

“They tend to eat it better...if they have a little say or a little help, even if it’s the most miniscule involvement.”

—caregiver focus group participant

“Well, a lot of times, you have parents who tell their kids they need to eat and drink healthy, but they don’t. So I think you’ve got to set the example, and then a lot of times they’ll follow it if, you know, they see you doing the right thing, making the right choices.”

—caregiver focus group participant

Chapter III • Impact Evaluation Methods and Results

A. Conceptual Framework for the Impact Evaluation

To provide an integrated understanding of the impacts of the LEAP2 program, the analysis was guided by a conceptual framework that helped track the range of potential program effects. The framework enabled the evaluation of the effects of the LEAP2 program through the specification of secondary outcomes that link the intervention to the long-term outcome of children’s average daily at-home consumption of fruits and vegetables. The secondary outcomes capture, in greater detail, the complexity of the behavior change process. The greater the number and strength of the changes seen among the secondary outcomes, the greater the likelihood of observing changes in fruit and vegetable consumption.

Key Findings

Primary Impacts:

- The LEAP2 program had no statistically significant impact on children’s average daily at-home consumption of fruits and vegetables.

Secondary Impacts:

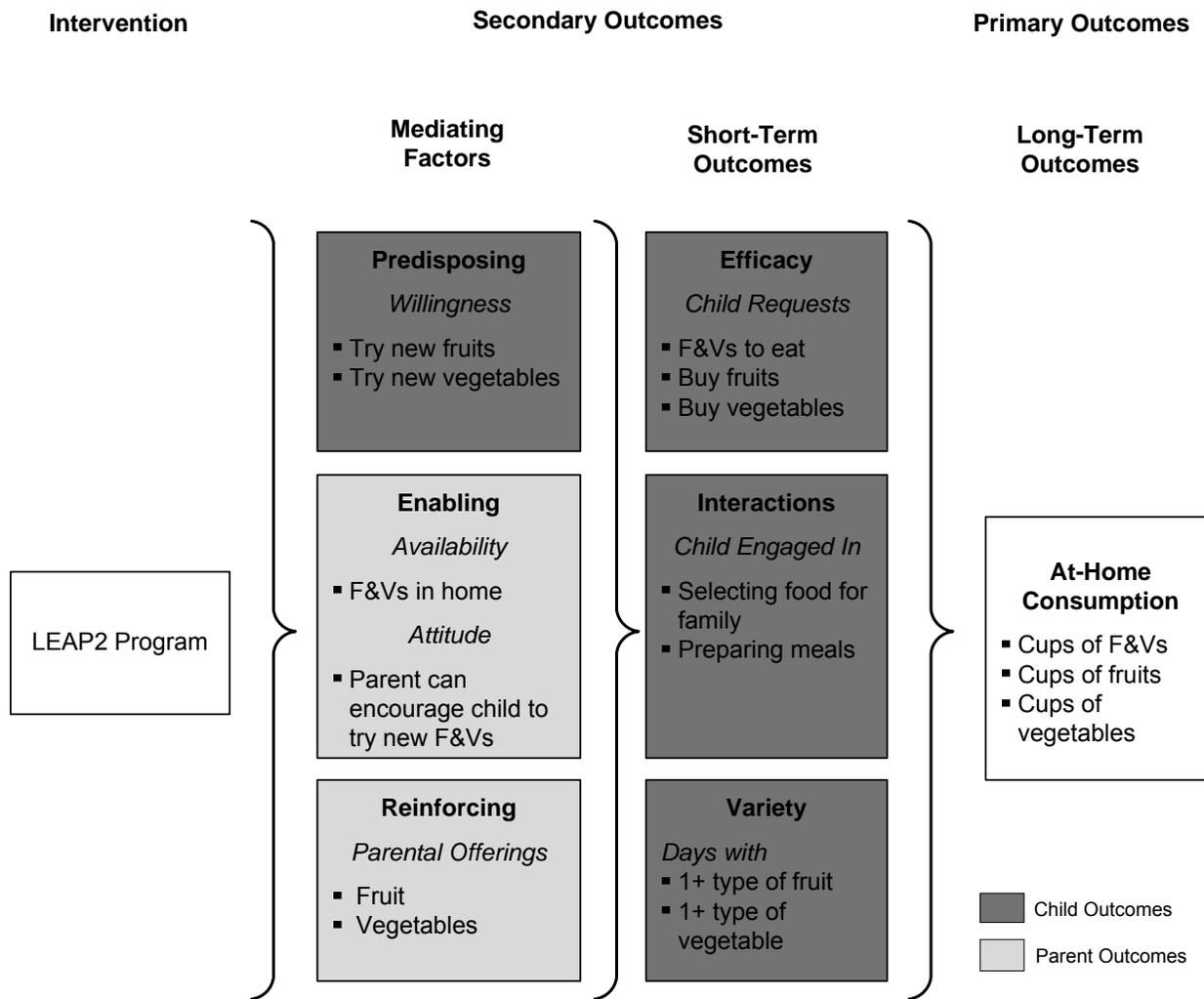
- There was a statistically significant impact on availability of fruits and vegetables among households with children exposed to the LEAP2 program compared with those not exposed to the program.

The framework presented in Figure III-1 is adapted from Green et al. (1980). It has been applied in other studies to capture the main types of secondary outcomes associated with changes in nutrition behavior (Mullen, Hersey, & Iverson, 1987). The secondary outcomes include mediating factors and short-term outcomes. Three main types of mediating factors can influence changes in dietary consumption:

- ▲ **Predisposing factors** include the knowledge and attitudes of an individual related to the motivation to act. In this evaluation, an example of a predisposing factor is the willingness of a child to try new fruits and vegetables.
- ▲ **Enabling factors** include the skills and resources needed to engage in good nutrition practices. In this evaluation, an example of an enabling factor is the availability of fruits and vegetables in a child’s home.
- ▲ **Reinforcing factors** include factors that help reinforce healthy nutrition. In this evaluation, an example of a reinforcing factor is a parent or caregiver offering fruits and vegetables as options for snacks or at dinner.

These mediating factors could affect dietary-related behaviors that are short-term outcomes, for example, the child asking to have fruits or vegetables to eat or the child eating a variety of fruits and vegetables each day. These short-term outcomes are directly related to lessons in the LEAP2 curriculum. For example, according to the model, greater willingness to try new fruits and vegetables may influence the frequency with which a child eats a variety of fruits and vegetables or asks to have fruits or vegetables to eat. Changes in these short-term outcomes might, in turn, influence at-home consumption of fruits and vegetables.

Figure III-1. Conceptual Framework for the LEAP2 Program Impact Evaluation



Source: Green, L. W., Kreuter, M. W., Deeds, S. G., & Partridge, K. B. (1980). *Health education planning: A diagnostic approach*. Palo Alto, CA: Mayfield Publishing Co.

Although this conceptual framework is helpful in tracking program impacts, it is not intended to represent a comprehensive logic model for the LEAP2 program. The program could also affect consumption through other pathways that are not reflected in this framework. Nonetheless, the use of this conceptual framework helps provide a fuller evaluation of the impacts of the LEAP2 program.

B. Methodology

1. Evaluation Design and Sample Selection

The LEAP2 program evaluation was designed to examine the implementation and impact of the program on first-, second-, and third-grade students attending schools in Laurel and Perry Counties, KY, by using a fully randomized experimental research design. To control for potential differences between the two counties, schools were matched within the county. Data provided by UKCES on school size (number of

anticipated first- through third-grade students) and percentage of students receiving free and reduced-price meals were used to create matched pairs. For each matched pair, schools were randomly assigned to either the intervention group or the control group, each having eight members.

Sample size was estimated following commonly accepted evaluation practices (80 percent statistical power and a type I error rate of 0.05 with a two-tailed test). Sample size estimation was based on observing a change in reported daily at-home consumption of fruits and vegetables combined of 0.30 standard deviation units or better, as specified by FNS. Estimates are based on a statistical model that assesses change across time between the intervention and control groups. This analysis indicated that to observe a net difference of 0.30 cups with eight schools in each study condition, completed baseline and follow-up information would be needed from 640 parents or caregivers. Appendix H provides additional information on the evaluation design and sample size calculations.

2. Primary and Secondary Outcome Measures

Exhibit III-1 lists the primary and secondary outcome measures for the impact evaluation of the LEAP2 program. The independent evaluators estimated the impact of the program on the primary outcome measure of the child's average daily at-home consumption of fruits and vegetables as reported by their parents or caregivers. It was hypothesized that children participating in the program would increase their average daily at-home consumption of fruits and vegetables combined by approximately 0.30 cups per day compared with children not participating in the program. The secondary outcome measures describe mediators and short-term outcomes that may influence at-home consumption of fruits and vegetables. The secondary outcome measures are grouped into two categories: (1) the child's other dietary behaviors and (2) the parent's or caregiver's behavior and household variables.

3. Instrument Development and Testing

To develop the impact evaluation instruments for the baseline and follow-up surveys, the independent evaluators reviewed UKCES' application and the program curriculum and talked with the UKCES project staff to identify the primary and secondary outcome measures for the intervention. Existing instruments as compiled for the literature review conducted for Wave I of this study (Altarum & RTI International, 2009) were reviewed to identify those that address these outcomes and are feasible, appropriate for the target audience, reliable, valid, and sensitive to change.

In developing the impact instruments, the appropriateness of the instruments for collecting data on fruit and vegetable outcomes was assessed. Exhibit III-2 provides information on the study population, mode(s) of data collection, reliability, validity, and sensitivity to change for the instruments used to develop the questionnaire items on outcome measures. The majority of the items were taken or adapted from instruments that have been administered successfully with low-income audiences, validated, and demonstrated to be reliable and sensitive to change in previous studies.

Exhibit III-1. Primary and Secondary Outcome Measures for the LEAP2 Program Impact Evaluation

Primary outcomes: child's dietary intake at home
Cups of fruits and vegetables consumed on a typical day ^a
Cups of fruits consumed on a typical day
Cups of vegetables consumed on a typical day
Secondary outcomes: child's other dietary behaviors at home
Number of days child ate more than one type of fruit during past week
Number of days child ate more than one type of vegetable during past week
Willingness to try new kind of fruit
Willingness to try new kind of vegetable
Frequency that child asked parent to buy a certain type of fruit during past month ^b
Frequency that child asked parent to buy a certain type of vegetable during past month ^b
Number of days child asked to have fruits or vegetables to eat during past week
Number of days child helped select food for family during past week
Number of days child helped make or cook a meal during past week
Secondary outcomes: parent's behavior and household variables
Availability of fruits and vegetables at home during past week ^c
Number of days parent gave fruit as a snack during past week
Number of days parent gave fruit at dinner during past week
Number of days parent gave vegetables as a snack during past week
Number of days parent gave vegetables at dinner during past week
Parent can encourage child to try new fruits or vegetables ^d

^a This measure represents an index of dietary intake created by summing two survey items: One asks for the number of cups of fruit eaten in the home and the other asks for the number of cups of vegetables eaten in the home. Each survey item includes response options that range from none to 3 or more cups, giving the index a range of 0 to 6 or more.

^b Response categories were converted to a dichotomous variable, with 0 = "never" or "seldom" and 1 = "sometimes," "most of the time," or "almost always."

^c Calculated an index score (0-9) based on the number of the following fruits and vegetables available in the home during the past week: bananas, apples, grapes, raisins, berries, celery, carrots, broccoli, and zucchini.

^d Response categories were converted to a dichotomous variable, where 0 = "strongly disagree," "disagree," or "agree" and 1 = "strongly agree."

For the primary outcome measures, child's dietary behavior, questions from previously validated instruments, the Food Stamp Program Fruit and Vegetable Checklist (Townsend, Kaiser, Allen, Joy, & Murphy, 2003) and University of California Cooperative Extension Food Behavior Checklist (Townsend, Silva, Martin, Metz, & Wooten-Swanson, 2008) were modified to ask the respondent (parent or caregiver) to report on his or her child's consumption of fruits and vegetables. Respondents were instructed not to include meals eaten at school or in childcare settings so that they were reporting only on observed consumption behavior.

To test and refine the instruments, cognitive interviews were conducted with nine parents and/or caregivers. The readability of the instruments was assessed using the Fry test, which examines the proportion of syllables and sentence length and is a commonly used measure of reading level (Fry, 1968).

Exhibit III-2. Summary of Instruments Used to Develop Impact Instruments for the LEAP2 Impact Evaluation

Outcome Measures	Instrument	Study Population(s)	Mode(s) of Data Collection	Reliability	Validity	Sensitivity to Change
Cups of fruits, vegetables, and fruits and vegetables consumed by child on a typical day ^a Child ate variety of fruits each day ^a Child ate variety of vegetables each day ^a	Food Stamp Program Fruit and Vegetable Checklist (Townsend et al., 2003) University of California Cooperative Extension Food Behavior Checklist (Townsend et al., 2008)	Low-income women	Self-administered, self-administered in group setting, and interviewer administered individually and in groups	The internal consistency for the 7-item fruit and vegetable subscale was high ($\alpha = 0.80$)	The 7-item fruit and vegetable subscale showed a significant correlation with serum carotenoid values ($r = 0.44, p < 0.001$), indicating acceptable criterion validity, and showed significant correlation with dietary variables	Demonstrated sensitivity to change for items expected to change as a result of the study intervention
Willingness of child to try new fruits Willingness of child to try new vegetables	Willingness to try new fruits and vegetables (Jamelske, Bica, McCarty, & Meinen, 2008)	4 th -, 7 th -, and 9 th - graders	Self-administered	Not reported	Not reported	Compared with controls, intervention participants reported an increased willingness to try new fruits and vegetables at school ($p < 0.01$)
Availability of fruits and vegetables at home during past week	Fruit, juice, and vegetable availability questionnaire (Marsh, Cullen, & Baranowski, 2003; Cullen et al., 2003)	Parents of 4 th - and 6 th -graders	Self-administered and interviewer administered via telephone	The internal consistencies for the fruit and vegetable availability items were high	There was significant agreement between self-reported and observed at-home availability for all fruit juices and most fruits and vegetables	Fruit, juice, and vegetable availability was a significant predictor of child fruit, juice, and vegetable consumption ($p < 0.05$)

^a The questions were modified to ask the respondent (parent or other caregiver) to report on his or her child's consumption of fruits and vegetables.

The questions were between fifth- and seventh-grade reading levels. Appendix C provides a copy of the final survey instruments, and appendix D provides a copy of the supplemental survey materials.

4. Survey Administration Procedures and Response

To collect information on the program's impact, a survey was administered to parents and caregivers of children who participated in the evaluation before and after the intervention. To maximize the response rate for the survey, a multimodal survey approach was used. Working with the schools in the study, packets with information on the study were sent home with students. The survey was mailed to parents and caregivers who consented to participate in the study. Nonrespondents to the mail survey were contacted by telephone. For the follow-up survey, the survey questionnaire was mailed and telephone follow-ups were made to nonrespondents. Respondents received \$10 cash for completing the baseline survey and \$15 cash for completing the follow-up survey. Appendix H provides additional information on interviewer training and the survey procedures.

At baseline, 475 participants in the intervention group (78 percent response rate among those agreeing to participate in the study) and 432 participants in the control group (77 percent response rate) completed the survey. At follow-up, 395 participants in the intervention group (83 percent response rate) and 373 participants in the control group (86 percent response rate) completed the survey, thus meeting the required sample size of 320 participants per group at follow-up.

5. Impact Analysis Procedures

To prepare the dataset for the impact analysis, the survey dataset was examined and some exclusions were made. To avoid clustering within families, a post hoc examination of the survey data was conducted to identify parents and caregivers who have more than one child attending a study school in the first through third grades. In such cases, a random selection process was used to select the index child for inclusion in the analysis dataset. This resulted in excluding 58 baseline responses and 45 follow-up responses; thus, a total of 450 respondents in the intervention group and 399 respondents in the control group were included in the baseline analysis. Additionally, responses for parents and caregivers in which the child changed to a school assigned to a different study condition (e.g., from a control school to an intervention school) during the evaluation period were excluded. This resulted in excluding two follow-up responses.

The impact evaluation included repeated measures on individual respondents who are nested within schools and schools that are nested in a study condition (intervention or control). When data are nested, responses within the same cluster tend to be correlated. If the correlated nature of the data is ignored in the specification of the model, it is likely to lead to inflated type I error rates. A series of hierarchical, or mixed-effects, regression models were developed to account for correlated responses by allowing for the inclusion of multiple sources of random variation.

General linear mixed models were used for continuous impact variables, and generalized linear mixed models were used for dichotomous impact variables to evaluate program impacts while accounting for the clustering of children within schools. These models were estimated via difference-in-difference estimates of program effect, comparing change across time (baseline and follow-up) in the intervention group with change across time in the control group. Covariates in the model included child age, child sex, household size, respondent race and/or ethnicity, respondent age, and respondent sex. Missing data for covariates ranged from 2.0 to 2.9 percent of responses. Appendix H provides additional detail on the sampling

models and link functions that describe the statistical models used to assess program outcomes and the structural models that detail the explanatory variables and the model coefficients.

Before conducting the impact analyses, the potential impact of attrition from the evaluation study on generalizability of the findings was assessed by comparing the pre-intervention similarity of study participants who provided follow-up data and those who did not.⁹ This was accomplished by fitting a logistic regression model that regressed completion status on variables that describe survey responders and their children (child sex, child age, respondent age, respondent sex, respondent race and/or ethnicity, and household size). This analysis provided odds ratios that highlight any association between the descriptive characteristics of participants and the likelihood of providing data at follow-up.

C. Impact Analysis Results

This section describes the baseline demographic characteristics of parents, caregivers, and children who participated in the evaluation study and the baseline outcome measures, discusses the results of the attrition analysis, and presents the impact results. A p -value of 0.05 was used for determining statistical significance.

1. Baseline Data

The baseline analysis included 849 parent and caregiver respondents: 450 for the intervention group (parents and caregivers of children attending eight schools) and 399 for the control group (parents and caregivers of children attending eight schools). Table III-1 shows the baseline demographic characteristics for parent and caregiver respondents and their children who participated in the LEAP2 evaluation study overall and by study condition. Children in the intervention and control groups were similar with regard to their demographic characteristics. Generally, the characteristics of parent and caregiver respondents and their households were similar for the intervention and control groups except for the proportion of Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) households. At baseline, 20 percent of households in the intervention group had at least one member currently receiving WIC benefits compared with 13 percent in the control group ($p < 0.05$).

Appendix E, Table E-1 shows the baseline outcome measures by study condition.¹⁰ At baseline, there were no statistically significant differences in any of the primary outcome measures between the two study conditions. There was one statistically significant difference between the two groups in a secondary outcome measure. Households in the control group reported greater availability of fruits and vegetables compared with the intervention group (5.06 fruits and vegetables versus 4.71 on a scale of 0 to 9, $p = 0.0248$).

For the primary outcome measure, the baseline mean daily reported at-home consumption of fruits and vegetables combined was 2.28 cups (1.15 for fruits and 1.13 for vegetables) for the intervention group and 2.32 cups (1.16 for fruits and 1.16 for vegetables) for the control group. When looking at these figures, it is important to bear in mind that these data are for at-home consumption of fruits and vegetables and do not include fruits and vegetables consumed while at school or childcare. As a point of reference, the USDA Food Guidance System recommends that children over the age of 5 eat about 1–2 cups of vegetables each day and 1–1.5 cups of fruit each day, depending on the child’s gender and activity

⁹ Attrition includes individuals who did not complete the follow-up survey.

¹⁰ Appendix E, Tables E-2 and E-3 provide the unadjusted baseline means and posttest means for the 378 intervention group participants and 343 control group participants who completed the baseline and follow-up surveys.

level (USDA, 2011). These results suggest that some children may be meeting the guidelines depending on their age and gender. It is also possible that these results reflect some degree of response bias. Figures III-2 and III-3 show the baseline distribution of reported consumption of fruits and vegetables, respectively, for children participating in the LEAP2 evaluation by condition.

Table III-1. Baseline Demographic Characteristics for Parent Respondents and Their Children Who Participated in the LEAP2 Program Evaluation Study, by Condition

Characteristic	Overall (SE)	Intervention Group (SE)	Control Group (SE)	Difference
Child demographics				
Sex, % male	51.16 (1.94)	50.22 (2.74)	52.15 (2.89)	-1.92
Age	7.61 (0.04)	7.55 (0.06)	7.67 (0.06)	-0.11
Parent ^a /household demographics				
Respondent age, %				
18 to 34	50.78 (2.12)	53.38 (2.78)	47.80 (2.94)	5.58
35 to 44	33.95 (2.06)	31.62 (2.73)	36.64 (2.87)	-5.02
45 or older	14.87 (0.85)	14.58 (1.20)	15.25 (1.28)	-0.66
Respondent sex, % male	6.96 (0.87)	6.01 (1.20)	8.04 (1.27)	-2.02
Respondent is Hispanic or Latino, %	2.06 (0.41)	2.08 (0.60)	2.06 (0.63)	0.02
Respondent race, %				
American Indian or Alaska Native	1.42 (0.39)	1.12 (0.55)	1.76 (0.58)	-0.64
Asian	0.82 (0.37)	0.88 (0.52)	0.75 (0.55)	0.13
Black or African-American	0.52 (0.36)	0.52 (0.52)	0.52 (0.53)	0.01
Native Hawaiian or other Pacific Islander	0.12 (0.12)	0.23 (0.17)	0.00 (0.18)	0.23
White	96.08 (0.78)	96.20 (1.11)	95.94 (1.17)	0.26
More than one race ^b	1.08 (0.21)	1.21 (0.29)	0.93 (0.30)	0.27
Size of household	4.45 (0.05)	4.44 (0.07)	4.47 (0.08)	-0.02
Single-adult household, %	17.54 (1.53)	16.93 (2.18)	18.23 (2.29)	-1.30
Member of household currently receives SNAP benefits, %	41.34 (2.94)	40.67 (4.24)	42.09 (4.37)	-1.42
Member of household currently receives WIC benefits, %	16.74 (1.69)	20.24 (1.90)	12.85 (2.02)	7.40*
School-provided food, %				
Received breakfast and lunch ^c	55.00 (3.21)	59.00 (4.43)	50.78 (4.55)	8.23
Received lunch only ^c	27.03 (2.82)	23.57 (3.90)	30.67 (4.01)	-7.10
Received breakfast and/or snacks only	4.06 (0.65)	4.75 (0.87)	3.29 (0.93)	1.46
Did not receive school-provided breakfast or lunch ^c	14.02 (0.89)	12.81 (1.16)	15.39 (1.24)	-2.58
Perceived nutrition environment ^d	12.58 (0.06)	12.61 (0.09)	12.55 (0.09)	0.06
Ate dinner as family ^e	5.16 (0.08)	5.16 (0.11)	5.16 (0.12)	-0.01

Child ate dinner with TV on ^e	2.51 (0.07)	2.56 (0.10)	2.46 (0.10)	0.11
Number of respondents	849	450	399	
Number of schools	16	8	8	

* Indicates statistical significance if the p-value is less than or equal to 0.05.

^a Represents the parent or guardian who completed the survey.

^b Includes respondents who selected more than one race category.

^c Some in this category also reported receiving school-provided snacks.

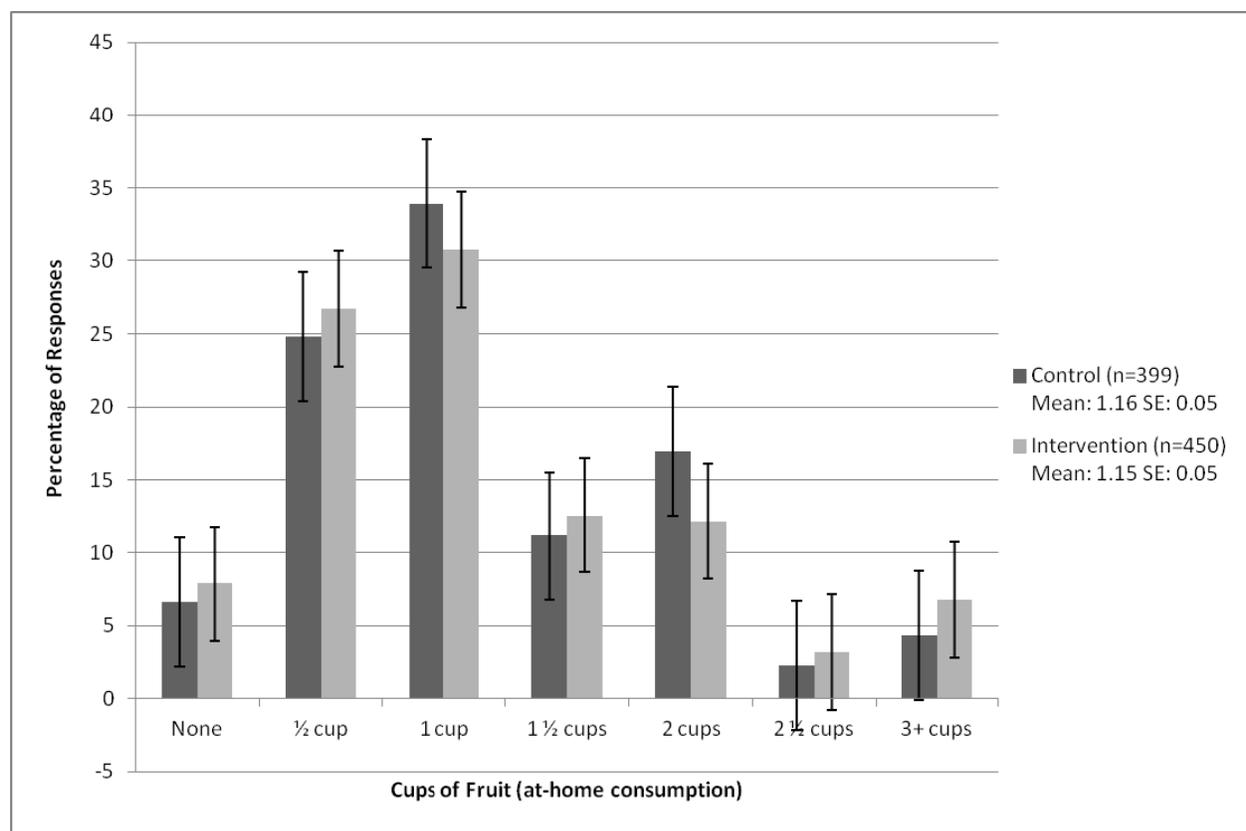
^d Index score (4–16) derived from four items that asked respondents to describe their access to fresh fruits and vegetables in the area in which they live. A higher score indicated perceived greater access to fresh fruits and vegetables.

^e Reported as the number of days in the past week.

Note: Standard errors and *t*-statistics used to test the null hypothesis of no difference between intervention and control groups were derived from model-based comparisons adjusted for clustering of students within schools. SE = standard error.

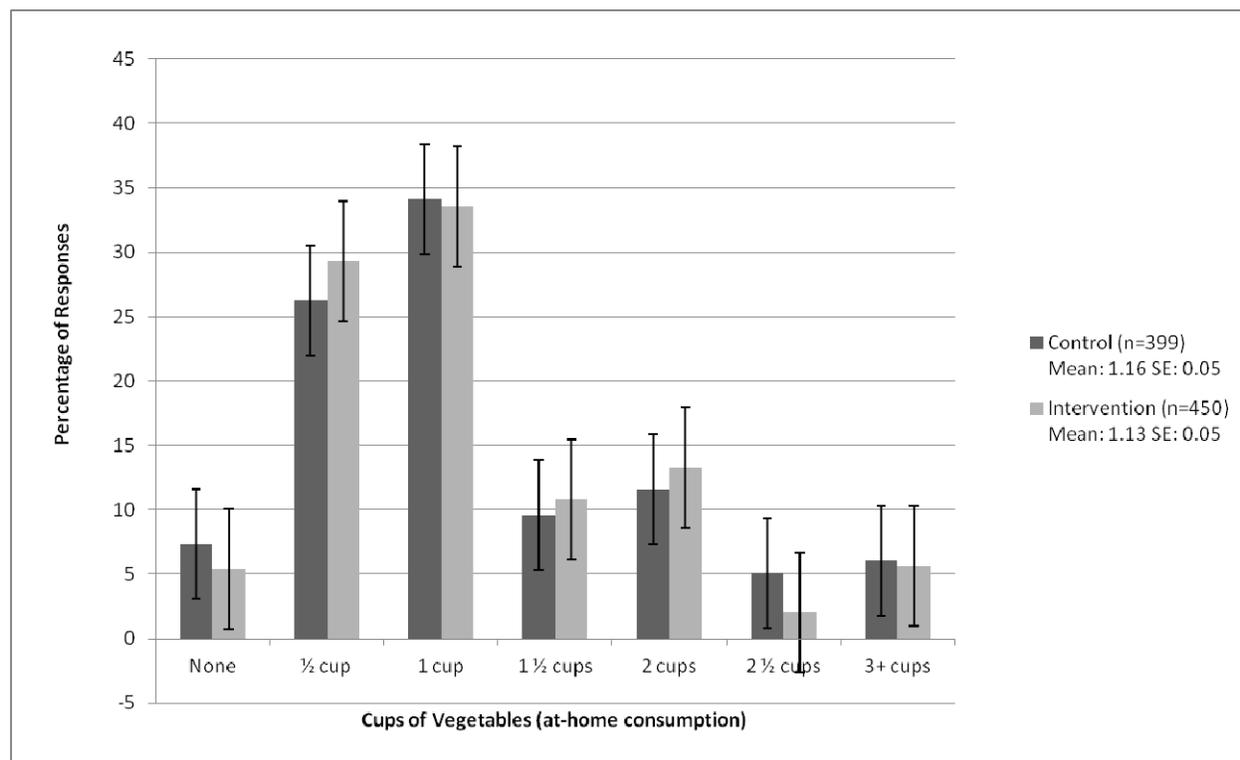
Source: Parent Baseline Survey, data collected September–October 2011; respondents are parents and guardians of children participating in the evaluation study.

Figure III-2. Baseline Distribution of Cups of Fruit Consumed at Home by Children Who Participated in the LEAP2 Program, by Condition



Source: Parent Baseline Survey, data collected September–October 2011.

Figure III-3. Baseline Distribution of Cups of Vegetables Consumed at Home by Children Who Participated in the LEAP2 Program, by Condition



Source: Parent Baseline Survey, data collected September–October 2011.

With regard to the secondary outcome measures, this study found the following at baseline for all study participants in both the intervention and control groups (see Appendix E, Table E-1):

- Children ate more than one type of fruit at home each day about 3.2 days during the past week and more than one type of vegetable at home each day about 3.6 days during the past week.
- Children asked to have fruits or vegetables to eat about 3 days during the past week.
- Fifty-seven percent of parents and caregivers reported that their children are willing to try new fruits, and 38 percent of parents and caregivers reported that their children are willing to try new vegetables.
- The at-home availability of nine fruits and vegetables was 4.88 (index score: 0–9).
- Parents and caregivers offered fruit for a snack about 3 days during the past week and offered vegetables for a snack about 1.5 days during the past week.
- At dinner, parents and caregivers offered fruit about 1 day during the past week and vegetables about 4.5 days during the past week.

2. Attrition Analysis

The potential impact of attrition from the evaluation study on generalizability of the study findings was assessed by comparing the pre-intervention similarity of study participants who provided follow-up data and those who did not. Appendix E, Table E-4 provides the results of this analysis. Some differences were observed between the two groups. White respondents were 2.5 times more likely to complete the follow-

up survey than respondents of other races and ethnicities ($p = 0.0069$); this may reflect the relatively high proportion of White respondents. Respondents in the oldest age group (45 years or older) were two times more likely to complete the follow-up survey than individuals in the youngest age group (18–34; $p = 0.0227$), and respondents between the ages 35 and 44 were 57 percent more likely to complete the follow-up survey than individuals in the youngest age group (18–34; $p = 0.0338$).

3. Child Primary Impact Results

Table III-2 shows the model-adjusted means at baseline and follow-up for the intervention and control groups and the estimated impact on the primary outcomes of number of combined cups of fruits and vegetables, cups of fruits, and cups of vegetables consumed at home. For the intervention group, parents and caregivers reported increases in cups of fruits and vegetables combined, or divided into cups of fruits, and cups of vegetables consumed by their children between baseline and follow-up. The difference in the changes between the intervention and control groups was not statistically significant; thus, there is no indication that the LEAP2 program had an impact on children’s average daily at-home consumption of fruits and vegetables.

4. Child Secondary Impact Results

Table III-3 shows the model-adjusted means at baseline and follow-up for the intervention and control groups and the estimated impact on children’s other dietary behaviors. Although there were small increases in most of the dietary behaviors in the intervention group, the differences in the changes between the two groups were not statistically significant. This suggests that the LEAP2 program did not have an impact on children’s other dietary behaviors.

5. Parent and Caregiver Secondary Impact Results

Table III-4 shows the model-adjusted means at baseline and follow-up for the intervention and control groups and the estimated impact on parent and caregiver offerings of fruits and vegetables, at-home availability of nine fruits and vegetables,¹¹ and parental efficacy. The results indicate that the LEAP2 program had a statistically significant impact on the household availability of fruits and vegetables; using an index of 0–9 fruits and vegetables, the LEAP2 program increased household availability of fruits and vegetables by 0.19 ($p = 0.0393$). There were no other observed impacts of the LEAP2 program on the parent’s or caregiver’s behavior or other household variables.

¹¹ Bananas, apples, grapes, raisins, berries, celery, carrots, broccoli, and zucchini.

Table III-2. Child’s Dietary Intake: Primary Impacts for the Evaluation of the LEAP2 Program

Daily At-Home Consumption	Model-Adjusted Baseline Means (SE)		Model-Adjusted Follow-Up Means (SE)		Estimated Impact ^a (95% CI)	Wald Chi-Square <i>p</i> -value
	Intervention Group	Control Group	Intervention Group	Control Group		
Cups of fruits and vegetables	2.26 (0.08)	2.30 (0.09)	2.32 (0.08)	2.29 (0.09)	0.06 (–0.20, 0.32)	0.6071
Cups of fruits	1.14 (0.04)	1.15 (0.05)	1.20 (0.05)	1.18 (0.05)	0.02 (–0.14, 0.18)	0.7837
Cups of vegetables	1.12 (0.04)	1.15 (0.05)	1.12 (0.05)	1.11 (0.05)	0.05 (–0.10, 0.20)	0.4978
Number of respondents	450	399	378	343		
Number of schools	8	8	8	8		

^a Program impact (with 95% confidence limits) estimated via difference-in-difference models comparing change across time in the intervention versus control groups.

Notes: General linear mixed models (SAS PROC MIXED) were used to evaluate the program impact while accounting for the clustering of students within schools. Covariates in the model included child and respondent sex, child and respondent age, race and/or ethnicity, and household size. Missing data ranged from 2.0 to 2.9 percent. SE = standard error. CI = confidence interval.

Source: Parent Survey, September–October 2011 (Baseline) and February–March 2012 (Follow-Up); respondents are parents and caregivers of children participating in the evaluation study.

Table III-3. Child's Other Dietary Behaviors: Secondary Impacts for the Evaluation of the LEAP2 Program

Measure	Model-Adjusted Baseline Means (SE)		Model-Adjusted Follow-Up Means (SE)		Estimated Impact ^a (95% CI)	Wald Chi-Square <i>p</i> -value
	Intervention Group	Control Group	Intervention Group	Control Group		
Ate variety of fruits ^b	3.11 (0.11)	3.21 (0.12)	3.18 (0.11)	3.18 (0.12)	0.11 (-0.24, 0.46)	0.5248
Ate variety of vegetables ^b	3.53 (0.11)	3.57 (0.11)	3.55 (0.11)	3.48 (0.12)	0.10 (-0.27, 0.48)	0.5647
Willingness to try new fruits ^c	56.43 (2.40)	58.45 (2.54)	58.57 (2.53)	55.90 (2.72)	1.21 (0.87, 1.68)	0.2307
Willingness to try new vegetables ^c	37.05 (2.52)	37.69 (2.69)	37.95 (2.66)	37.88 (2.83)	1.03 (0.74, 1.43)	0.8467
Asked parent to buy certain fruit ^d	2.33 (0.04)	2.45 (0.04)	2.35 (0.04)	2.35 (0.04)	0.11 (-0.04, 0.26)	0.1493
Asked parent to buy certain vegetable ^d	1.54 (0.06)	1.62 (0.07)	1.51 (0.06)	1.62 (0.07)	-0.03 (-0.15, 0.1)	0.6611
Helped parent make or cook meal ^b	1.52 (0.10)	1.58 (0.11)	1.72 (0.11)	1.80 (0.11)	-0.02 (-0.32, 0.28)	0.8880
Helped select family food ^b	2.88 (0.15)	3.06 (0.16)	2.90 (0.16)	2.92 (0.17)	0.15 (-0.16, 0.47)	0.3181
Asked to have fruits or vegetables ^b	3.10 (0.12)	3.12 (0.13)	3.16 (0.13)	3.13 (0.13)	0.05 (-0.40, 0.50)	0.8125
Number of respondents	450	399	378	343		
Number of schools	8	8	8	8		

^a Program impact (with 95% confidence limits) estimated via difference-in-difference models comparing change across time in the intervention versus control groups. Impacts provided as odds ratios for dichotomous outcomes.

^b Reported as the number of days in the past week.

^c Dichotomous variable indicates the proportion responding yes.

^d Response categories converted to continuous variable, with 0 = never and 4 = always.

Notes: General linear mixed models (SAS PROC MIXED) for continuous impact variables and generalized linear mixed models (SAS PROC GLIMMIX) for dichotomous impact variables were used to evaluate the program impact while accounting for the clustering of students within schools. Covariates in the model included child and respondent sex, child and respondent age, race and/or ethnicity, and household size. Missing data ranged from 2.0 to 2.9 percent. SE = standard error. CI = confidence interval.

Source: Parent Survey, September–October 2011 (Baseline) and February–March 2012 (Follow-Up); respondents are parents and caregivers of children participating in the evaluation study.

Table III-4. Parent Offerings and Fruit and Vegetable Availability in Households: Secondary Impacts for the Evaluation of the LEAP2 Program

Measure	Model-Adjusted Baseline Means (SE)		Model-Adjusted Follow-Up Means (SE)		Estimated Impact ^a (95% CI)	Wald Chi-Square <i>p</i> -value
	Intervention Group	Control Group	Intervention Group	Control Group		
Availability of fruits and vegetables ^b	4.70 (0.09)	5.06 (0.09)	4.98 (0.09)	5.14 (0.10)	0.19 (0.01, 0.38)	0.0393*
Parent offered fruit for a snack ^c	3.03 (0.11)	3.06 (0.12)	3.02 (0.12)	3.07 (0.12)	-0.02 (-0.4, 0.35)	0.8897
Parent offered fruit at dinner ^c	1.26 (0.10)	1.21 (0.11)	1.59 (0.10)	1.51 (0.11)	0.04 (-0.23, 0.31)	0.7541
Parent offered vegetable for a snack ^c	1.38 (0.09)	1.50 (0.10)	1.51 (0.10)	1.60 (0.10)	0.04 (-0.24, 0.31)	0.7847
Parent offered vegetable at dinner ^c	4.47 (0.10)	4.46 (0.10)	4.52 (0.10)	4.43 (0.11)	0.07 (-0.25, 0.39)	0.6322
Parent can encourage child to try new fruits or vegetables ^d	32.01 (2.47)	35.67 (2.69)	31.58 (2.61)	37.82 (2.90)	0.89 (0.61, 1.32)	0.5450
Number of respondents	450	399	378	343		
Number of schools	8	8	8	8		

* Indicates statistical significance if the *p*-value is less than or equal to 0.05.

^a Program impact (with 95% confidence limits) estimated via difference-in-difference models comparing change across time in the intervention versus control groups. Impacts provided as odds ratios for dichotomous outcomes.

^b Index score (0–9) based on reported household availability of nine fruits and vegetables.

^c Reported as the number of days in the past week.

^d Dichotomous variable indicates the proportion responding strongly agree.

Notes: General linear mixed models (SAS PROC MIXED) for continuous impact variables and generalized linear mixed models (SAS PROC GLIMMIX) for dichotomous impact variables were used to evaluate the program impact while accounting for the clustering of students within schools. Covariates in the model included child and respondent sex, child and respondent age, race and/or ethnicity, and household size. Missing data ranged from 2.0 to 2.9 percent. SE = standard error. CI = confidence interval.

Source: Parent Survey, September–October 2011 (Baseline) and February–March 2012 (Follow-Up); respondents are parents and caregivers of children participating in the evaluation study.

Chapter IV ● Assessment of UKCES' Self-Evaluation

A. Methodology

Determining the effectiveness of the evaluation conducted by UKCES required a clear understanding of the planning, design, and implementation of the evaluation based on both objective and subjective measures. To the extent possible, the assessment was based on objective information, such as the evaluation report prepared by UKCES. Qualitative methods were used to gather in-depth information as well as perspectives of key players in the evaluation (e.g., the principal investigator (PI), the program administrators). Exhibit IV-1 describes the data sources used for the assessment, and Appendix F provides copies of the forms and instruments used in the assessment.

The assessment of UKCES' evaluation of the LEAP2 program included a detailed description of their evaluation methodology, including management, staffing, and costs of the evaluation; an assessment of the quality of UKCES' evaluation, including strengths and weaknesses; a comparison of UKCES' study design and results with the FNS independent evaluation; and an assessment of lessons learned based on the quality assessment, cost analysis, and reported factors affecting evaluation implementation. Appendix I provides additional information on the methodology for assessing UKCES' self-evaluation.

Key Findings

- The UKCES evaluation employed the same experimental research design used for the independent evaluation, with randomization at the school level.
- Strengths of UKCES' evaluation included the use of a viable comparison strategy, use of the school lunch consumption photographic assessment as an observed measure of fruit and vegetable consumption, and collection of data on intervention dosage.
- Weaknesses included having control school children complete daily fruit and vegetable calendars, thereby exposing them to one aspect of the intervention; not taking into account the clustering of children within schools in all data analyses; and limiting the school lunch consumption photographic assessment to only four schools.
- The UKCES evaluation found that the intervention students reported eating more fruits and vegetables than the control students based on self-reported data from the daily fruit and vegetable calendars, but the school lunch photographic assessment data did not show a significant difference between groups. Similarly, the independent evaluation did not show an impact in parents' reports of their child's consumption of fruit and vegetables at home.

Exhibit IV-1. Description and Use of Data Sources for the Assessment of UKCES' Self-Evaluation

Data Source	Description and Use
UKCES' application	The application to request funding as a demonstration project provided information on the proposed evaluation procedures. The independent evaluators abstracted information from UKCES' application to describe their evaluation approach and identify any differences between their planned and actual evaluation approach.
Evaluation review form	This form included eight evaluation components (e.g., viable comparison strategy) that were rated on a 1–5 scale. The form was completed using information from UKCES' application and evaluation report and additional information obtained in the key-informant interviews conducted following the evaluation. The completed review form was used to prepare a descriptive assessment of the quality of UKCES' evaluation that identified the strengths and weaknesses of the evaluation and detailed areas for improvement.
Evaluation cost form	This form, completed by UKCES, documented the resources used and costs incurred to evaluate the LEAP2 program. The completed form and the findings from the key-informant interviews were used to prepare a descriptive assessment of the cost of conducting the evaluation.
UKCES' evaluation report	The independent evaluators provided UKCES with an outline for preparing a report on their evaluation methodology and results. The report was reviewed and key information was abstracted from the report to complete the assessment of the quality of UKCES' evaluation and to compare UKCES' study design and results with the FNS independent evaluation.
Key-informant interviews	Using structured interview guides, the independent evaluators conducted in-depth interviews with key informants, including the PI, co-PIs, evaluator, and the program manager, program evaluators and program administrators before and after the evaluation was conducted. The findings from these interviews informed all aspects of the assessment of UKCES' self-evaluation, in particular, the assessment of the management of the evaluation and lessons learned from conducting the evaluation.

B. Description of UKCES' Self-Evaluation

This section describes the methodology employed by UKCES to evaluate the LEAP2 program and provides information on the management, staffing, and costs of the evaluation. This description is based on information provided in UKCES' demonstration project application (UKCES, 2009) and its evaluation report (UKCES, 2012).

1. Research Objectives and Hypotheses and Outcome Measures

The evaluation study conducted by UKCES hypothesized that first- through third-grade children who participated in LEAP2 would have greater positive changes in their willingness to try fruits and vegetables and their consumption of fruits and vegetables both at school and at home compared with those children in the control group (who did not participate in the program).

The UKCES self-evaluation included outcome measures for children participating in the program. Exhibit IV-2 identifies the objectives for the LEAP2 Program.

Exhibit IV-2. Objectives for the UKCES LEAP2 Program

At the end of the LEAP2 program, the intervention group will report greater positive changes between pre- and post-intervention in the following variables than the control group:

Willingness to try fruits and vegetables as indicated by

- The number of fruits and vegetables selected at lunch (as measured with the school lunch consumption photographic assessment) and
- Taste testing fruits and vegetables (as reported by NEP assistants' lesson reports) and

Consumption of fruits and vegetables as indicated by

- The number of fruits and vegetables consumed at lunch (as measured with the school lunch consumption photographic assessment),
- The number of fruits and vegetables consumed daily during the intervention (as measured with the students' daily fruit and vegetable calendar), and
- The number of fruits and vegetables consumed at home (as measured with the parent survey conducted by the independent evaluators).

Source: UKCES Evaluation Report, 2012

2. Research Design and Sample Selection

Originally, UKCES had planned on conducting a three-part evaluation of the LEAP2 intervention involving a retrospective parent and caregiver survey; daily fruit and vegetable calendar; and a pre-, post-, and 6-month post- school lunch consumption photographic assessment. Given this evaluation plan, UKCES' application specified that eligible schools in Laurel and Perry Counties would participate in the evaluation study and schools would be randomly assigned to an intervention group or control group. Each group would contain approximately 226 children. However, in consultation with FNS and the independent evaluators, UKCES agreed to use the data from the independent evaluator's pre- and post-parent survey instead of conducting a separate retrospective parent and caregiver survey. Combining the survey administration in this way reduces respondent burden and capitalizes on the strengths of a pre- and posttest design over simply a retrospective design. Thus, the number of intervention classrooms was increased from the original study design to increase the number of participants to meet power and analysis calculations needed for the independent evaluation study design.

The independent evaluator developed the research design and sample selection procedures in consultation with FNS so that UKCES and the independent evaluator used the same study design. The study population consisted of first through third grade students attending 16 schools in Laurel and Perry Counties, KY. Eight schools were assigned to the intervention group, and eight were assigned to the control group. Forty-two classrooms were selected for the intervention group and 40 classrooms were selected for the control group to achieve the required sample size of 320 participants per group at follow-up for the parent survey. The intervention classroom students received the LEAP2 program intervention consisting of eight lessons based on the LEAP2 storybooks that focus on fruit and vegetable consumption. The control classroom students received four lessons based on LEAP2 storybooks that focus on food safety, bones, and teeth. The original plan was that only the intervention classroom students would participate in a daily fruit and vegetable calendar activity, although in actuality both intervention and control classroom students completed the activity. Parents and caregivers of control classroom students

were also given weekly newsletters consistent with the lesson topic for that week; thus, they received four newsletters, and parents and caregivers of intervention participants received eight newsletters.

Originally UKCES had planned for, and indicated on their application, a sample size of 226 children per group to yield 85 percent power to detect a 40 percent difference in fruit and vegetable intake, a reasonable measure and conservative approach based on six comparable school-based intervention studies. The sample size calculation used a standard deviation of 1.25 in the estimate and a baseline average of 2.5 servings of fruits and vegetables a day as indicated by the comparable studies.

3. Development and Testing of Data Collection Tools

Exhibit IV-3 provides information on the instruments and/or measures used by UKCES for data collection. The exhibit also details information on reliability and validity provided by UKCES in their evaluation report. While UKCES did not report on the reliability and validity of the student-reported fruit and vegetable calendars in their evaluation report based on data that they had collected, they did provide information on reliability and validity in their application for funding:

“Food records and recalls are valid and reliable methods for measuring dietary intake and eating behaviors of children in a school environment (Frank, 1991). While there appear to be a range in abilities, children aged 5–years have been shown to generally be accurate in reporting the food they have recently eaten. However, there does appear to be a difference between their ability to recall food accurately when food is packed from home versus being purchased at school, with a slightly stronger ability to do so when brought from home possibly due to familiarity with the food (Warren et al., 2003). Baxter et al. (2009) reported that primary children’s food recall accuracy was dependent upon target period and interview time. According to their study the optimal target period is the previous 24-hour time period.”

Measuring food intake among children is complex, particularly given the cognitive challenges of memory for what they have eaten and estimation of portion size (Baxter et al., 2004; Domel et al., 1994). In order to judge the validity of the children’s self-reported data from this study, the instruments used in this study ideally should be tested for reliability and validity with this sample of children or a similar sample. According to the literature, it is difficult to collect accurate data from children in this age range, but not impossible if the instrument is proven reliable or valid. From the beginning (when writing their proposal to FNS), UKCES recognized the challenges associated with children in this age range reporting on serving sizes; therefore the intent of the fruit and vegetable calendars was to track the number of fruits and vegetables eaten. Students circled the number (one to five) of fruits and/or vegetables that they had eaten the prior day and were encouraged to write in a higher number if necessary.

Exhibit IV-3. Instruments and/or Measures for UKCES' Self-Evaluation

Outcome	Instrument and/or Measure	Type of Measure	Information on Reliability and Validity
Select fruit and vegetables	School lunch consumption photographic assessment	Single point estimate	Kappa reliability statistics were calculated between the two raters for each food item. For vegetables, percent agreement between the two raters was relatively low at 73–75%. For fruits, the percent agreement was generally high at 94–96%.
Taste fruit and vegetables	NEP assistants lesson reports	Descriptive	n/a
Consume fruit and vegetables	• School lunch consumption photographic assessment	Single point estimate	See above
	• Students' daily fruit and vegetable calendar	Single measure	n/a

Source: UKCES Evaluation Report, 2012.

n/a = not available.

4. Data Collection Procedures and Response

To collect information on the outcomes of interest, UKCES asked students to report their daily intake of fruits and/or vegetables by completing the daily fruit and vegetable calendar. In 82 classrooms, there were 1,604 children in the full sample analyzed for this measure, with 733 children in the intervention group and 871 children in the control group. In addition, UKCES used photographic assessments of school lunches (before and after lunch) at pre- and post-intervention. Two schools per county were chosen for school lunch consumption photographic assessments (one intervention and one control), and all students in the participating classrooms of these four schools who were present on the day of the photographic assessment participated. During the first round of photographic assessments, 185 children in the intervention group and 180 children in the control group participated. In the second round of photographic assessments, 185 children in the intervention group and 199 children in the control group took part. Data collection training and procedures are described below.

a. Student daily fruit and vegetable calendars

Training for data collectors was provided to NEP assistants and extension agents on use of the student self-reporting calendars, lesson stickers, and the procedures for using folders to keep students' records together without identification.

During each school day, teachers passed out daily fruit and vegetable calendars and asked students in both the intervention and control groups to report the daily number of fruits and/or vegetables that they ate at school and at home during the previous day by circling a number (one to five). Students in the intervention schools completed calendars at baseline and each day during the 8 weeks of LEAP lessons. Although this

was not part of the original study design, program administrators mistakenly had students in the control schools complete calendars at baseline and each day during the intervention period. The original study design included the calendar recall activity for the control schools at baseline and follow-up only. Completion of the calendars helps students become more aware of their intake (Kuczmariski & Aljadir, 2003) and may facilitate behavior change, which is not desirable for control group students who should not receive any intervention. Because they received some level of the intervention, this dilutes the intervention effect. Furthermore, the control school students did not complete the calendars during a consistent time period, which makes it even more difficult to interpret their reported intake levels. In the five control schools in Laurel County, students kept a baseline calendar and a calendar for each of the 4 weeks during which the lessons were taught. However, in Perry County, there was a deviation that occurred from a misunderstanding of the teachers' and assistants' instructions. Because the lessons were not conducted on 4 consecutive weeks in two of the three control schools, control school students also completed calendars for weeks in between the lessons as well, resulting in extra weeks' worth of data. Because UKCES staff received all of the completed calendars at the same time, they did not realize this deviation from protocol had occurred until after the project was completed.

b. Photographic assessment of school lunch

To measure intervention impact on consumption, UKCES staff used digital photography to allow visual estimation of consumption using "before" and "after" pictures of school lunch trays. This method of assessing cafeteria consumption has been demonstrated to be highly valid and reliable (Swanson, 2008; Williamson, Allen, Martin, Alfonso, Gerald, & Hunt, 2003) and has been successfully used on multiple occasions in various elementary schools in Kentucky (Swanson, Branscum, & Nakayima, 2009).

Two schools per county were chosen for the school lunch consumption photographic assessment (one intervention and one control). All students in the participating classrooms present on the day of the photographic assessment participated. A standard menu for food consumption photographic assessment studies was established and included fruits and vegetables that were neither the most popular nor the least popular served.

A baseline food consumption photographic assessment was conducted at each selected school prior to implementing the lessons. Before and after still digital photographs were taken of cafeteria trays for every lunch served to participating students. Each tray was marked with an identification number, which allowed comparison of before and after pictures. Two analysts observed each set of photographs and visually estimated in 10 percent increments the amount of each fruit and vegetable consumed. Juice cartons were weighed to determine ounces of juice consumed. When the two analysts' estimates for the consumed amount of each item varied more than 50 percent, another reviewer was asked to evaluate the photographs. The two closest estimates were then averaged to provide a single point estimate for the consumed amount of each item. Second food consumption photographic assessment studies were conducted at each school after the lessons were completed. A final food consumption photographic assessment was conducted approximately 2 months later to determine whether any changes in fruit and vegetable intake were still in effect. Because there were no short-term effects, the data from this final assessment were not reported in the UKCES evaluation report. Data from the pre- and immediate posttest assessments were examined for inter-rater reliability.

Prior to study commencement, graduate assistants were trained on using digital photography as a tool to measure school cafeteria consumption. Instructions included the following:

- Coding disposable serving trays for identification,
- Photographing trays leaving the serving line,
- Coding juice boxes so they can be identified with their corresponding trays,
- Photographing trays after meals were consumed, and
- Weighing and recording weights of juice boxes after meals were consumed.

Analysts estimating the amounts consumed in each pair of before and after pictures were given written instructions about accessing the photos, using Microsoft Office Picture Manager for viewing the photos, recording estimations in Microsoft Excel, and recording missing or obstructed data.

5. Data Analysis Procedures

Stata 11.0 was used for all data analyses. Crosstabs and paired *t*-tests were used to distinguish statistically significant differences between intervention and control groups. The *t*-tests and linear regressions were used to describe the sample population and to test for differences in consumption between baseline and each week of the intervention and post-intervention based on data from the self-reported calendars. Multilevel analysis or hierarchical linear models (HLM) were used to assess the effect of the intervention, classroom, and school on changes in fruit and vegetable consumption and the other outcomes of interest. Analysis of Variance (ANOVA) models were used to analyze data from the photographic assessments for differences in the average number of servings consumed.

An attrition analysis (comparing pre-intervention similarity of participants who did and did not complete all assessment tools) was not conducted to investigate the potential impact of attrition on generalizability. Item nonresponse (missing data) was minimal: 18 missing cases were dropped from the analysis of data from the self-reported calendars. Missing data resulted from school days cancelled by snow and school holidays which disrupted the classroom schedules. Data collected during this time was deemed potentially unreliable due to the time gaps in children’s memories and incomplete follow-up by teachers. UKCES chose not to analyze the calendar data for lessons (in both intervention and control schools) that fell within this disruptive period.

6. Description of Management, Staffing, and Costs of the Evaluation

The demonstration project’s evaluation was coordinated and managed by a PI with support from program administration staff. A faculty researcher was responsible for coordinating the plate waste data collection and recording of the photo assessment data. A second faculty researcher was responsible for data analysis and reporting for both the fruit and vegetable calendar data and the photo assessment output data. County extension staff supported the process by helping conduct the plate waste study and with collecting fruit and vegetable calendars.

Table IV-1 presents a summary of UKCES’ costs for their self-evaluation, a total of \$41,551.33 in Federal funds, with all of the direct costs attributed to staff salaries, materials, and travel. Appendix B includes the detailed budget tables UKCES provided for this evaluation, including a breakout of non-Federal and Federal funding for each budget category.

Table IV-1. Summary of UKCES Costs for Evaluation of LEAP2 (FY 2012)

Budget Category	Expenditures	Percentage of Total Costs
Salary and benefits	\$31,521.00	75.9
Materials	\$2,800.00	6.7
Travel	\$3,452.94	8.3
Total direct costs	\$37,773.94	90.9
Indirect costs	\$3,777.39	9.1
Total	\$41,551.33	100.0

Source: Cost data provided by UKCES (see the completed Resource and Expense Tracking Form in Appendix B).

- **Salary and benefits.** This expense includes the salaries or hourly wages for the following implementing agency staff who supported the UKCES evaluation of the LEAP2 program directly or administratively:

Position	Number of FTEs
PI	0.10
Faculty researcher co-PI	0.08
Faculty researcher co-PI	0.05
<u>Extension faculty</u>	<u>0.02</u>
Total	0.25

- **Materials.** This expense includes costs associated with folders for fruit and vegetable calendars for each child and materials for photographic plate waste (e.g., cardboard lunch trays, miscellaneous supplies).
- **Travel.** The program travel expenditures include the costs for 14 round trips from Lexington to Perry and Laurel Counties and travel to a planning retreat for evaluation project personnel and extension agents to coordinate evaluation details.

C. Assessment of the Quality of UKCES' Self-Evaluation

Although FNS' SNAP-Ed Guidance encourages all States to evaluate the effectiveness of their SNAP-Ed interventions, measuring and identifying the results of nutrition education in terms of concrete changes to dietary behaviors are challenges for FNS' State and local partners. To compare findings from an intervention's self-evaluation with a rigorous independent evaluation, the independent evaluators adapted a scoring tool based on the one used by the Center for Substance Abuse Prevention in developing the National Registry of Evidence-based Programs and Practices database (see <http://nrepp.samhsa.gov/> for additional information). The evaluation review form, provided in Appendix G, includes eight evaluation components and requires a reviewer to assign a numerical score ranging from one to five for each component. Reviewers were provided the following anchors for scoring each component:

- 1 = missing or so poorly described that its value to the evaluation cannot be determined.
- 2 = inappropriate, misunderstood, or misrepresented in such a way that it cannot contribute to an effective evaluation of the program. The actions or materials reported are not appropriate for the evaluation effort proposed.

- 3 = showing a general understanding of its role in the evaluation. However, key details have been overlooked or not thoroughly reported. Needs moderate revision to be considered acceptable.
- 4 = appropriate for the evaluation, technically correct, and described well enough to show a general understanding of its role in the overall evaluation. Evidence shows that it will or has been implemented properly, but minor details may be missing or unclear.
- 5 = appropriate for the program being evaluated and presented in a way that shows the evaluator has a clear understanding of its role in the evaluation.

Scores of 1, 2, and 3 indicate components that are not aligned with the overall evaluation design in a way that makes them unlikely to contribute to useful or interpretable information. Scores in this range indicate opportunities for improvement in future evaluations. Scores of 4 and 5 indicate components that are well-matched to the design; these components are likely to contribute useful or interpretable information to the overall evaluation. Scores in this range indicate evaluation components that could be replicated in future evaluations.

Using the evaluation review form, two members of the impact evaluation staff (one rater was the designated impact evaluation leader for the independent evaluation) rated each evaluation component. Inter-rater agreement was assessed and a consensus score reached for each evaluation component. Table IV-2 provides the results of the completed review form.

Table IV-2. Assessment Scores for UKCES’ Self-Evaluation

Evaluation Component^a	Score
Research objectives and hypotheses	4
Viable comparison strategy	4
Outcome measures	4
Data collection	3
Data analysis	3
Attrition/nonresponse between pre- and post-surveys	4
Missing data (survey item nonresponse)	4

^aAppendix I provides a description of the criteria used to assess each evaluation component.

The strengths and weaknesses of UKCES’ evaluation are summarized in Exhibit IV-4. Based on the assessment, the strengths of UKCES’ evaluation include the use of a viable comparison strategy. The study employed the same experimental research design used for the independent evaluation. The study included some key measures, namely a measure of intervention dosage and the photographic assessment of children’s lunchtime fruit and vegetable consumption, an observed measure of fruit and vegetable consumption, in addition to self-reported measures. Additional information on the weaknesses and a discussion on why these weaknesses are a concern are provided in section D, which compares the UKCES evaluation methodology with that of the independent evaluation.

Exhibit IV-4. Summary of Strengths and Weaknesses of UKCES' Self-Evaluation

Strengths

- The staff employed the same experimental research design used for the independent evaluation.
- Staff recorded the approximate length of time and number of sessions offered in each of the individual classrooms as a way of measuring dosage, although these data were not used in analyses examining its association with outcomes.
- The study included the use of the school lunch consumption photographic assessment, which provides a fairly objective, observed measure of fruit and vegetable consumption.

Weaknesses

- The study aimed to find statistically significant levels of improvement but did not specify a desired or expected amount of behavior change based on a relevant evidence-based literature.
- The limiting of the photographic assessment subsample to four schools (one intervention and one control per each of the two counties) introduced severe design effects.
- Most of the data analyses did not take into account the complexity of the evaluation design, namely the clustering of individuals within schools.
- Analysis of the data from children's daily fruit and vegetable calendars did not control for differences between the intervention and comparison schools in baseline levels of consumption of fruits and vegetables and did not examine differences between these groups over time.
- By having children in control schools complete the daily fruit and vegetable calendars, the difference between groups may have been attenuated because it provided education and reinforcement for these students (acting as a self-monitoring tool); or, if nothing else, it could have affected their self-reports of consumption.
- For the photographic assessment, the kappa statistics reported were generally high for fruit (around 95 percent), but the percent agreement between raters for vegetables at baseline and at post-intervention was relatively low (around 74 percent).
- The children's self-reported daily fruit and vegetable calendars is not an ideal measure to yield reliable data because of demand characteristics where children interpret that the purpose of the intervention is to increase their consumption and unconsciously increase their self-reported consumption to fit that interpretation. Further, children in this age range face cognitive challenges with memory and understanding of serving sizes (Baxter et al., 2004; Domel et al., 1994), which can limit the validity of their self-reported data. There were also some challenges with fidelity of data collection due to disruptions in school schedules and limited time to complete the measures every day.
- Attrition analysis was not conducted to investigate the potential impact of attrition on generalizability of the study findings.

D. Comparison of Evaluation Methods and Results for the UKCES and Independent Evaluations

Exhibit IV-5 compares the study design for the UKCES self-evaluation and the independent impact evaluation of the LEAP2 program. The UKCES evaluation and the independent evaluation used the same research design but different sampling and data collection strategies. UKCES' evaluation employed a daily fruit and vegetable calendar and a pre- and post-intervention photographic assessment of school lunches, and the independent evaluation included pre- and post-intervention surveys of parents and caregivers. All students enrolled in the intervention and control schools participated in the daily fruit and vegetable calendar assessment, and all students in the participating classrooms of two schools per county (one intervention and one control school) participated in the photographic assessment.

The analyses conducted for the independent evaluations and some of the UKCES daily fruit and vegetable calendar data analyses account for the nesting of individual-level observation. When analyses are

conducted on data from respondents who are embedded (nested) in predefined social units (such as schools), there is a strong potential that their responses to survey items could be similar because of shared experiences or similar sociodemographics. This similarity reflects the fact that individuals do not aggregate in social units randomly. Children within the same schools may have similar family economics or shared values, and they certainly have shared experiences that are unique to the school (e.g., teachers). This similarity results in correlated observations that, if ignored, will likely lead to underestimated standard errors and falsely inflated test statistics (Zucker, 1990; Murray et al., 1996; Murray, 1998). By specifying schools as the between-subjects factor and employing a mixed modeling approach, one can account for potential correlation among individuals within the same school and provide *p*-values from tests of program impacts that are accurate. In contrast, the analyses of the photographic assessments and some of analyses of the daily fruit and vegetable calendars provided by the UKCES evaluation specified children as the unit of analysis and made no adjustments to account for correlated data at the school level; thus, the *p*-values reported by UKCES in their evaluation are likely to be inflated. ANOVAs were conducted on the data from the photographic assessments to examine differences in the average number of servings of fruits and vegetables consumed between the control and intervention groups from baseline to post-intervention. The *t*-tests and linear regressions on the daily fruit and vegetable calendar data were used to describe the sample population and to test for differences between baseline and each week of the intervention and post-intervention. Multilevel analysis or HLM on the fruit and vegetable calendar data were used to assess the effect of the classroom and school on fruit and vegetable consumption change.

Table IV-3 presents the results of UKCES' analysis from the subset of schools that completed the photographic assessments. The findings do not demonstrate a significant difference in the amount of fruit and vegetables consumed by students between groups. As indicated in Table IV-3, consumption of fruits and vegetables did increase slightly among the students in the intervention group, compared to the controls, but not enough to reach statistical significance.

Exhibit IV-5. Comparison of Study Designs for the UKCES and Independent Evaluations

Study Design Characteristics	UKCES Evaluation	Independent Evaluation
Comparison strategy	Employed the same research design as the independent evaluation.	Experimental research design with eight matched pairs of schools.
Sampling strategy and required sample size	For the photographic assessment, two schools per county were chosen based on comparable size, comparable student demographics, and school cooperation. Intervention group = 185 (pretest), 185 (posttest) Control group = 180 (pretest), 199 (posttest) For the self-reported daily fruit and vegetable calendars, a census of students enrolled in intervention and control schools was taken. Intervention group = 733 Control group = 871	Parents/caregivers of 1 st - through 3 rd -grade students attending schools in Laurel and Perry Counties, KY. Intervention group = 320 (target), 395 (actual at posttest) Control group = 320 (target), 373 (actual at posttest)
Primary outcome measure(s)	Children who participated in the intervention would have greater positive changes in their willingness to try and consumption of fruits and vegetables both at school and at home compared with those children in the control group.	Increase in average daily consumption of fruits and vegetables combined by approximately 0.30 cups.
Data collection	Photographic assessments of in-school lunch consumption were conducted pre- and post-intervention in a subset of schools. Intervention and control students completed daily fruit and vegetable calendars at baseline and each week.	Pre- and post-surveys were mailed to participants, and nonrespondents were contacted by telephone.
Impact estimate	Pre- and posttest change between intervention and control groups.	Pre- and posttest change between intervention and control groups.
Data analysis	ANOVA, <i>t</i> -tests, linear regressions, multilevel analysis, or HLM. An attrition analysis was not conducted.	Mixed model regression using maximum likelihood estimation. Conducted attrition analysis to investigate potential impact of attrition on generalizability by comparing pre-intervention similarity of participants who completed follow-up survey and those who did not.

Table IV-3. Results for UKCES Photographic Assessments: Average Fruit and Vegetable Servings Consumed

Outcome	Intervention			Control			Impact	p-value
	Pre (n=185)	Post (n=185)	Change	Pre (n=180)	Post (n=199)	Change		
Average Number of Servings	0.71	0.83	0.12	0.74	0.82	0.08	0.04 (-0.18, 0.25)	0.73

Source: UKCES Evaluation Report, 2012. Differences in means are reported and impact is measured as the difference of differences.

Table IV-4 presents the results of UKCES’ analysis of the data reported in the daily fruit and vegetable calendars, which show the mean number of weekly combined fruits and vegetables that children in the intervention and control groups reported consuming each week of the program. Limitations in the UKCES data analysis strategy previously discussed should be considered when assessing reported impacts.

Table IV-4. Results for Daily Fruit and Vegetable Calendars: Reported Weekly Fruits and Vegetables Consumed

	Intervention Means (SDs) (n = 733)	Control Means (SDs) (n = 871)
Baseline	12.08 (9.9)	10.33* (5.6)
Week 1	13.87 (9.2)	11.11* (5.5)
Week 2	14.04 (9.3)	11.42* (5.6)
Week 3	14.25 (9.3)	11.28* (5.5)
Week 4	13.90 (9.7)	11.03* (5.7)

*The p-value for test for (weekly) differences between groups is 0.001.

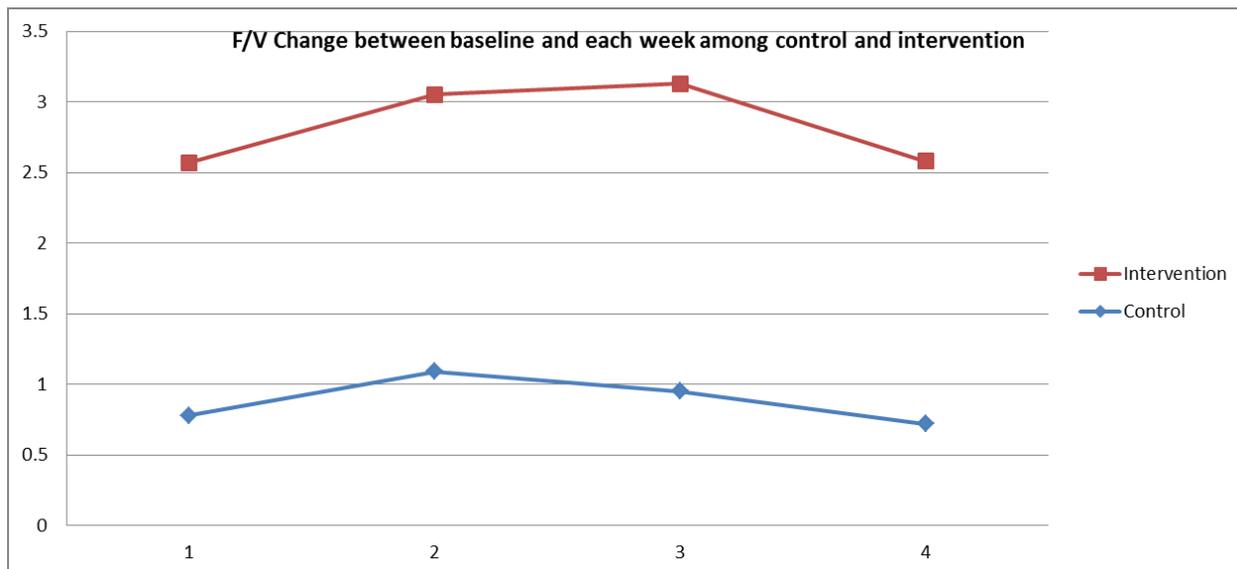
These data represent intervention weeks, which were not sequential weeks for all classrooms.

Source: UKCES Evaluation Report, 2012.

As shown in Table IV-4, among intervention students, there was an increase in the number of fruits and vegetables consumed between baseline and each week of the intervention. Students in the intervention group consumed more fruits and vegetables per week for each week of the intervention than students in the control group. Specifically, intervention students consumed at least 2.5 more fruits and vegetables each week compared with control students. However, the results also indicate there was a small but significant increase in consumption of fruits and vegetable among students in the control group each week as well.

As shown in Figure IV-1, relative to the control group, the intervention group started with a higher intake of fruits and vegetables and increased their consumption throughout the intervention. By the fourth intervention week, however, there was a decline in recorded fruit and vegetable consumption, which UKCES attributed to Thanksgiving break and school closures and a decrease in the fidelity of record keeping in the classrooms.

Figure IV-1. Fruit and Vegetable Change Between Baseline and Each Week Among Control and Intervention



Source: UKCES Evaluation Report, 2012.

Table IV-5 compares the results of the children’s fruit and vegetable consumption from the independent evaluation to the UKCES evaluation. Results from the UKCES evaluation are from the self-reported daily fruit and vegetable calendars; they do not control for the baseline level of consumption or any other variables, or account for clustering. Instead, UKCES simply reports the test in the difference in means for the intervention and control groups at week 4, rather than testing change over time from baseline to posttest between the two groups, as done in the independent evaluation. The UKCES evaluation results are also reported from the subset of schools where the school lunch consumption photographic assessment was completed—only two schools per county (one intervention and one control). The results from the independent evaluation are based on data from the parent survey.

Although the behaviors were measured using different instruments and different types of tests were conducted, one can assess whether the findings of the two evaluations were similar in terms of magnitude and direction. The UKCES evaluation found that although intervention students had an increase in the number of fruits and vegetables consumed between baseline and each week, students in the control group also had a small but significant increase in consumption of fruits and vegetable each week. A linear regression showed a significant difference between the intervention and control groups at week 4 of the program, not accounting for baseline level of consumption, other variables, or clustering ($\beta = 2.88$, $SE = 0.38$, $t = 7.41$, $p < 0.001$). However, because the intervention group had a higher level of consumption at baseline and this analysis did not compare change over time between the two groups, it is hard to interpret the meaning of the difference at week 4. The UKCES evaluation used hierarchical linear models to assess the effect of the classroom and school on fruit and vegetable consumption change, but they did not present results of the significance tests or pre- and posttest means from these analyses that would have allowed for a more direct comparison with the independent evaluation findings. Data from the subset of schools where the school lunch consumption photographic assessment was completed did not demonstrate a significant difference in changes in fruit and vegetable consumption between the intervention and control groups. For the independent evaluation, the difference in the changes between the two groups also was not statistically significant; thus, there is no indication that the LEAP2 program had an impact on

children's average daily at-home consumption of fruits and vegetables. The differences in the changes in children's other dietary behaviors between the two groups were not statistically significant. This suggests that the LEAP2 program did not have an impact on children's other dietary behaviors. The results indicate that the LEAP2 program had a statistically significant impact on the household availability of fruits and vegetables; using an index of 0 to 9 fruits and vegetables, the LEAP2 program increased household availability of fruits and vegetables by 0.19 ($p = 0.0393$). There were no other observed impacts of the LEAP2 program on the parent's or caregiver's behavior or other household variables.

Table IV-5. Comparison of Results for the Independent Evaluation and the UKCES Self-Evaluation

Behavior	Independent Evaluation ^{a,b}					UKCES Evaluation ^{c,d}					
	Intervention Group Means		Comparison Group Means		Estimated Impact	Wald Chi-Square <i>p</i> -value	Intervention Group Means		Control Group Means		<i>p</i> -value
	Pre	Post	Pre	Post			Pre	Post	Pre	Post	
Fruit and vegetable consumption	2.26	2.30	2.32	2.29	0.06	0.6071	12.08	13.9	10.33	11.03	0.001

^a Source: Parent Survey, September–October 2011 (Baseline) and February–March 2012 (Follow-Up). General linear mixed models (SAS PROC MIXED) for continuous impact variables were used to evaluate the program impact while accounting for the clustering of students within schools.

^b For the independent evaluation, based on parental reports of average daily number of cups of fruit and vegetables consumed at home.

^c Source: UKCES Evaluation Report, 2012. Means and *p*-value from *t*-tests at baseline and week 4 of the program (also reported in Table IV-4). Consumption was measured as number of fruits and vegetables as reported by children each week on the fruit and vegetable calendars. The intent of the fruit and vegetable calendars was to track the number of fruits and vegetables eaten, given the challenges with understanding and reporting on specific serving sizes for children in this age range. Students circled the number (one to five) of fruits and/or vegetables they had eaten the day before and were encouraged to write in a higher number if necessary.

^d Estimated impact not reported.

E. Lessons Learned

In order to better understand UKCES' experiences in its evaluation and the State's plans for dissemination and use of the evaluation results, information was gathered from a variety of sources. These include existing documents, written responses to evaluation interview questions, and follow up in-depth interviews with evaluators and program administrators.

1. Facilitators and Challenges to Implementation of Evaluation as Planned

Both the evaluation team and program administrators emphasized the importance of conducting program evaluation. At the same time, both identified several critical challenges that they have faced in implementing an evaluation of this program. The most commonly reported facilitators and challenges are described below.

a. Facilitators

▲ **Successful partnerships established within the academic departments of the university**

Program administrators were able to establish successful partnerships with other members of the university faculty to support the evaluation of the program. The lead evaluator for the photographic assessment is a member of the Department of Health and Behavior within the University's College of Public Health. He has conducted extensive research in the field of digital photography as a tool to measure school cafeteria consumption. Although this project was the first time he had used this methodology for program evaluation, he employed the same protocol validated in previous studies to analyze fruit and vegetable consumption of children in the school cafeteria setting. Two other staff members from within the School of Human Environmental Sciences were also involved in the project. One staff member from the Department of Nutrition and Food Science with a history of community nutrition program implementation and evaluation assisted with initial program and evaluation planning. Another staff member from within the university with experience in nutrition epidemiology and a history working with large datasets was engaged after the intervention to assist with data analysis. Program administrators reported that these partnerships helped to lessen the impact of the lack of evaluation resources within the cooperative extension program.

▲ **Coordination with food service directors**

Program evaluators reported that meetings with food service directors prior to the plate waste study were essential to complete the challenging task of standardizing the menu in four different schools. The lead evaluator for the plate waste studies shared that building relationships with food service directors, engaging them in the process, and establishing buy-in early in the planning process is crucial. Before beginning the evaluation process, evaluators held a conference call with food services directors and extension agents to establish a standardized menu that would be served in each school participating in the plate waste study. After having to reschedule one school because the agreed upon menu was not served, reminder calls were made to the food service directors prior to the visits. The evaluator reported that the food service staff members were flexible and willing to participate in the research project. County food services administrators within the two counties were involved to identify which schools would have environments that were conducive to the photographic assessment process.

▲ **Use of extension staff for data collection during the photographic assessment**

The lead evaluator for the plate waste studies reported that the use of cooperative extension staff during the plate waste studies facilitated the process in the schools. In other studies, he had used graduate students to collect the plate waste data, which often led to inconsistencies in staffing due to student schedules and reliability. He reported that the extension staff's knowledge of the environment and processes within the school system helped ensure that the process ran smoothly. In future projects, he plans to involve community members during the photographic assessment process.

▲ **Online survey tool for direct educators**

The online survey instrument developed by the program administrators facilitated communication and feedback from the NEP assistants in each county to the program planners in Lexington. The NEP assistants completed the online form after each lesson, capturing both quantitative and qualitative data about the implementation. Capturing the data in this format facilitated the use of the data for process and outcome reporting.

b. Challenges

▲ **Use of a daily fruit and vegetable recall as an evaluation tool**

Comments from the teachers may indicate that some students this young lack the ability to complete a food recall accurately. This finding is supported by studies that have found low accuracy and low consistency in young children's food recalls (Baxter et al., 2002). Teachers also mentioned the developmental difference in first- to third-graders, which may present challenges in reporting, such as the ability to identify food groups and recall meals eaten.

| *"Some students didn't know what to count as fruits and vegetables."*

—school teacher

| *"Third grade can usually do it, you'll have a couple of third graders who are lower end of the spectrum, aren't quite on target yet, who have trouble with it, but first and second grade, you're above their ability. So, they don't get what they're doing."*

—direct educator

Another challenge to the use of the fruit and vegetable recall calendar as an evaluation tool is the time of day it is administered. Although UKCES staff suggested that teachers complete the recalls first thing in the morning to improve accuracy, several teachers mentioned completing the calendars at other times during the day. Teachers also mentioned that students had difficulty recalling how many fruit and vegetables they had consumed on the weekends. Only 29 percent (11 of the 38) of teachers surveyed reported completing the recalls daily and several commented that the children had difficulty recalling what they had eaten days earlier.

| *"We didn't do the weekends after a few times, because the kids couldn't remember and if I tried to send them home they would not return them."*

—school teacher

| *"Not every day. I tried, but I would forget some times, so...and then catching up was even worse, when you didn't do it every day."*

—school teacher

▲ Training for teachers on the use of the daily fruit and vegetable calendars

Program administrators, NEP assistants and county extension agents reported that training provided for teachers about completing the fruit and vegetable recall calendars with students was inadequate and this led to inaccurate and missing data and inconsistencies across classrooms. NEP assistants also described challenges with substitute teachers who were not given any instruction about completion of the fruit and vegetable calendars. Program administrators reported that a script or discussion guide for teachers to help explain the correct procedure for completing the calendars, along with a more thorough fidelity check during the intervention period, would improve the process.

NEP assistants and county extension agents reported that the design of the fruit and vegetable calendar caused confusion among the teachers. The numbers that the children circled to indicate the amount of fruit and vegetables consumed were highlighted in different colors. On each calendar there was also a picture of a plate indicating the different food groups, highlighted in the same colors. NEP assistants reported receiving questions from some of the teachers who asked if these numbers represented the different food groups on the plate. During interviews with 12 teachers, three teachers described a process for completing the calendars that differed from that intended by the study planners. Of the three, one reported that she was given instructions on the proper way to complete the calendar by the educator during the intervention period.

“They just gave us the calendars. It was pretty self-explanatory: If they ate vegetables, circle the 2. If you ate fruit, circle the 5. Circle the color that corresponds to the plate.”

—school teacher

NEP assistants and county extension agents interviewed reported that better training for the teachers would have also improved the fruit and vegetable calendar collection process. Each student’s calendars were intended to be maintained together within a manila folder; however, some teachers took the calendars out of the manila folders before passing them to the county extension staff.

“Well, on the calendars, there was no place to have identification for a child. So, when all of the calendars came back from the teachers, they came back in different ways. Some came back in a great big bundle, you know, with everything just sort of mixed together. Some had them separated in folders. So, teachers did it differently because we were not told up front exactly how they needed to be done.”

—extension agent

▲ Preparation of direct educators and extension agents for the evaluation process

Both the NEP assistants and county extension agents reported that the training that they received on the rationale and process of the evaluation was insufficient. County extension staff shared that more instruction on the evaluation process prior to the start of the intervention would have allowed them to better understand why the evaluation components had to be implemented in a particular manner, making it possible to provide more thorough instructions to the teachers and family resource staff. Several extension staff also reported that involving the NEP assistants and county extension agents in the planning process for the evaluation would have yielded suggestions and recommendations resulting in a more efficient collection process for the fruit and vegetable recalls.

"If they are expected to do it but they don't know why, then sometimes it doesn't make sense. Whereas if you tell them this is what we're going to do and this is why we're doing it, whether or not they agree, then they'll say, okay, well, we would maybe not have done it this way, but we can understand why they are."

—extension staff member

▲ Daily fruit and vegetable calendar used for the control group

The original evaluation plan for the control group called for a fruit and vegetable recall prior to the intervention and another after the control lessons were completed. During the planning process, program administrators mistakenly distributed fruit and vegetable calendars to the control schools to complete on a daily basis. Literature suggests that the process of completing food recalls may change eating behavior (Kuczmarski & Aljadir, 2003; Rockett et al., 2003). Engaging the control students in the process of tracking their fruit and vegetable intake daily may have impacted their behavior and led to increased fruit and vegetable intake among the control group.

▲ Lack of evaluation expertise early in the LEAP2 planning process

Program administrators reported that the challenges in the evaluation process stemmed in large part from not having trained evaluators involved prior to the LEAP2 implementation planning process. One evaluator, engaged during the implementation process, commented that using a validated food recall tool and altering the process of data collection would have improved the quality and fidelity of the data. Several program administrators shared that being involved in the process has given them a greater understanding and appreciation for the evaluation process.

"I have always thought that that is a weakness of extension. We are all about doing and the pressure is on people to do because your audience is right there and so there is not nearly enough attention paid to evaluation research, and so I think everyone who participated in this has a new appreciation for that."

—program administrator

▲ Standardizing school lunches for photographic assessment

One challenge cited by lead evaluator of the plate waste studies was the difficulty of standardizing the menu across different schools and different counties. Although the food service staff agreed to certain menu items, the method of preparation and serving style varied in the different schools. Some variations mentioned by evaluation staff follow:

- Some schools served canned produce while others served fresh.
- Some schools served whole fruits while others served sliced fruit.
- Some schools served significantly larger servings of vegetables.
- At some schools, students were offered fruits and/or vegetables; at others, students would serve themselves.

The evaluators reported that working with food service directors to create a more standard menu, including preparation and serving style, would improve consistency of data analysis across schools.

2. Intended Use of Evaluation Results

Program administrators and evaluation staff indicated that they plan to share their evaluation results by submitting abstracts to present findings at professional conferences, submitting manuscripts to peer-reviewed journals, and sharing information with colleagues within and outside the university. Program

evaluators are considering at least two manuscripts, a process manuscript and another on the plate waste portion of the evaluation. One evaluator commented that comparing the data collected through the self-reported calendars with the plate waste photography data would be an interesting article from a methodological standpoint and would be valuable to the larger nutrition community. Evaluators and administrators also plan to share the results with the primary schools and staff that were part of the process.

3. UKCES' Future Evaluation Plans

Program administrators emphasized the importance of conducting program evaluation, recognizing that it is critical to ensuring continued improvement and implementation of the LEAP2 program. For this reason, they plan to continue evaluating the program and modifying it as necessary based on their findings.

To address their infrastructure needs for evaluation within the extension program, program administrators discussed the recent hire of an evaluation specialist. They reported that this is the first time in the history of the extension service in Kentucky that a specialist has been hired specifically for evaluation and that this new evaluation specialist would be integral in helping to design an effective evaluation of their programming.

Currently, UKCES is undergoing a review of the lessons used in the LEAP2 program. Several books used in the current LEAP2 curriculum are out of print. They will also be using feedback from the NEP assistants and county extension agents concerning which books and aspects of the program were most effective with the target audience. Using this feedback, they plan to expand the number of storybooks and corresponding lessons to offer multiple choices appropriate for varying age levels and classroom situations. As new lesson guides are created to accompany each book, program administrators reported that they will be looking closely at the best way to evaluate their effectiveness.

To address some of the challenges noted by key informants, program administrators identified several ways they plan to modify or enhance the evaluation of LEAP2 program. Although the program administrators feel the fruit and vegetable calendar is an effective teaching strategy that helps children become more cognizant of their intake, they would spend more time to train students and teachers in the correct procedures for documentation. Program administrators reported that they may not use the fruit and vegetable calendars as an evaluation tool, but instead may use 24-hour recalls completed with the help of NEP assistants during each LEAP2 lesson. Another change that UKCES is considering for a future evaluation is to add a component that looks at the role of the effectiveness of individual direct educators and classroom environment. They described a process of adding more observations and looking at student behavior outcomes by classroom to help describe which aspects of the NEP assistants' characteristics and approaches were most effective. Program administrators also noted the need for better communication among all parties about project evaluation protocol and timelines.

▲ Suggestions for improving evaluations

A well-designed impact evaluation accomplishes several tasks that permit investigators to draw reasonable and supportable conclusions about the effects of the program and the likelihood that any changes observed among participants would replicate to the broader target population. No single design can address every potential concern, but some approaches are commonly viewed as preferable. Based on the independent contractor's assessment of UKCES' self-evaluation, there is room for improving the evaluation particularly related to conceptualizing the program theory of change, designing the data collection approach, and conducting data analyses.

Conceptualizing program theory of change

For future evaluation studies, it is recommended that UKCES prioritize evaluation objectives and provide quantitative indicators of potential success as part of these objectives. This conceptualization would be further strengthened by developing a model to illustrate the expected relationships between the various indicators.

Designing data collection approach

Regarding UKCES' data collection approach, future evaluations would benefit from having only the intervention group participate in the daily fruit and vegetable calendar activity as specified in the original study plan, rather than have both the intervention and control group students complete them. Because control students completed them, they were in effect exposed to one component of the intervention. Instead of using the calendars as a measurement tool, UKCES should use another published measure that has been validated with children in this age range. With the calendars, it is unclear exactly what the number of fruits and vegetables means (e.g., the number of different servings or the number of different types of fruits and vegetables). Questions also remain regarding the cognitive ability of children in this age range to recall and count prior consumption. Altogether, these concerns about the calendar's usefulness for data collection suggest another measure should be used instead. For the school lunch consumption photographic assessment, only two schools per county were chosen (one intervention and one control); limiting this subsample in only a few schools introduces severe design effects. The assessment should be administered in as many of the schools as feasible, even if this requires limiting the data collection to only a pretest and an immediate posttest.

Conducting data analyses

The assessment of UKCES' evaluation identified several areas where the data analysis approach could be improved. The study design involved randomly assigning schools to condition; however, the UKCES evaluation found that differences in baseline consumption levels between the intervention and control schools were substantially larger than the magnitude of change observed over time. This suggests that the randomization may not have adequately controlled for the factors that influenced differences in consumption of fruits and vegetables at baseline. For future evaluation studies, statistical techniques, such as those used in the independent evaluation, should be implemented to control for differences in baseline levels of consumption of fruits and vegetables adequately. Furthermore, future evaluations would be strengthened by collecting demographic data at the individual level so it can be used in statistical analyses to determine whether there were differences between attriters and completers on key outcome variables.

For future evaluations, use of a mixed modeling approach for all analyses is advised. While some of the analyses conducted by UKCES employed a mixed modeling approach that accounted for potential correlation among individuals within the same school and provided accurate *p*-values from tests of program, the analyses of the photographic assessments and some of analyses of the fruit and vegetable calendar data specified children as the unit of analysis and made no adjustments to account for correlated data at the school level. For these analyses, the *p*-values reported by UKCES in their evaluation are likely to be inflated.

Chapter V • Conclusions and Discussion

LEAP2 is a school-based SNAP-Ed nutrition education program conducted by the UKCES program since 2008. This nutrition education program for first-, second-, and third-graders is designed to increase consumption of fruits and vegetables and promote physical activity. Eight weekly lessons based on storybooks for children were implemented during the intervention period. Each lesson included a story book reading, a food tasting, and a physical activity. Newsletters sent home with children each week summarized key intervention messages with the goal of increasing at-home offering and consumption of fruits and vegetables by parents and caregivers.

In Federal FY 2012, LEAP2 was implemented in eight schools in Laurel and Perry Counties in Kentucky. The intervention reached approximately 889 children and their parents and caregivers at an estimated cost of \$30.96 per child. This final chapter presents a summary and discussion of the key findings of this independent study.

A. Key Process Evaluation Findings: Factors Supporting Implementation

Program administrators, NEP assistants, and teachers reported that the LEAP2 program was popular with children and relatively easy and straightforward to implement. Key informants identified many factors that contributed to its successful implementation, including the following:

- ▲ **Relevance of program materials and messages.** There was a high level of overall satisfaction with the LEAP2 program materials and messages. The NEP assistants found the LEAP2 program easy to teach, supported by clear and straightforward lesson guides. Key stakeholders reported that the LEAP2 programs ability to reinforce learning in different ways was instrumental to its effectiveness. There was also a high degree of satisfaction with the parent newsletters, which were designed to support incorporation of LEAP2 messages within the home.
- ▲ **Engagement and receptiveness of target audience.** Teachers reported that the LEAP2 program was popular with students at each grade level and reported that students were disappointed when the program ended. Stakeholders reported a high degree of satisfaction with all aspects of the LEAP2 lessons, particularly the food tasting. During observations, children participated fully throughout the lesson and appeared to enjoy all components of the intervention. In focus groups, parents and caregivers reported that their children were more willing to try new foods and a larger variety of foods after their participation in the LEAP2 intervention.
- ▲ **Satisfaction with NEP assistants.** Principals, teachers, and program administrators reported that the effectiveness of the NEP assistants in engaging the children was a central factor that supported implementation. During observations, NEP assistants added their own personality to each lesson and were able to customize their delivery and tailor discussion questions to the age of the children. NEP assistants described their flexibility and ability to make small adaptations to the lessons to accommodate space and other considerations in the schools. Teachers reported that the organization and preparation of the NEP assistants when they arrived to the classroom facilitated the implementation of the LEAP2 lessons.
- ▲ **Engagement and support of schools.** Both county cooperative extension offices described a positive and productive relationship with the schools in their area. A history of successful

collaboration between the school systems and the county cooperative extension programs facilitated the recruitment of schools and the implementation of the program. Principals interviewed for this evaluation spoke of a positive and fruitful relationship with the cooperative extension office and requested to have the LEAP2 program continue to be implemented in their schools. NEP assistants reported that the engagement of the Family Resource Center staff helped facilitate the schedule and often the communication with teachers.

B. Key Process Evaluation Findings: Challenges to Implementation

Key informants identified some challenges that, if addressed, could improve the implementation of the LEAP2 program:

- ▲ **Maximization of parent and caregiver involvement in the program.** All stakeholders expressed the need for increased involvement of the parents and caregivers in the LEAP2 program. In focus groups, parents and caregivers reported that if they had known more about the program, they would have been prepared for the requests from their children for different fruits and vegetables. Only 18 percent of parents and caregivers surveyed reported reading five or more of the newsletters. In focus groups, several parents and caregivers noted that they may have focused more on the newsletter if they had known it was part of the program. All stakeholders agreed that parent and caregiver involvement is essential to change at home consumption of fruits and vegetables because young children are fully dependent on their parents and caregivers for the food purchased and prepared at home.
- ▲ **Training and preparation of NEP assistants.** Although the NEP assistants were reported to be highly successful in implementing the LEAP2 program, they requested a more thorough preparation and training prior to implementing the program. While the LEAP2 program is covered along with other curricula for children in the introductory training for all NEP assistants, several of the NEP assistants involved in the LEAP2 implementation were new and had not completed the training. The NEP assistants who had attended new staff training, had not implemented the LEAP2 program previously. NEP assistants and county extension agents in both counties expressed dissatisfaction with the preparation and guidance they received prior to implementing the program.
- ▲ **Ability of the teachers to implement the fruit and vegetable calendar on a daily basis.** In the post-intervention survey, teachers were asked if they were able to complete the fruit and vegetable calendars with their students. Of the 38 teachers who completed the survey, 29 percent said no and another 42 percent said that they were not able to complete it daily. Teachers reported that the two biggest barriers were time and the inability of the students to remember what they had eaten the day prior.

C. Key Impact Evaluation Findings

The goal of the impact evaluation was to assess the impact of the LEAP2 program on children's daily at-home consumption of fruits and vegetables as reported by their parents. The impact analysis findings suggest that the program did not have a statistically significant impact on children's daily at-home consumption of fruits and vegetables. Despite small increases in the mean number of cups of fruits consumed at home each day among children in the intervention group, there was little evidence to support the assumption that changes in consumption were related to the program. Children's daily at-home

vegetable consumption did not change for the intervention group and the control group saw a small decrease over the study period.

While the control group did not receive any direct nutrition education regarding fruits and vegetables from the LEAP2 staff, the control group did complete the daily fruit and vegetable calendars at baseline and each week during the four LEAP2 control lessons. This exercise of completing the daily fruit and vegetable calendars may have attenuated the difference between groups because it provided education and reinforcement for these students. If nothing else, it may have affected the students' self-reports of consumption.

The LEAP2 program had a statistically significant impact on the household availability of fruits and vegetables. This availability, if sustained, may contribute to increased fruit and vegetable consumption. There were no observed impacts of the LEAP2 program on children's other dietary behaviors or parents' and caregivers' behaviors. Although there were small increases in most secondary outcomes, the differences in the changes between the two groups were not statistically significant.

D. Key Findings from the Assessment of UKCES' Self-Evaluation

The independent evaluators assessed the quality of UKCES' self-evaluation and compared the methods and results of UKCES' self-evaluation with those of the independent evaluation. The UKCES evaluation employed the same experimental design used for the independent evaluation. The assessment identified the following strengths and weaknesses of UKCES' self-evaluation:

- ▲ A strength of UKCES' evaluation was the use of the school lunch consumption photographic assessment, a fairly objective measure of fruit and vegetable consumption.
- ▲ Weaknesses included the procedure of having children in the control group complete the daily fruit and vegetable calendars, which possibly reduced the difference between the intervention and the control groups because the control group was exposed to one aspect of the intervention; limitations of the analysis procedures, including failure to conduct an attrition analyses, not taking into account the clustering of individuals within schools in all data analyses, and not controlling for group differences in baseline levels of consumption of fruits and vegetables; use of an non-validated tool (the fruit and vegetable calendar) as an evaluation measure; and limiting the school lunch consumption photographic assessment to two schools per county (one intervention and one control).

UKCES reported that students at intervention schools ate more fruits and vegetables than students at the control schools based on self-reported student data from the daily fruit and vegetable calendars. However, data from the four schools where the photographic assessment was completed did not demonstrate a significant difference in fruit and vegetable consumption between intervention and control students. Likewise, the independent evaluation did not show an impact in parents' and caregivers' reports of their child's consumption of fruits and vegetables at home.

E. Recommendations

Based on the findings from the independent evaluation, the LEAP2 program did not result in a measurable difference in daily at-home consumption of fruits and vegetables. This may be due to limitations of the evaluation or program implementation. Despite the lack of change observed for primary outcomes, there was a statistically significant impact on availability of fruits and vegetables among

households with children exposed to the LEAP2 program compared with those not exposed to the program. Reports from NEP assistants and teachers, as well as from observations as part of this evaluation, found that children displayed a high level of enjoyment and enthusiasm for the program. Despite their lack of engagement, parents and caregivers of children receiving the intervention expressed satisfaction with the program overall and felt that the newsletters were helpful and easy to read.

Challenges were identified by both the LEAP2 team and this evaluation, indicating that there is room to strengthen the program and potentially increase the behavioral impact of the program. Some of these opportunities for improvement as well as recommendations for improving the LEAP2 self-evaluation are noted below.

F. Key Areas for Program Improvement

As UKCES continues to implement and refine the LEAP2 program and assess its impact on primary school children and their families, the following actions should be considered for program improvement:

- ▲ **Maximize parent and caregiver awareness and knowledge about the LEAP2 program to encourage involvement.** To increase the awareness of parents and caregivers about the program, stakeholders suggested conducting an introductory session to explain the program, with suggestions to help parents and caregivers increase the offering of fruits and vegetables in the home environment. During the intervention, offering a cooking class to share creative and easy recipe ideas, may sustain parent and caregiver involvement in the program. An online resource, such as a Web site, was another possibility offered by parents and caregivers to increase their involvement in the program and use of LEAP2 messages with their children.
- ▲ **Add an interactive component to the training for NEP assistants.** NEP assistants and county extension agents described an ideal preparation for implementing the LEAP2 program that would include an interactive component to allow NEP assistants to practice with the material and the lessons prior to teaching in the classrooms. They suggested adding a component where the NEP assistants would try components of the lessons and receive feedback from trainers and other educators. They also suggested engaging a direct educator that had taught the lessons previously to demonstrate successful strategies for implementing the lessons successfully. Another suggestion by NEP assistants and teachers was adding content about classroom management for all NEP assistants.
- ▲ **Provide clear guidance to the teachers on completion of the daily fruit and vegetable calendar.** During interviews, program administrators shared plans to continue to use the fruit and vegetable calendar as a teaching tool. Several teachers reported that if they were provided with more guidance on completing the calendar, they may have completed it more frequently. Due to the challenge of obtaining in-service time for teachers, a handout suggesting ways to introduce the calendar to children would supplement any in-person explanation from NEP assistants. One program administrator shared that having someone do a more thorough fidelity check during the intervention would provide the opportunity to identify any issues and correct them early in the intervention.

G. Suggestions for Improving Evaluations

Based on the independent contractor's assessment of UKCES' self-evaluation, there is room for improving the evaluation, particularly related to designing the data collection approach and conducting data analyses:

- ▲ **Designing the data collection approach.** Future evaluations would benefit from having only the intervention group students complete the daily fruit and vegetable calendars activity rather than all students. The calendars are useful as reinforcement tool, but as an evaluation measure, they are not ideal. Instead of using the calendars as an evaluation measure, using a valid and reliable age-appropriate evaluation tool is suggested. The school lunch consumption photographic assessment should be administered in as many of the schools as feasible in order to avoid design effects, even if this requires limiting the data collection periods to only a pretest and immediate posttest.
- ▲ **Conducting data analyses.** The assessment of UKCES' evaluation identified several areas where the data analysis approach could be improved:
 - Using statistical techniques to control for group differences in baseline levels of consumption of fruits and vegetables,
 - Collecting demographic data at the individual level and using it in statistical analyses to determine if there were differences between attriters and completers on key outcome variables, and
 - Employing a mixed-modeling approach that accounts for potential correlation among individuals within the same school for all analyses.