

## **Long-Term Behavior Change of Participants in a Northeast Nutrition Education Program**

### **Abstract**

Limited data exist on the self-reported retention of core educational concepts by Maine Expanded Food and Nutrition Education Program (EFNEP) participants. We assessed the effectiveness of the program by comparing participants' responses on an EFNEP checklist completed before starting the program, immediately after the program, and 6 months after graduation. Results indicate that participants maintained certain positive behaviors. Frequencies with which participants shopped with a grocery list and used the Nutrition Facts label to make food choices increased after education, and those behaviors persisted long-term. Room for improvement also exists. The findings have implications for future program planning.

**Keywords:** [nutrition education](#), [food safety](#), [low income](#), [long-term evaluation](#), [Expanded Food and Nutrition Education Program \(EFNEP\)](#)

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## **Introduction**

The Expanded Food and Nutrition Education Program (EFNEP) was established in 1969 to address nutrition and health issues associated with living in poverty (U.S. Department of Agriculture [USDA], National Institute of Food and Agriculture [NIFA], 2017b). Annually, EFNEP providers supply hands-on nutrition education to over half a million low-income families and youths nationally to improve diet quality and physical activity, increase knowledge related to stretching food budgets, and improve food safety practices (USDA NIFA, 2017b). The goal of improving dietary behavior and food security by educating low-income families and children is achieved through EFNEP's paraprofessional educational delivery model (USDA NIFA, 2017b).

Evaluation of EFNEP occurs primarily through the collection of data on short-term, self-reported behavior and knowledge change in the program's adult and youth participants (USDA NIFA, 2017b). There is not consistent execution of intermediate and long-term program evaluation on national and state levels that would address whether program delivery and educational interventions are effective at improving and

sustaining positive behavior change and, thereby, could justify continued funding of the efforts to improve health outcomes in the low-income adult population. Some previous state-specific studies have addressed the medium and long-term impacts of EFNEP on participant behaviors (Arnold & Sobal, 2000; Koszewski, Behrends, Sehi, & Tuttle, 2011; Wardlaw & Baker, 2012), but we found that no such studies had been conducted in Maine.

Our twofold purpose with the research described here was to determine whether Maine EFNEP participants' self-reported positive behavior changes had been sustained at least 6 months after participation in the program and whether any relationships existed between program participation factors (e.g., number of months enrolled) and participants' sustained behavior changes. Our findings may guide future program planning by informing decisions about long-term retention of EFNEP lesson messages.

## Methods

The University of Maine Institutional Review Board for the Protection of Human Subjects approved our research project. We assessed participants' self-reported behaviors by comparing their responses on a preprogram EFNEP behavior checklist, a postprogram EFNEP behavior checklist, and a long-term postprogram EFNEP behavior checklist completed at least 6 months after graduation from the program. The response set for the checklist questions comprises options on a 5-point Likert scale plus a "not applicable" option (1 = *do not do*, 2 = *seldom*, 3 = *sometimes*, 4 = *most of the time*, 5 = *almost always*, N/A = *not applicable*). "Not applicable" responses were scored as zero (Boone & Boone, 2012). Table 1 shows how certain survey questions are categorized according to the four core EFNEP practice areas (Anliker, Willis, & Montgomery, 1998; USDA NIFA, 2017b).

**Table 1.**

Organization of Survey Questions According to Core Practice Areas Addressed by EFNEP

<b>Question</b>	<b>Core practice area</b>
1. How often do you plan meals ahead of time?	Food resource management practices
2. How often do you compare prices before you buy food?	Food resource management practices
3. How often do you run out of food before the end of the month?	Food security practices
4. How often do you shop with a grocery list?	Food resource management practices
5. This question is about meat and dairy foods. How often do you let these sit out for more than two (2) hours?	Food safety practices
6. How often do you thaw frozen foods at room temperature?	Food safety practices
7. When deciding what to feed your family, how often do you think about healthy food choices?	Nutrition practices
8. How often do you prepare foods without adding salt?	Nutrition practices
9. How often do you use the "Nutrition Facts" on the food label to make food choices?	Nutrition practices
10. How often do your children eat something in the morning within two (2) hours of waking up?	Nutrition practices

In addition to the EFNEP behavior checklist items, we included two open-ended questions. Question 11 asked whether there was anything specific that had changed in participants' lives due to their participation in EFNEP, and Question 12 solicited suggestions for ways to improve the program or new topics for discussion.

## Data Collection

The participants in the study were adults 18 years or older who had graduated from the program, met educational objectives, completed a minimum of four lessons, and completed the required entrance and exit surveys. Past participant data were collected and stored through the Web-Based Nutrition Education Evaluation and Reporting System (WebNEERS), Version 1.0.11. To maintain participant confidentiality, we removed all identifying information and coded each survey with a subject ID that corresponded with data in the WebNEERS statewide database. We mailed surveys to 144 fiscal year 2013 graduates in September 2014. After a low response, we mailed the surveys a second time, in December 2014, to those participants who did not respond as well as to 278 people who graduated in fiscal year 2014. Six people completed the first survey, and 20 responded to the second mailing. In February 2015, we called participants who had not mailed back the questionnaire, yielding 25 completed telephone interviews. The mailed survey responses and the phone survey responses were combined for a total of 51 completed surveys.

## Data Analysis

We conducted statistical analysis using Microsoft Excel, Version 15.13.1 (Microsoft, Redmond, VA) and XLStat software (Addinsoft, New York, NY). We used descriptive statistics (mean and standard deviation) to analyze the distribution of the data. We used Friedman's test to test for any significant differences among the presurvey, postsurvey, and long-term survey groups and Nemenyi's procedure (two-tailed) to test for significant differences between pairwise sets of data from the same participant. We grouped responses to the two open-ended questions by themes previously identified by Koszewski, Hlavacek, Yerxa, and Procter (2014) and used the chi-square test for independence to test for significance between survey responses and program participation factors. The significance value was set at  $p \leq .05$  for all statistical analyses.

## Results

### Respondent Demographic Information

The overall response rate was 12%, and the majority of responses (61%) were provided by fiscal year 2014 graduates. The only significant difference in demographic or program participation characteristics between the 2013 and 2014 EFNEP graduates was length of time since completing the program. The mean age of respondents was 34 years, and 70% of respondents had household incomes below the 2014 poverty level for households with one to four people (U.S. Department of Health and Human Services, 2014). The majority of respondents (72%) reported that they lived in households of two to four persons. Other respondent characteristics as well as comparison data for Maine EFNEP and national EFNEP populations are displayed in Table 2.

**Table 2.**

Characteristic	Study participants (2013 & 2014)		2014 Maine EFNEP participants <sup>a</sup>		2014 national EFNEP participants <sup>b</sup>	
	No.	% of total	No.	% of total	No.	% of total
Gender distribution						
Female	47	92%	406	81%	105,773	87%
Male	4	8%	94	19%	15,300	13%
Age						
19 and younger	0	0%	15	3%	7190	6%
20 to 29	15	29%	212	42%	38,139	31%
30 to 39	18	35%	158	32%	35,357	29%
40 to 49	5	10%	60	12%	19,922	16%
50 to 59	7	14%	24	5%	10,601	9%
60 and over	1	2%	6	1%	6747	6%
Not given	5	10%	25	5%	3117	3%
Number of children in household						
0 children	0	0%	22	4%	17,975	15%
1 child	17	33%	197	39%	38,743	32%
2 children	19	37%	182	36%	32,780	27%
3 or more children	15	30%	99	20%	31,575	26%

*Note.* EFNEP = Expanded Food and Nutrition Education Program.  
<sup>a</sup>University of Maine Cooperative Extension. (2014). Expanded Food and Nutrition Education Program adult summary report [WebNEERS data report]. Unpublished state report. <sup>b</sup>U.S. Department of Agriculture National Institute of Food and Agriculture. (2014). Expanded Food and Nutrition Education Program adult summary report [WebNEERS data report]. Unpublished federal report.

The survey respondents in our small sample were similar to Maine and national EFNEP participants. Maine EFNEP participants are younger compared to the overall population in Maine, which had a median age of 43 years around the time of our study (U.S. Census Bureau, 2012). The majority of survey respondents were in the program for less than 6 months and had been out of the program for 6 to 12 months (Table 3). More than half of respondents completed between seven and nine lessons, and most took part in group lessons.

**Table 3.**  
 EFNEP Participation by Survey Respondents

**Participation characteristic No. of participants % of total**

Months in the programa

1–5	28	55%
6–10	15	29%
11–15	8	16%
Months out of the program <sup>a</sup>		
6–12	28	55%
13–18	13	25%
19–24	8	16%
25 or more	2	4%
Number of lessons <sup>b</sup>		
4–6	8	16%
7–9	28	56%
10–12	14	28%
Hours completed <sup>a</sup>		
1–6	13	25%
7–12	26	51%
13–18	9	18%
19–24	3	6%
Lesson type <sup>a</sup>		
Group	36	70%
Individual	7	14%
Group and individual	8	16%

Note. EFNEP = Expanded Food and Nutrition Education Program.

<sup>a</sup>Number of respondents = 51. <sup>b</sup>Number of respondents = 50.

## Core Practice Survey Responses

The mean values for the preprogram, postprogram, and long-term survey responses for each question are shown in Table 4. Frequencies with which participants planned for meals (Question 1), shopped with a grocery list (Question 4), and provided breakfast for children (Question 10) all improved significantly from the start of the program, and participants maintained the frequencies of those practices long-term. Greater improvements in the practices of thinking about healthful food for the family and using Nutrition Facts label information (Questions 7 and 9, respectively) occurred after the survey respondents had left EFNEP. For Questions 3, 5, and 8, there were no significant improvements in behavior after graduation. However, 26 persons reported before starting the program that they did not keep meat or dairy products out of the refrigerator for more than 2 hr, and they maintained this food safety practice after completing EFNEP. Another 15 persons reduced the frequency of this unsafe behavior. No behaviors improved or decreased significantly from the end of the program to the time of the long-term survey.

**Table 4.**

Question	Preprogram survey	Postprogram survey	Long-term survey
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
1. How often do you plan meals ahead of time? <sup>a</sup>	3.2 (1.2) <sub>a</sub>	4.0 (0.9) <sub>b</sub>	4.1 (0.9) <sub>b</sub>
2. How often do you compare prices before you buy food? <sup>a</sup>	4.0 (1.2) <sub>a</sub>	4.6 (0.8) <sub>b</sub>	4.4 (0.8) <sub>ab</sub>
3. How often do you run out of food before the end of the month? <sup>a</sup>	2.2 (1.3) <sub>a</sub>	2.0 (1.3) <sub>a</sub>	2.2 (1.2) <sub>a</sub>
4. How often do you shop with a grocery list? <sup>a</sup>	3.4 (1.4) <sub>a</sub>	4.0 (1.2) <sub>b</sub>	4.1 (1.1) <sub>b</sub>
5. This question is about meat and dairy foods. How often do you let these sit out for more than two (2) hours? <sup>a</sup>	1.8 (1.2) <sub>a</sub>	1.4 (1.0) <sub>a</sub>	1.4 (0.8) <sub>a</sub>
6. How often do you thaw frozen foods at room temperature? <sup>b</sup>	2.7 (1.4) <sub>a</sub>	2.1 (1.3) <sub>b</sub>	2.2 (1.2) <sub>ab</sub>
7. When deciding what to feed your family, how often do you think about healthy food choices? <sup>a</sup>	3.7 (1.1) <sub>a</sub>	4.2 (0.8) <sub>ab</sub>	4.5 (0.6) <sub>b</sub>
8. How often do you prepare foods without adding salt? <sup>a</sup>	3.4 (1.4) <sub>a</sub>	3.6 (1.2) <sub>a</sub>	3.6 (1.2) <sub>a</sub>
9. How often do you use the "Nutrition Facts" on the food label to make food choices? <sup>b</sup>	3.0 (1.4) <sub>a</sub>	3.6 (1.1) <sub>ab</sub>	3.9 (1.3) <sub>b</sub>
10. How often do your children eat something in the morning within two (2) hours of waking up? <sup>a</sup>	4.1 (1.1) <sub>a</sub>	4.6 (0.8) <sub>b</sub>	4.6 (0.9) <sub>b</sub>

*Note.* Likert scale: 1 = *do not do*, 2 = *seldom*, 3 = *sometimes*, 4 = *most of the time*, 5 = *almost always*, or N/A = *not applicable*. For questions 5 and 6, the desired change in behavior is noted when the score decreases, meaning the behavior is done less frequently. Friedman's test with multiple pairwise comparisons using Nemenyi's procedure was selected for analysis. Means within rows sharing the same subscript letter are not significantly different ( $p \leq .05$ ). Cases that were missing values were omitted from analyses.

<sup>a</sup>Number of respondents = 51. <sup>b</sup>Number of respondents = 50.

## Program Participation Factors

We performed a chi-square test for independence to examine relationships between program participation factors and degrees of change in self-reported behaviors. No significant association was found between any

of the program participation factors we studied—months enrolled in the program, number of months since completing EFNEP, number of lessons completed, lesson format, or number of hours of education—and participants' responses regarding behavior changes.

## Open-Ended Survey Questions

Responses from the 19 people who answered the first qualitative question, regarding changes in respondents' lives due to their participation in EFNEP (Question 11), were categorized into five major themes: increased knowledge, improved overall health, enjoyment/desire to learn, family, and new perspective on health. Comments from the 16 people who answered the second qualitative question, regarding suggestions for program improvements or topics for discussion (Question 12), were categorized into five themes, as shown in Table 5.

**Table 5.**  
Themes for Improvements to Maine EFNEP

Theme	No. of responses	Paraphrased response(s)
New topics for classes	6	Healthful alternatives to water Substitutions for baking ingredients Nutrition book recommendations Information on spices MyPlate materials for home use Information on buying in bulk
Types of recipes desired	5	Low sugar, fat, and salt Less white flour High protein with nonmeat sources Inexpensive ingredients Large families
More follow-up after program	1	Opportunities for continued learning
More programs offered	2	More classes Increase EFNEP participation by other members of the community
More family-focused topics	2	Tips to get children to eat healthfully Ways to introduce healthful foods from school meals at home

*Note.* EFNEP = Expanded Food and Nutrition Education Program.

## Discussion

We sought to determine whether self-reported positive behavior change of program graduates had been sustained at least 6 months after participation in EFNEP and whether any relationships existed between program participation factors and participants' sustained behavior changes. The results of our research indicate that a sample of Maine EFNEP graduates from 2013 and 2014 maintained positive behaviors after

graduating from the program in the areas of food resource management and certain nutrition practices.

Concerning food security status, 65% of survey respondents said that they never or seldom ran out of food before program entry. More than half of respondents indicated that before starting EFNEP, they did not engage in letting meat or dairy products stay out of the refrigerator for 2 hr or longer, and because they maintained that practice after graduation, no improvement could be expected. Another 29% of the group reduced the frequency of this behavior after completion of the program. Thus, most survey respondents were successfully using this safety practice after leaving EFNEP. Koszewski et al. (2011) reported similar findings. In our long-term survey, 26 respondents said that they thawed foods at room temperature, as opposed to in a refrigerator, seldom or not at all, but 14 reported thawing food improperly more frequently than they had done before participating in EFNEP. Moreover, improvements made immediately after the program were not sustained long-term. Thus more emphasis on the importance of thawing foods under refrigeration may be needed. Additionally, respondents did not indicate any initial behavior change or long-term improvement regarding preparing foods without adding salt. Perhaps related to this finding, participant-suggested changes for the program included provision of more information on using herbs and spices.

## **Program Participation Factors**

Broader impact from the selected program participation factors was expected, but the small sample size in the study may have contributed to the lack of meaningful associations; small behavior change may be normal regardless of dosage (Olander, 2007). A larger sample size might have resulted in findings of more significance between program characteristics and behavior change, but it is important not to assume that these findings will apply to any EFNEP population. There may have been bias introduced by responses from more motivated participants who were already using recommended food resource management, food safety, and nutrition practices. Individuals who did not care about making improvements in their food and nutrition habits might not have answered the survey.

## **Program Implications**

Graduates from Maine EFNEP may benefit from continued communication with program educators through reminders to use newly learned skills in all EFNEP core areas. The continued educational nudges may better support participants' maintenance and improvements in short-term behavior changes after graduation from the program. A few responses to the qualitative questions indicated that program graduates would welcome opportunities for continued learning and support with preparing foods that are lower in sugar, salt, fat, and refined grains and creating meals using spices and plant proteins.

Considering the geographic and economic challenges of providing face-to-face nutrition education in a rural state like Maine, websites and social media may be the most practical solutions for providing EFNEP participants with supplemental education during and after the program. Smartphones were the most common Internet access point for lower-income Americans in 2016 (Ryan, 2018), so nutrition messages should be designed for viewing on phones or tablets. Nationally, EFNEP is beginning to integrate recorded and live online classes and social media to supplement traditional education for EFNEP participants (Campbell, Koszewski, & Behrends, 2013; USDA NIFA, 2017a). Although technology has not yet been used to augment EFNEP education in Maine, the potential exists, given that an estimated 80.7% of Maine households have broadband Internet (Ryan, 2018). EFNEP graduates who used social media at least twice



per week indicated that trust was a key feature for EFNEP-related social media sites and that these sites might foster positive food- and nutrition-related behaviors outside of in-person EFNEP lessons (Leak et al., 2014).

## Research Opportunities

Contact through social media and online educational opportunities after graduation would allow for continuing relationships with participants and provide an educational platform for reminding participants to use the skills and behaviors learned in EFNEP classes. Nationally, EFNEP leadership recently developed and implemented a new validated pre- and postprogram questionnaire that more comprehensively assesses behavior change in the four core practice areas of EFNEP. Conducting a similar study nationally, using the new EFNEP questionnaire, would be a low-cost opportunity to document intermediate and long-term outcomes for EFNEP participants more broadly.

The information gained from the long-term evaluation described in this article can be used to enhance program qualities that positively affect participants and improve program delivery methods that do not benefit participants. Using social media for continued communication with EFNEP graduates might mitigate the problem of frequent address changes that resulted in the low response rate for this survey.

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