

# North Carolina 2019 SNAP-Ed Program Outcomes Evaluation Report



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## EXECUTIVE SUMMARY

**Background and Aims:** North Carolina’s Supplemental Nutrition Assistance Program-Education (SNAP-Ed) improves the health of eligible (at or below 185% of the federal poverty level) North Carolinians through evidence-based nutrition programs to promote healthy eating behaviors and food resource management strategies. North Carolina SNAP-Ed also implements policy, systems, and environmental (PSE) changes to facilitate healthy living where North Carolinians eat, learn, live, play, shop, and work.

To improve the health of eligible North Carolinians, the North Carolina Department of Health and Human Services’ Division of Social Services, Economic and Family Services partners with the following nine implementing agencies (IAs):

1. Alice Aycock Poe Center for Health Education
2. Down East Partnership for Children
3. Durham County Department of Health – Durham’s Innovative Nutrition Education (DINE)
4. East Carolina University – Motivating Adolescents with Technology to Choose Health (MATCH)
5. North Carolina Agricultural and Technical State University
6. North Carolina State University – Steps to Health
7. Second Harvest Food Bank of Northwest North Carolina
8. University of North Carolina at Chapel Hill – Center for Health Promotion and Disease Prevention
9. University of North Carolina at Greensboro – Recipe for Success

The aim of this report was to assess whether in federal fiscal year (FFY) 2019, North Carolina’s SNAP-Ed programs were associated with improvements at both the individual and environmental levels, as outlined by the SNAP-Ed Evaluation Framework, which was created by the United States Department of Agriculture Food and Nutrition Service (USDA-FNS) in 2016 (USDA-FNS, 2016). IAs reported participant data for two medium term (MT) direct education indicators and one MT PSE indicator. At the individual level, self-reported data on healthy eating (MT1) and food resource management (MT2) were examined. At the environmental level, PSE changes (MT5) were assessed.

**Methods:** Data were provided by North Carolina’s nine SNAP-Ed IAs. To assess healthy eating (MT1) and food resource management (MT2) behavioral indicators, individual level data were collected at the beginning (pre-test) and at the end (post-test) of direct education programs. North Carolina IAs reported on MT1 indicators for children, teens, and adults, and MT2 indicators were only reported for adults. Programs used various instruments to collect data about the seven MT1 and six MT2 indicators. Thus, the specific questions and responses varied for each IA. To account for these differences, the



Public Health Institute Center for Wellness and Nutrition (PHI CWN) developed guidelines for recoding MT1 and MT2 survey responses. These guidelines were reviewed by nutrition evaluation experts and an expert committee regarding content validity.

To develop the guidelines, PHI CWN reviewed each question to determine its fit for evaluating direct education in accordance with the SNAP-Ed Evaluation Framework (USDA-FNS, 2016). For healthy eating (MT1) behavior changes, responses were recoded to indicate whether the participant did meet or did not meet the standards set by the *2015-2020 Dietary Guidelines for Americans* (DGA; U.S. Department of Health and Human Services & U.S. Department of Agriculture, 2015). For food resource management (MT2) behavior indicators, PHI CWN used its previously determined cutoffs, which were reviewed by nutrition evaluation experts, a registered dietitian, and an expert committee regarding content validity. Participant responses were coded as meeting or not meeting those cutoffs. Each IA used these guidelines to recode participant responses to each question from pre- and post-tests to indicate whether the participant did meet or did not meet recommendations. IAs then submitted their summary data to PHI CWN using standardized Microsoft Excel templates. To assess whether there were differences between participants' pre- and post-test reports of meeting recommendations for dietary and food resource management behaviors, matched cases were statistically analyzed using McNemar tests for dichotomous outcomes and *t*-tests for continuous outcomes.

PSE changes (MT5) data were collected by sites using direct observation, interviews with key informants, and repeated assessments or surveys. IAs submitted data on PSE changes using PHI CWN standardized Microsoft Excel templates. Descriptive statistics were conducted to calculate the number and estimated reach of PSE changes.

**Results:** Direct education data were provided for healthy eating behaviors (MT1) and food resource management (MT2) behaviors. IAs provided data from 13,421 participants who provided a response for at least one indicator at either the pre-test or post-test. Of these 13,421 participants, 10,153 participants (75.7%) provided a pre-test and post-test response for at least one MT1 or MT2 indicator and were considered matched cases. Since participant reports were analyzed for each age group separately, two matched cases were removed because the participants did not report their age. Thus, a total of 10,151 participants with matched pre- and post-tests were included in direct education analyses. Results showed statistically significant improvements from post-tests, compared to pre-tests, for self-reported fruit consumption among children, teens, and adults and vegetable consumption among adults. There was also a statistically significant improvement in children's reported consumption of low-fat or fat-free milk. Analyses of food resource management behaviors showed that from pre-test to post-test, there was a statistically significant increase in the number of adults who reported choosing healthy foods for their families when on a budget.

IAs reported 516 PSE changes at 428 sites with a reach of 556,555. The majority of PSE changes were systems changes (*n* = 267; 51.7%), followed by environmental changes (*n* = 182; 35.3%) and policy changes (*n* = 67; 13.0%).

The majority of systems changes were the improvement in hours of operation to improve access and convenience (*n* = 68, 25.5%), the prioritization of farm-to-table and increases in fresh or local produce (*n* = 34; 12.7%), and the implementation of federal food programs, such as Child and Adult Care Food Program (CACFP), The Emergency Food Assistance Program

(TEFAP), and summer meals (n = 28; 10.5%). The most frequent environmental change was the establishment, reinvigoration, or maintenance of food gardens (n = 63, 34.6%), followed by the establishment of new food banks, pantries, or distribution sites (n = 51, 28.0%), and the improvement or expansion of cafeteria, dining, and servicing areas and facilities (n = 22; 12.1%). The most common policy change was the establishment or improvement of a nutrition policy (n = 38; 56.7%), followed by the implementation of a school or childcare wellness policy (n= 15; 22.4 %), and the establishment or maintenance of standards for healthier food policies in other settings (n = 8; 11.9%). The majority of PSE changes took place in settings where eligible North Carolinians learn (n = 181; 46.2%) and eat (n = 121; 30.9%). PSE changes primarily took place at United States Department of Agriculture (USDA) summer meal sites (n = 118; 27.2%), schools (n = 114; 26.3%), and early care and education sites (n = 82, 19.0%).

**Conclusions and Recommendations:** Overall, direct education results highlighted positive changes and, equally important, recommended areas of focus for program expansion. In FFY 2019, direct education programs led to increased self-reported fruit consumption among children, teens, and adults, as well as increased self-reports of vegetable consumption among adults and low-fat and fat-free milk consumption among children. Whereas there were significant improvements for several nutrition indicators, results for other healthy eating indicators such as water (MT1g) and sugar-sweetened beverages (SSB; MT1h), and food resource management (MT2) did not show significant improvements. These results highlighted the importance of future programs directed at SSB consumption (especially among children and teens), as well as water consumption and food resource management behaviors among adults.

IAs were engaged in a variety of nutrition-related PSE activities throughout North Carolina in FFY 2019. North Carolina focused on systems changes and targeted primarily settings where eligible North Carolinians eat and learn, including USDA summer meal sites, schools, and early care and education sites. Given the reach of current nutrition-related PSEs, future PSE work should focus on physical activity supports to help facilitate active lifestyles for SNAP-Ed-eligible North Carolinians.

Analyses of the direct education and PSE activities for FFY 2019 point to important and exciting recommendations for future work:

- **Program education, social marketing campaigns, and environmental supports specifically targeted toward water and SSB consumption for North Carolinians of all ages.**
- **Stronger engagement with older youth and teens using youth-led participatory approaches.**
- **Original, individual-level direct education data that is linked to curricula and demographic information reported by IAs.**
- **Future PSE programs in settings where people live, play, and work.**
- **PSE programs focused on improving physical activity.**
- **Additional promotions for PSE efforts.**



## BACKGROUND

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The Supplemental Nutrition Assistance Program (SNAP) formerly known as Food Stamps, is administered by the United States Department of Agriculture (USDA). SNAP is the largest federal food safety net program in the United States and offers nutrition assistance to millions of eligible, low-income (at or below 185% federal poverty level) individuals and families to reduce hunger and help put healthy food on the table. Supplemental Nutrition Assistance Program-Education (SNAP-Ed) is the federal nutrition education program of SNAP and is designed to increase the likelihood that individuals with limited budgets can eat a healthy diet and achieve a physically active lifestyle based on the *2015-2020 Dietary Guidelines for Americans* (DGA) (U.S. Department of Health and Human Services & U.S. Department of Agriculture, 2015) and public health approaches. The DGA provides evidence-based nutrition information and advice for Americans ages two and older to help them make healthy choices about food and beverages in their daily lives. The DGA recommends a diet rich in fruits and vegetables, whole grains, a variety of proteins (including nuts, seeds, and legumes), and low-fat or fat-free dairy, which also limits added sugars, salt and fats (U.S. Department of Health and Human Services & U.S. Department of Agriculture, 2015). SNAP-Ed also uses the *Physical Activity Guidelines for Americans*, which are similar to the DGA, to provide science-based guidance and recommendations for Americans to improve their health through participation in regular physical activity, both aerobic and strength building, and to reduce sedentary lifestyles for better health (U.S. Department of Health and Human Services, 2018).

The North Carolina Department of Health and Human Services' Division of Social Services, Economic and Family Services prioritizes the important goals of promoting healthy lifestyles, increasing food security through food management strategies, and increasing levels of physical activity in SNAP-Ed-eligible communities across the state. In order to achieve these goals, the North Carolina Department of Health and Human Services' Division of Social Services, Economic and Family Services partners with the following nine implementing agencies (IA).

1. Alice Aycock Poe Center for Health Education
2. Down East Partnership for Children
3. Durham County Department of Health – Durham's Innovative Nutrition Education (DINE)
4. East Carolina University – Motivating Adolescents with Technology to Choose Health (MATCH)
5. North Carolina Agricultural and Technical State University
6. North Carolina State University – Steps to Health
7. Second Harvest Food Bank of Northwest North Carolina
8. University of North Carolina at Chapel Hill – Center for Health Promotion and Disease Prevention
9. University of North Carolina at Greensboro – Recipe for Success

To accomplish these goals, two primary strategies are employed: direct education and policy, systems, and the environmental (PSE) changes. Direct education consists of in-person, interactive classes, and hands-on activities. These programs are aimed at teaching healthy eating behaviors, including skills needed to prepare healthy food and practical strategies to stretch limited food dollars. PSE changes are healthy changes that aim to make the healthy

choice the easy choice where participants eat, learn, live, play, shop, and work. An example of a policy change is a school formalizing a written policy to reduce the unhealthy foods in cafeterias. Systems changes are less formal than policy changes and impact the ways in which business is done, such as a school cafeteria implementing a farm-to-school program. An environmental change consists of changing the physical environment to increase healthful behaviors. An example of an environmental change is a school cafeteria adding a salad bar.

In federal fiscal year (FFY) 2019, North Carolina’s IAs identified common direct education and PSE SNAP-Ed indicators from the SNAP-Ed Evaluation Framework created by the United States Department of Agriculture Food and Nutrition Service (USDA-FNS) on which to focus and evaluate. The selected direct education indicators were healthy eating behaviors (MT1) and food resource management behaviors (MT2). The PSE indicator was nutrition supports (MT5).

Tables 1, 2, and 3 identify all the SNAP-Ed Evaluation Framework (USDA-FNS, 2016) indicators on which an IA could report. IAs were not required to report on every indicator, which led to inconsistencies in the number of participants who provided responses for the indicators, across IAs. Children, teens, and adults were asked about MT1 indicators, whereas only adults were asked about MT2 indicators.

Table 1. Healthy Eating (MT1) Behavioral Indicators and Descriptions

Indicator	Description	Number of Children Who Provided Responses	Number of Teens Who Provided Responses	Number of Adults Who Provided Responses
MT1c	Ate more than one kind of fruit throughout the day or week	422	322	1,249
MT1d	Ate more than one kind of vegetable throughout the day or week	422	316	1,244
MT1g	Drinking water more frequently	4,441	3,538	1,432
MT1h	Drinking fewer sugar-sweetened beverages	4,828	3,620	1,449
MT1i	Consuming low-fat or fat-free milk	4,376	NR	1,440
MT1l	Cups of fruit consumed per day	NR	NR	426
MT1m	Cups of vegetables consumed per day	NR	NR	426

NR = not reported

Table 2. Food Resource Management (MT2) Behavioral Indicators and Descriptions

Indicator	Description	Number of Adults Who Provided Responses
MT2a	Choose healthy foods for a family on a budget	1,400
MT2b	Read nutrition facts labels or nutrition ingredients lists	1,434
MT2g	Not run out of food before month's end	1,034
MT2h	Compare prices before buying foods	1,441
MT2i	Identify foods on sale or use coupons to save money	1,406
MT2j	Shop with a list	1,062

Table 3. PSE Nutrition Supports (MT5)

Indicator	Description
MT5b	Total number of policy changes
MT5c	Total number of systems changes
MT5d	Total number of environmental changes
MT5e	Total number of promotional changes
MT5f	Reach - Total potential number of persons who encounter the improved environment or are affected by the policy, systems, or environmental change on a regular basis and are assumed to be influenced by it.

## METHODS

Using the indicators selected by the North Carolina IAs and data collected by the IAs in FFY 2019, Public Health Institute Center for Wellness and Nutrition (PHI CWN) conducted analyses to evaluate North Carolina's direct education and policy, systems, and environmental (PSE) activities during that fiscal year.

### Data Sources

Data were provided by all nine IAs in North Carolina. The data were collected from SNAP-Ed direct education and PSE programs targeting children, teens, and adults. The programs were aimed at addressing the SNAP-Ed Evaluation Framework (USDA-FNS, 2016) healthy eating (MT1) and food resource management (MT2) behaviors, as well as PSE nutrition supports (MT5) indicators. All IAs used evidence-based curricula designed to address the specific needs of each age group, although the exact curricula used by each program varied.

### Direct Education

To assess the efficacy of the direct education programs, each program collected data before (pre-test) and after (post-test) the program of evidence-based direct education sessions. Participants responded to items that measured healthy eating (MT1) and food resource management (MT2) behaviors. Pre-test surveys were delivered at the beginning of the program and post-test surveys were delivered at the end of the program. In accordance with the Interpretive Guide to the SNAP-Ed Evaluation Framework (USDA-FNS, 2016), IAs used validated surveys to collect information about seven MT1 and six MT2 indicators. To collect this information, IAs used one of nine surveys; thus, the specific questions and responses varied for each survey instrument. To account for differences between instruments, PHI CWN first reviewed each survey question to assess content validity and appropriateness for evaluating direct education in accordance with the SNAP-Ed Evaluation Framework (USDA-FNS, 2016). PHI CWN then developed guidelines for recoding survey responses for the healthy eating (MT1) and food resource management (MT2) indicators. These guidelines were reviewed by nutrition evaluation experts, a registered dietitian, and an expert committee regarding content validity.

Using the PHI CWN guidelines, IAs recoded their healthy eating (MT1) participant data to indicate whether the participant did or did not meet the standards set by the DGA (U.S. Department of Health and Human Services & U.S. Department of Agriculture, 2015). There were two exceptions to this procedure: MT1l and MT1m, for which the exact numbers of reported cups of fruit and cups of vegetables were recorded by the IAs (i.e., these were continuous variables).

IAs used PHI CWN's previously determined cutoffs to recode food resource management (MT2) indicators. The guidelines used to recode healthy eating (MT1) and food resource management (MT2) behaviors created standardized data that were used to examine the aggregate results for all IAs. Matched cases were statistically analyzed to assess whether there were



differences between participants' pre- and post-test reports of meeting recommendations for dietary and food resource management behaviors. Demographics and inferential statistical analyses included 10,151 participants with matched responses on pre- and post-tests (see Appendix 1 for more information on the total sample of all 13,421 participants).

### Policy, Systems, and Environmental Changes

IAs compiled evaluation data for MT5, which were collected using direct observation, repeated assessments or surveys, and/or photographic evidence, as recommended by the Interpretive Guide to the SNAP-Ed Evaluation Framework (USDA-FNS, 2016). In conjunction with the IAs, PHI CWN developed a standardized template and definitions for reporting PSE sites and changes, as well as promotional efforts associated with PSEs. The IAs used a standardized Microsoft Excel template to ensure uniform data collection and reporting. The template provided drop-down menus to indicate the PSE change and promotional effort used. If a site reported duplicate entries, the duplicate was removed from the analyses. IAs selected classifications for their PSE activities using a list that was derived from options provided by the SNAP-Ed Interpretive Guide (USDA-FNS, 2016). As the list of options was not exhaustive, IAs had the option of providing a description of the work done in an additional field. PHI CWN reviewed the entered items to determine whether they fit within the SNAP-Ed Evaluation Framework (USDA-FNS, 2016) and removed PSE data that did not fit within the Framework ( $n = 39$ ; 9.1%).

### Statistical Analysis

Data from all nine North Carolina IAs were combined into two datasets for analysis: One dataset for direct education and another dataset for PSE changes. All healthy eating (MT1) and food resource management (MT2) analyses were conducted using SAS version 9.4 or SPSS statistical software. No statistical analyses were performed on PSE (MT5) data.

For each MT1 and MT2 indicator, analyses included only participants who provided both a pre-test and a post-test response for that indicator. To analyze MT1 and MT2 data, either a McNemar test or a  $t$ -test was used. A McNemar test was used when both the pre- and post-test responses were dichotomous and tested for statistically significant differences in the proportion of participants who met recommendations at post-test compared to pre-test. The statistic that was reported for a McNemar test was chi-square ( $\chi^2$ ). McNemar tests were used for all variables except MT1l (cups of fruits consumed) and MT1m (cups of vegetables consumed). To assess whether there was a difference in the post-test average amounts of fruits or vegetables consumed by participants, compared to pre-test,  $t$ -tests were conducted and the  $t$  statistic that was reported. A statistical significance criterion of  $p$ -value  $< 0.05$  was set for each test.

For those analyses that were statistically significant, an effect size was calculated. An effect size is a measure of the magnitude of the behavioral change. This means that analyses that resulted in a larger effect size indicated a larger and more practically meaningful change in the behaviors that direct education participants reported. Two measures of effect size were used based on the two types of analyses that were performed: the  $g$  statistic and the  $d$  statistic. The  $g$  statistic was calculated for statistically significant McNemar tests and the  $d$  statistic was calculated for statistically significant  $t$ -tests. Each statistic had its own range of values indicating whether an effect size was small, medium, or large, as shown in Table 4 (Cohen, 1988). Larger effect sizes

indicated a larger and more practically meaningful (or clinically relevant) change in participants' self-reported healthy eating and food resource management behaviors.

Table 4. Effect Size Ranges

Effect size statistic	Small	Medium	Large
<i>d</i>	0.20 - 0.49	0.50 - 0.79	$\geq 0.80$
<i>g</i>	0.05 - 0.14	0.15 - 0.24	$\geq 0.25$

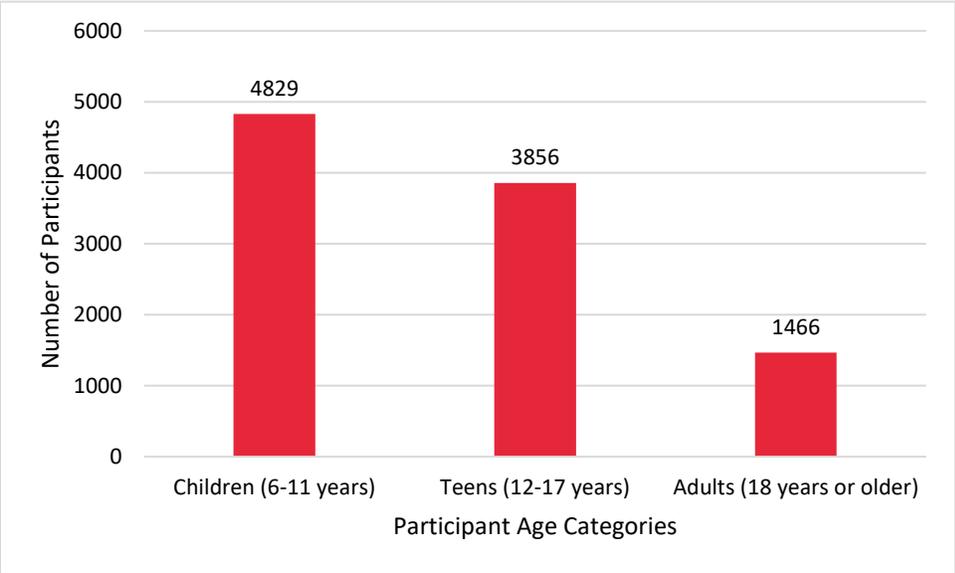
When analyses were significant but had an effect size that fell below the indicated “small” range for the respective effect size measure, the reported change was considered trivial and did not reflect a meaningful change. When this was the case, findings should be interpreted cautiously.

# DIRECT EDUCATION

## Participants

A total of 10,151 participants provided a pre-test and post-test response for at least one MT1 or MT2 indicator. As depicted in Figure 1, of these 10,151 participants, there were 4,829 children (47.6% of participants), 3,856 teens (38.0% of participants), and 1,466 adults (14.4% of participants). Please see Appendix 1 for demographics of the entire sample.

Figure 1: Total number of Participants by Age Categories



In addition to age, participants were asked to report their ethnicity, race, and sex. Table 5 represents participants’ ethnicity, race, and sex by age category.

Table 5. Participant Ethnicity, Race, and Sex by Age Category (N= 10,151)

		Children (6-11 years) N = 4,829	Teens (12-17 years) N = 3,856	Adults (18 years or older) N = 1,466
Demographics	Categories	Count (Percent)	Count (Percent)	Count (Percent)
Ethnicity	Hispanic or Latino	849(17.6%)	135(3.5%)	76(5.2%)
	Not Hispanic or Latino	3,956(81.9%)	194(5%)	1,383(94.3%)
	Did not report	24(0.5%)	3,527(91.5%)	7(0.5%)
Race	Asian	95(2.0%)	67(1.7%)	12(0.8%)
	Black	1,184(24.5%)	1,061(27.6%)	999(68.1%)

		Children (6-11 years) N = 4,829	Teens (12-17 years) N = 3,856	Adults (18 years or older) N = 1,466
Demographics	Categories	Count (Percent)	Count (Percent)	Count (Percent)
	Pacific Islander	37(0.8%)	4(0.1%)	2(0.1%)
	White	3,043(63.0%)	1,719(44.6%)	397(27.1%)
	Other race	433(9.0%)	985(25.5%)	42(2.9%)
	More than 1 race	12(0.2%)	15(0.4%)	7(0.5%)
	Did not report	25(0.5%)	5(0.1%)	7(0.5%)
Sex	Female	2,393(49.6%)	2,117(54.9%)	1,173(80%)
	Male	2,413(50.0%)	1,735(45%)	259(17.7%)
	Did not report	23(0.4%)	4(0.1%)	34(2.3%)

## Results

Inferential statistical analyses were conducted to examine the extent to which participants' self-reported healthy eating (MT1) and food resource management (MT2) behaviors changed from pre- to post-test. As noted in the Statistical Analyses section, McNemar tests were conducted for dichotomous outcome variables, which were the majority of the MT1 indicators (i.e., fruit (MT1c), vegetable (MT1d), water (MT1g), sugar-sweetened beverage (SSB; MT1h), and milk (MT1i) consumption) and all MT2 indicators. Continuous variables were number of cups of fruits (MT1l) and number of cups of vegetables (MT1m) and were subjected to *t*-tests.

### Adult Direct Education Results

Results are presented for each MT1 and MT2 indicator.

#### MT1c. Ate more than one kind of fruit.

A total of 1,249 adult participants reported whether they ate more than one kind of fruit each day. Results from a McNemar test showed no statistically significant changes in adults'



reports of whether they ate more than one kind of fruit each day or week ( $\chi^2(1) = 0.24, p > .05$ ).

Figure 2 "Do you eat more than one kind of fruit each day or week?"(Adults)

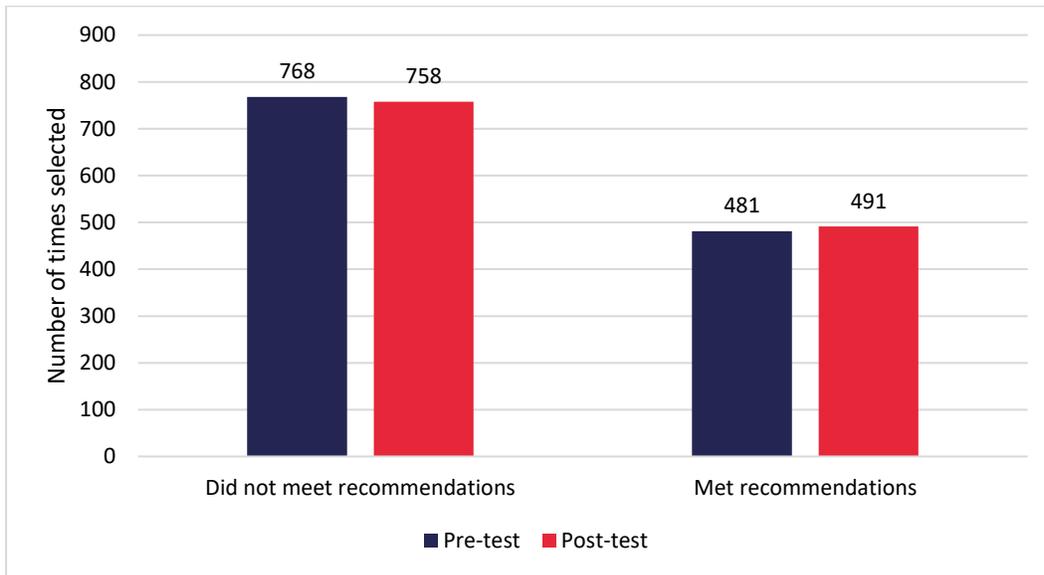


Figure 2. At pre-test, 481 participants (38.5%) met the recommendation, whereas at post-test, 491 participants (39.3%) met the recommendation.

#### MT1d. Eating more than one kind of vegetable.

A total of 1,244 adult participants reported whether they ate more than one kind of vegetable each day or week. A McNemar test showed there was no statistically significant change in adults reporting whether they ate more than one kind of vegetable each day or week ( $\chi^2(1) = 0.76, p > .05$ ).

Figure 3 "Do you eat more than one kind of vegetable each day or week?" (Adults)

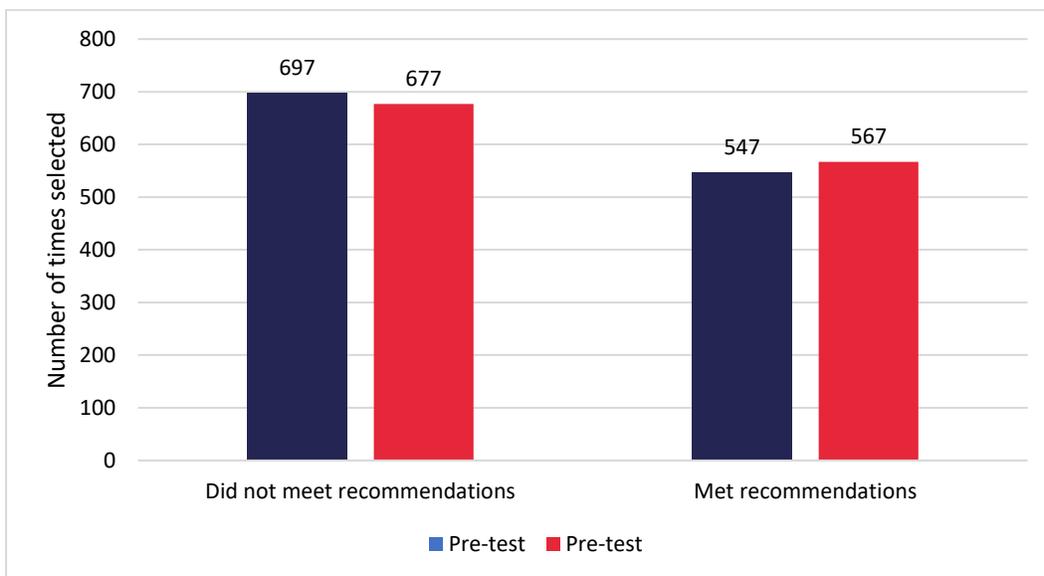


Figure 3. At pre-test, 547 participants (44.0%) met the recommendation, whereas at post-test, 567 participants (45.6%) met the recommendation.

### MT1g. Drinking water.

A total of 1,432 adult participants reported the frequency with which they drank water. A McNemar test showed that there was a statistically significant decrease in adults' reports of drinking water ( $\chi^2(1) = 29.97, p < .01, g = 0.12$ ). See Figure 4 for proportions of participants who did and did not meet recommendations.

Figure 4 "How often do you drink water?" (Adults)

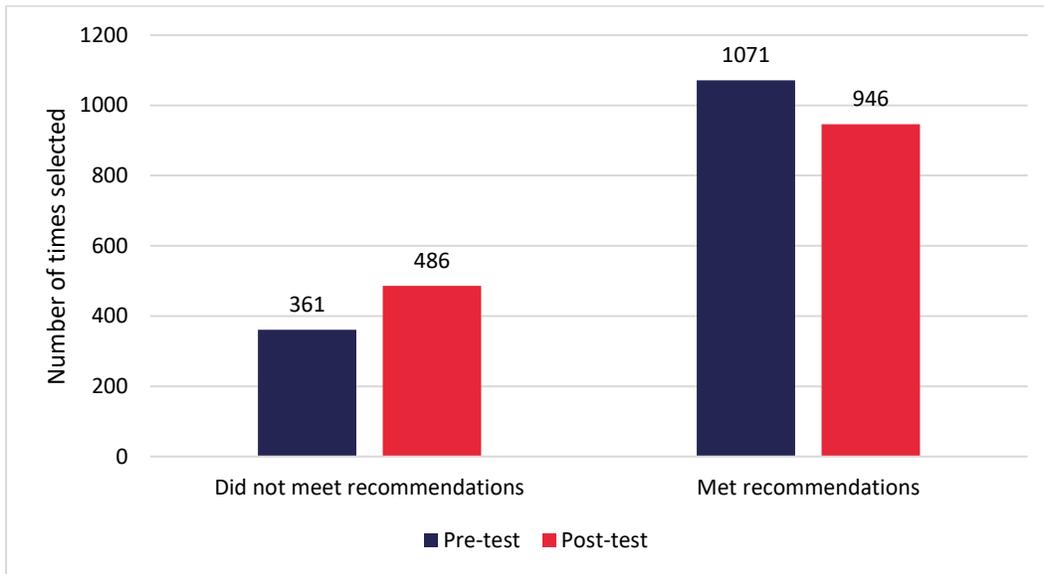


Figure 4. At pre-test, 1,071 participants (74.8%) met the recommendation, whereas at post-test, 946 participants (66.1%) met the recommendation.

### MT1h. Drinking fewer sugar-sweetened beverages (e.g., regular soda or sports drinks).

A total of 1,449 adult participants reported the frequency with which they drank fruit drinks, sports drinks, or punch. A McNemar test showed no significant change in reports of drinking SSBs ( $\chi^2(1) = 0.28, p > .05$ ).

Figure 5 "How often do you drink fruit drinks, sports drinks or punch?" (Adults)

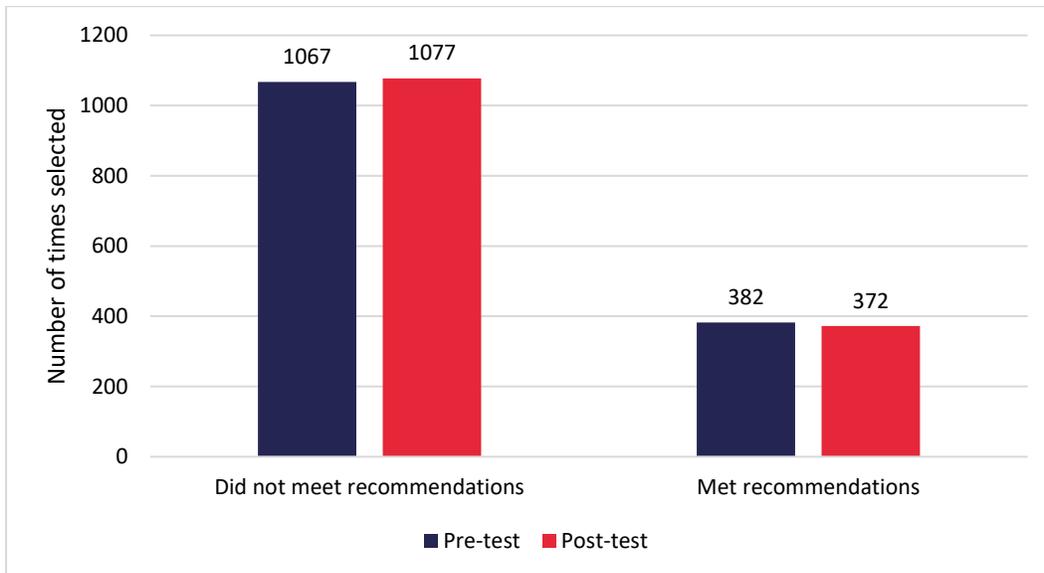


Figure 5. At pre-test, 382 participants (26.4%) met the recommendation, whereas at post-test, 372 participants (25.7%) met the recommendation.

**MT1i. Consuming low-fat or fat-free milk, milk products, or fortified soy beverages.**

A total of 1,440 adult participants reported the frequency with which they consumed low-fat or fat-free milk. A McNemar test showed no significant change in reports of consuming low-fat or fat-free milk ( $X^2(1) = 1.73, p > .05$ ). See Figure 6 for the proportions of participants who did and did not meet recommendations.

Figure 6 "How often do you consume low-fat or fat-free milk?" (Adults)

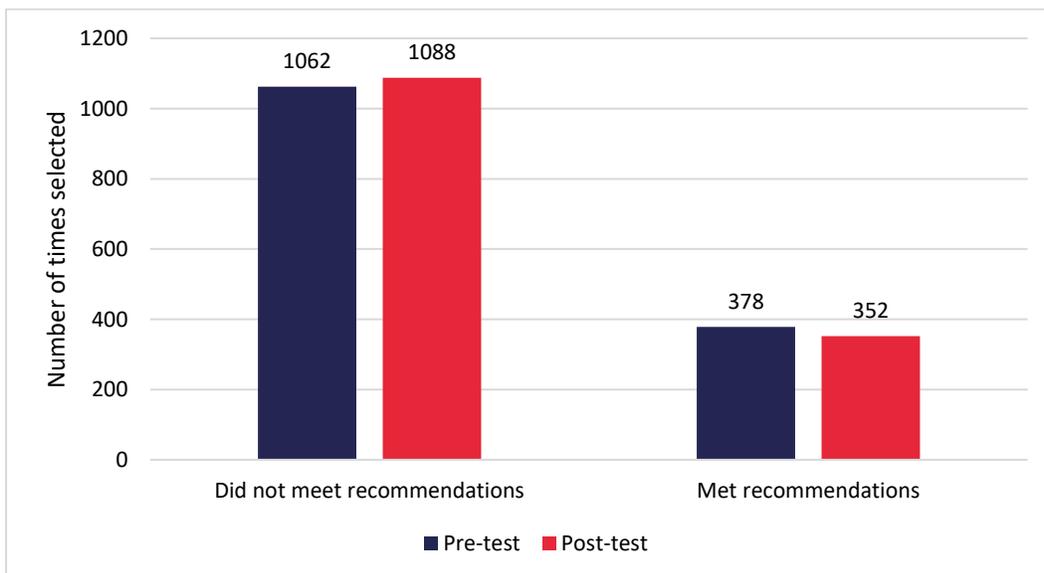


Figure 6. At pre-test, 378 participants (26.3%) met the recommendation, whereas at post-test, 352 participants (24.4%) met the recommendation.

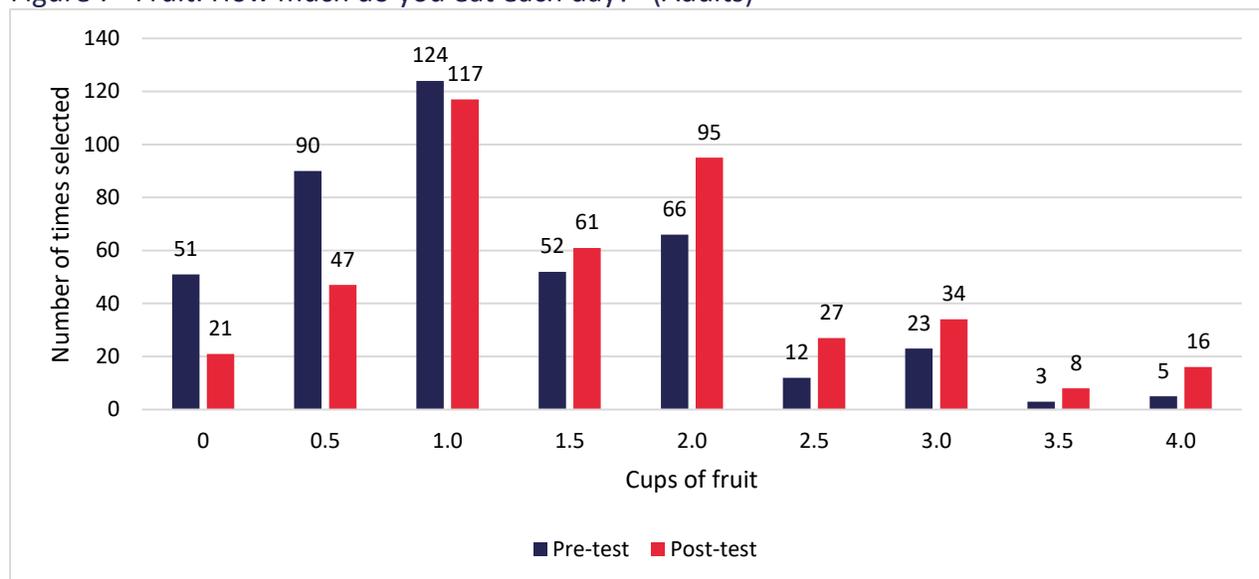


### MT1l. Cups of fruit consumed per day.

A total of 426 adult participants reported the number of cups of fruit they ate each day. The DGA (U.S. Department of Health and Human Services & U.S. Department of Agriculture, 2015) recommends consuming two or more cups of fruit per day. At pre-test, 25.6% of participants ( $n = 109$ ) reported that they ate 2 or more cups of fruit, whereas at post-test, 42.3% of participants ( $n = 180$ ) reported that they ate 2 or more cups of fruit.

A paired-samples  $t$ -test revealed that there was a statistically significant increase in the number of cups of fruit participants reported consuming ( $t(425) = 8.99, p < .001, d = 0.45$ ). At pre-test, the mean amount of fruit reported was 1.19 cups (Standard Deviation = 0.87). At post-test, the mean amount of fruit reported was 1.60 cups (Standard Deviation = 0.94). Figure 7 shows the distribution of the number of cups of fruit adults reported consuming per day.

Figure 7 “Fruit: How much do you eat each day?” (Adults)

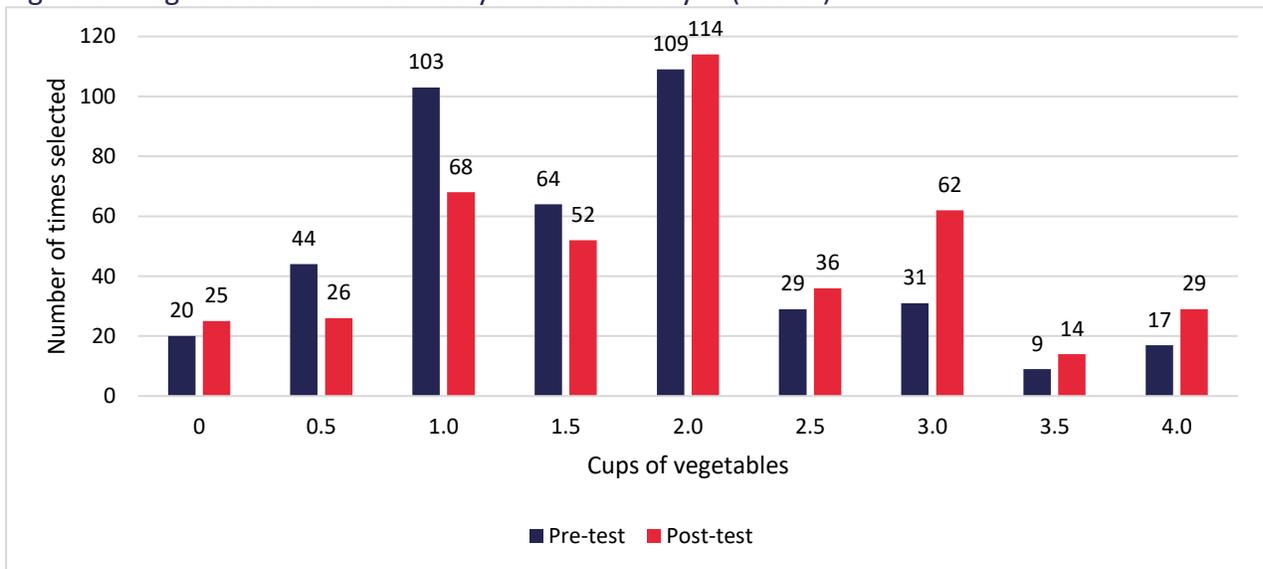


### MT1m. Cups of vegetables consumed per day.

A total of 426 adult participants reported the number of cups of vegetables they ate each day. The DGA (U.S. Department of Health and Human Services & U.S. Department of Agriculture, 2015) recommends consuming 2.5 or more cups of vegetables per day. At pre-test, 20.2% of participants ( $n = 86$ ) reported that they ate 2.5 or more cups of vegetables, whereas at post-test, 33.1% of participants ( $n = 141$ ) reported that they ate 2.5 or more cups of vegetables.

A paired-samples  $t$ -test showed that there was a significant increase in the number of cups of vegetables participants reported consuming ( $t(425) = 5.86, p < .001, d = 0.29$ ). At pre-test, the mean amount of vegetables reported was 1.65 cups (Standard Deviation = 0.94). At post-test, the mean amount of vegetables reported was 1.94 cups (Standard Deviation = 1.04). Figure 8 shows the distribution of the number of cups of vegetables consumed per day.

Figure 8 “Vegetables: How much do you eat each day?” (Adults)



**MT2a. Choose healthy foods on a budget.**

A total of 1,400 adult participants reported how often they chose healthy food for their families on a budget. A McNemar test showed there was a statistically significant increase in the number of adults who reported that they chose healthy food on a budget ( $X^2(1) = 3.90, p < .05, g = 0.07$ ).

Figure 9 “Do you choose healthy foods on a budget?” (Adults)

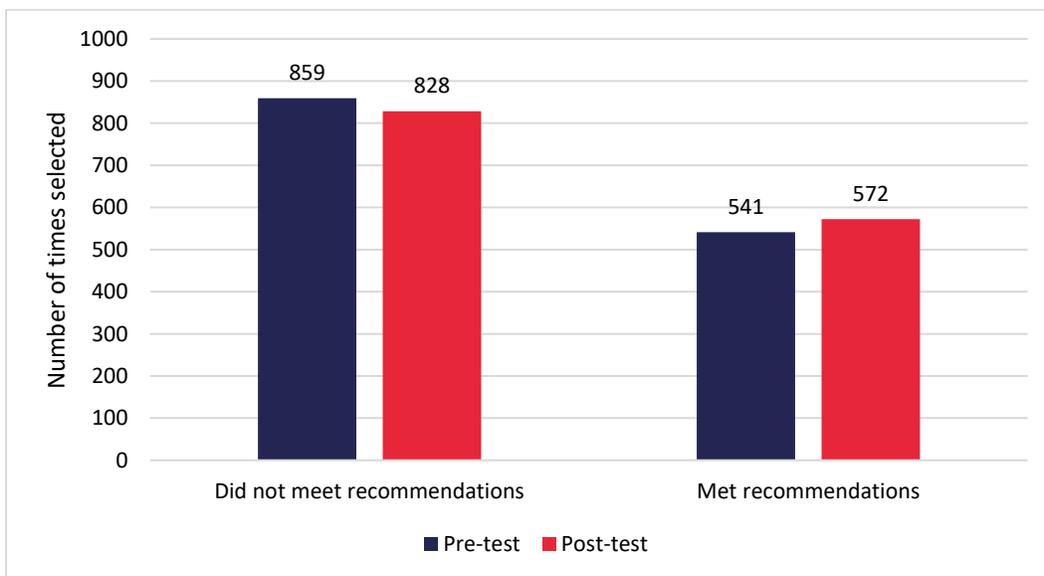


Figure 9. At pre-test, 541 participants (38.6%) met the recommendation, whereas at post-test, 572 participants (40.9%) met the recommendation.

### MT2b. Read nutrition facts labels or nutrition ingredients lists.

A total of 1,434 adult participants reported how often they read nutrition facts labels or nutrition ingredients lists on food items when shopping. A McNemar test showed that there was no statistically significant change in the number of adults reporting that they read nutrition facts labels or nutrition ingredients lists ( $\chi^2(1) = 2.72, p < .05$ ).

Figure 10 "Do you use this label when food shopping?" (Adults)

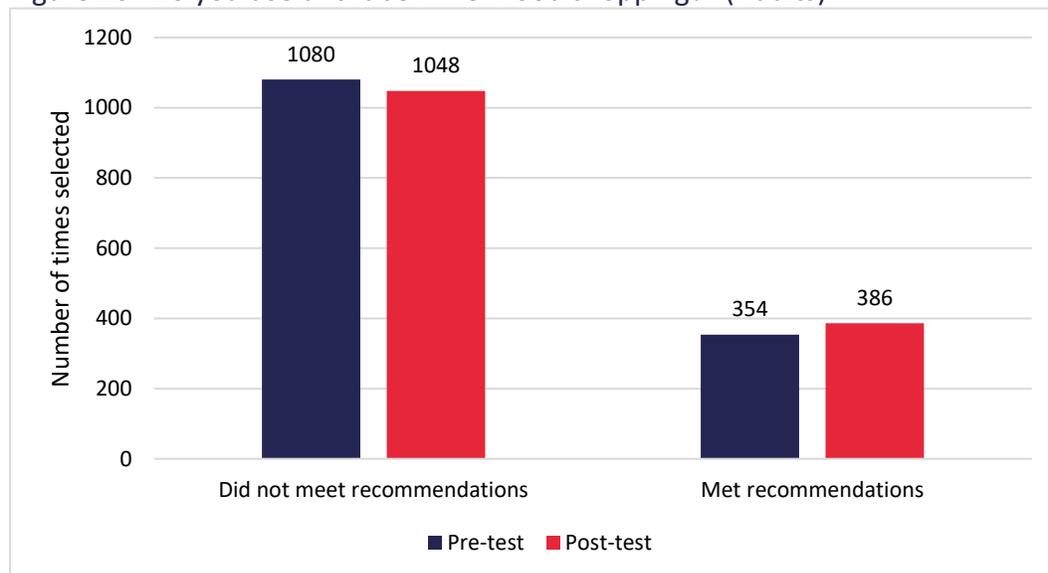


Figure 10. At pre-test, 354 participants (24.7%) met the recommendation, whereas at post-test, 386 participants (26.9%) met the recommendation.

### MT2g. Not running out of food before month's end.

A total of 1,034 adult participants reported whether they ran out of food before the end of the month. Results from a McNemar test indicated there was a significant decrease in the number of adults who indicated that they met the recommendation ( $\chi^2(1) = 10.51, p < .01, g = 0.09$ ).

That is, compared to pre-test, more adults reported that they ran out of food before the end of the month at post-test.

Figure 11 "Do you run out of food before the end of the month?" (Adults)

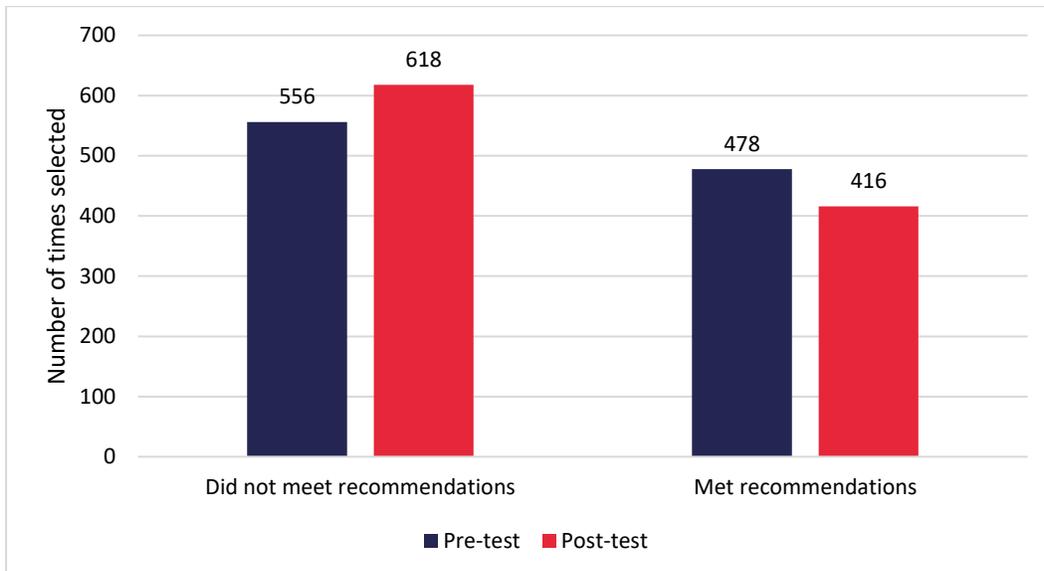


Figure 11. At pre-test, 478 participants (46.2%) met recommendations, whereas at post-test, 416 participants (40.2%) met recommendations.

#### MT2h. Compare prices before buying foods.

A total of 1,441 adult participants reported whether they compared prices before buying foods. A McNemar test indicated there was a significant decrease in the number of adults reporting that they met the recommendation ( $X^2(1) = 9.08, p < .01, g = 0.07$ ). That is, compared to pre-test, more adults reported that they did not compare prices before buying food at post-test.

Figure 12 "Do you compare prices before buying foods?" (Adults)

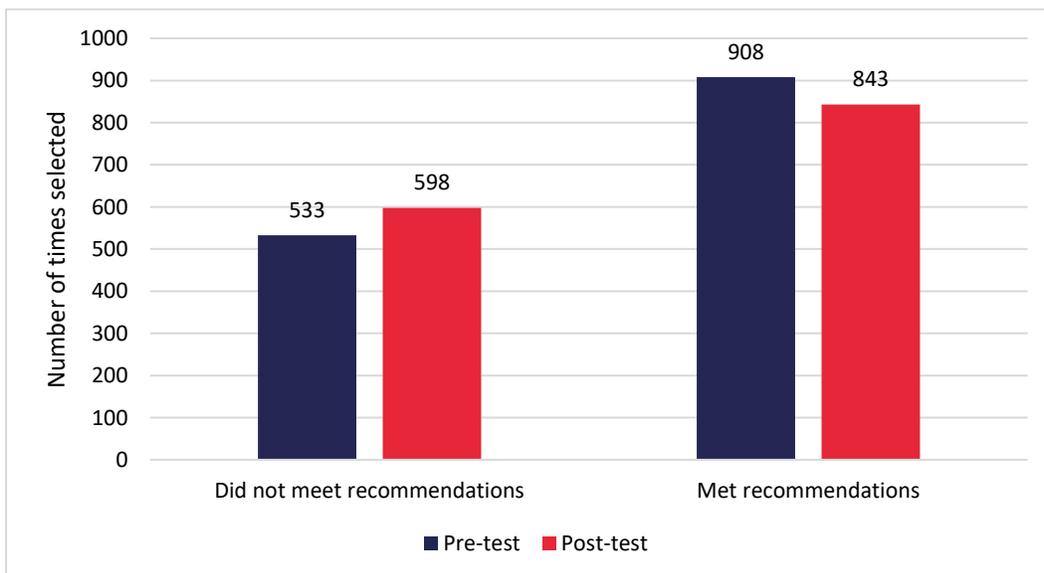


Figure 12. At pre-test, 908 participants (63.0%) met recommendations, whereas at post-test, 843 participants (58.5%) met recommendations.

### MT2i. Identify foods on sale or use coupons to save money.

A total of 1,406 adult participants reported whether they identified foods on sale or used coupons to save money. A McNemar test indicated there was a significant decrease in the number of adults who reported that they met the recommendation ( $\chi^2(1) = 19.06, p < .001, g = 0.11$ ). That is, compared to pre-test, more adults reported that they did not identify foods on sale or use coupons to save money at post-test.

Figure 13 "Do you compare prices before buying foods?" (Adults)

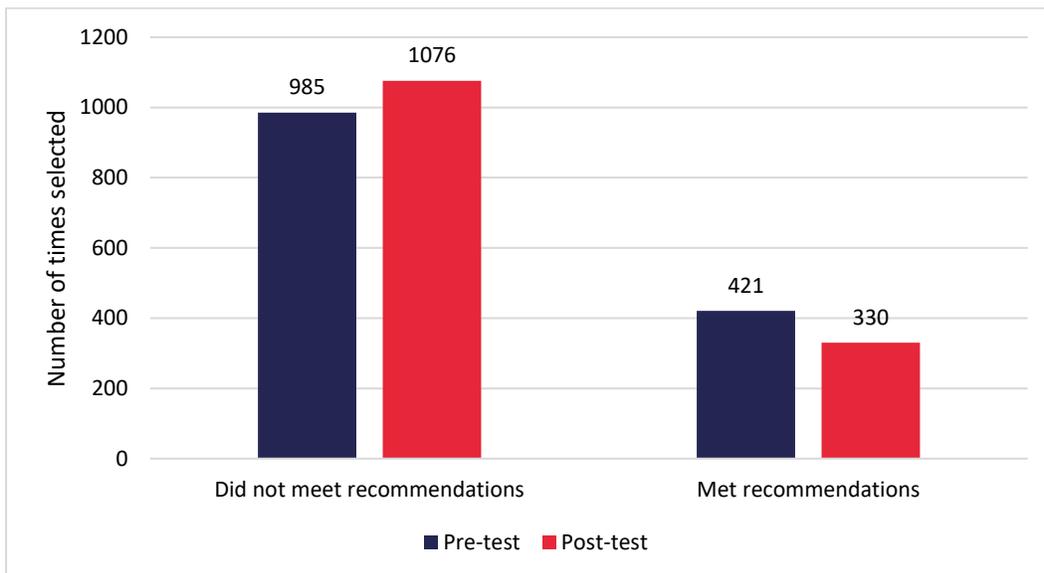


Figure 13. At pre-test, 421 participants (29.9%) met the recommendation, whereas at post-test, 330 participants (23.5%) met the recommendation.

### MT2j. Shop with a list.

A total of 1,062 adult participants reported whether they shopped with a list. A McNemar test indicated there was a significant decrease in the number of adults who met the recommendation ( $\chi^2(1) = 9.55, p < .01, g = 0.09$ ). That is, compared to pre-test, more adults reported that they did not shop with a list at post-test.

Figure 14 "Do you shop using a list?" (Adults)

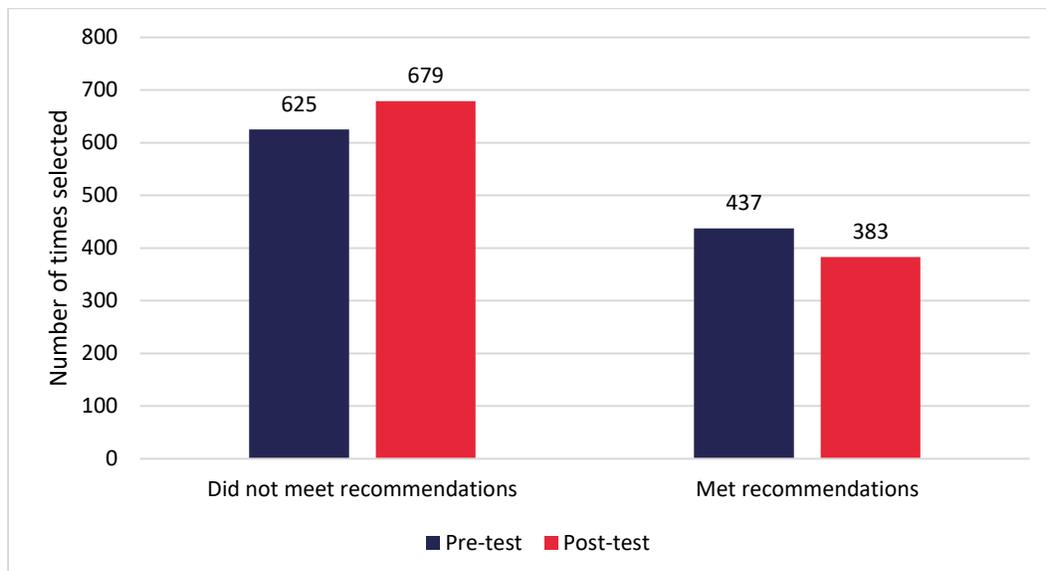


Figure 14. At pre-test, 437 participants (41.1%) met the recommendation whereas at post-test, 383 participants (36.1%) met the recommendation.

### Teen Direct Education Results

Results for teens are reported by each MT1 indicator. One IA reported data for only a subset of MT1 indicators related to water (MT1g;  $n = 3,538$ ) and SSB (MT1h;  $n = 3,620$ ) consumption; therefore, the total number of teen participants for statistical analyses of these two indicators differs from results reported for consumption of fruits (MT1c;  $n = 322$ ) and vegetables (MT1d;  $n = 316$ ).

#### MT1c. Ate more than one kind of fruit.

A total of 322 teen participants reported whether they ate more than one kind of fruit each day. A McNemar test indicated that there was a statistically significant increase for teens' reports of consuming more than one kind of fruit ( $X^2(1) = 4.82$ ,  $p < .05$ ,  $g = 0.13$ ).



Figure 15 "Do you eat more than one kind of fruit each day?" (Teens)

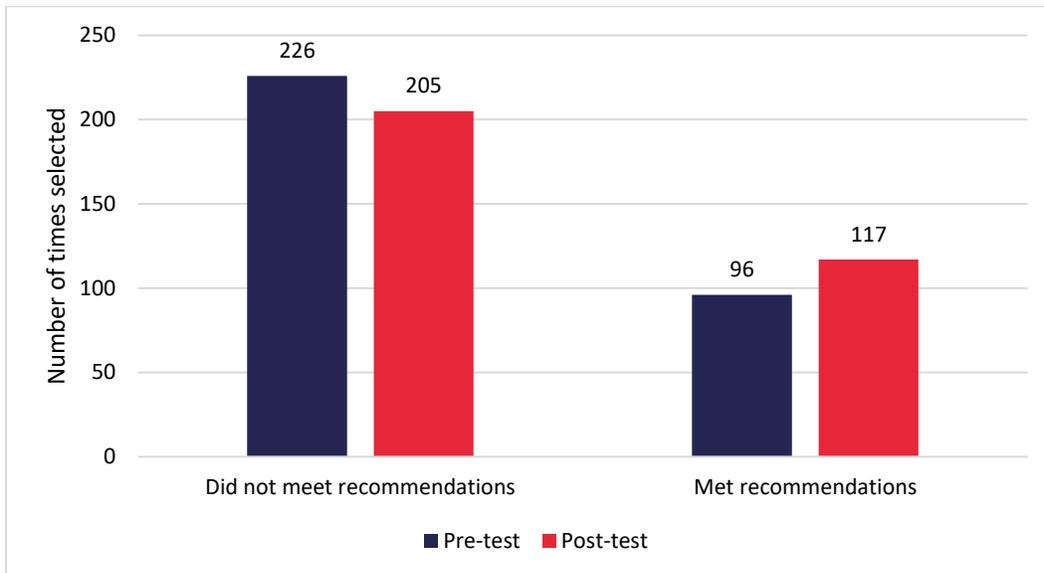


Figure 15. At pre-test, 96 participants (29.8%) met the recommendation, whereas at post-test, 117 participants (36.3%) met the recommendation.

**MT1d. Eating more than one kind of vegetable.**

A total of 316 teen participants reported whether they ate more than one kind of vegetable each day. A McNemar test showed no significant change in reports of eating more than one kind of vegetable each day ( $\chi^2(1) = 0.10, p > .05$ ).

Figure 16 "Do you eat more than one kind of vegetable each day?" (Teens)

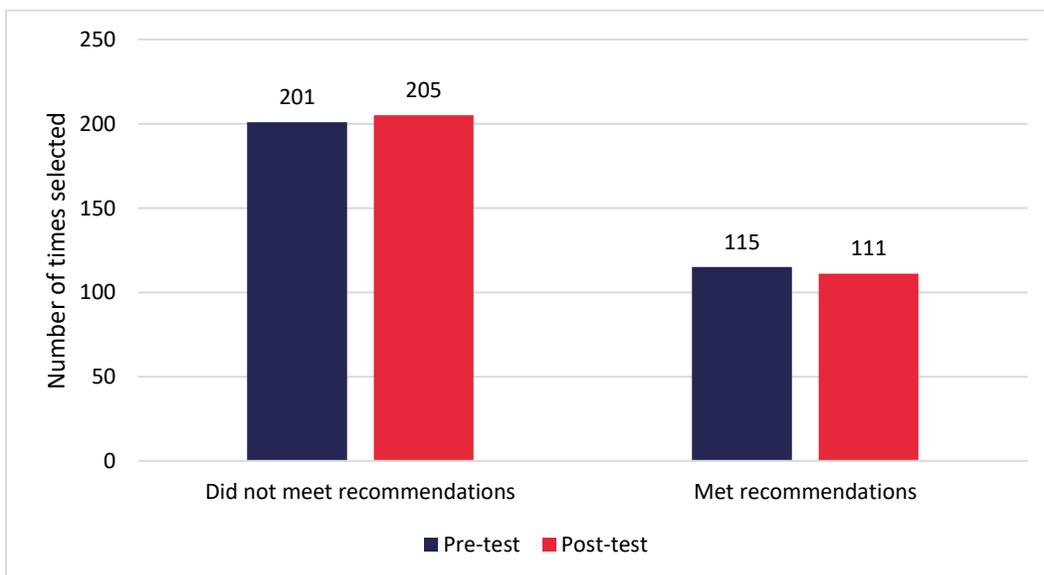


Figure 16. At pre-test, 115 participants (36.4%) met the recommendation, whereas at post-test, 111 participants (35.1%) met the recommendation.

### MT1g. Drinking water.

A total of 3,538 teen participants were asked to indicate the number of times they drank water the previous day. A McNemar test showed there was no significant change in the number of times teens reported drinking water, ( $\chi^2(1) = 0.63, p > .05$ ).

Figure 17 "Yesterday, did you drink any water, such as from a glass, a bottle, or a water fountain?" (Teens)

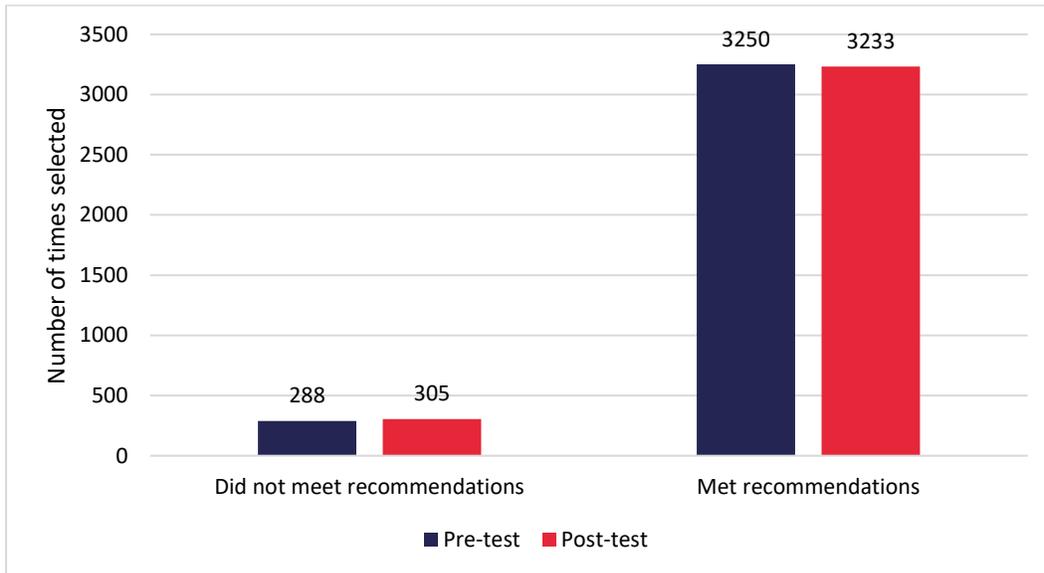


Figure 17. At pre-test, 3,250 participants (91.9%) met the recommendation, whereas at post-test, 3,233 participants (91.4%) met the recommendation.

### MT1h. Drinking fewer sugar-sweetened beverages.

A total of 3,620 teen participants were asked the frequency with which they drank any SSBs during the previous day. A McNemar test showed no significant change in reports of drinking SSBs ( $\chi^2(1) = 1.23, p > .05$ ).

Figure 18 "Yesterday, did you drink any punch, sports drinks or other fruit-flavored drinks?" (Teens)

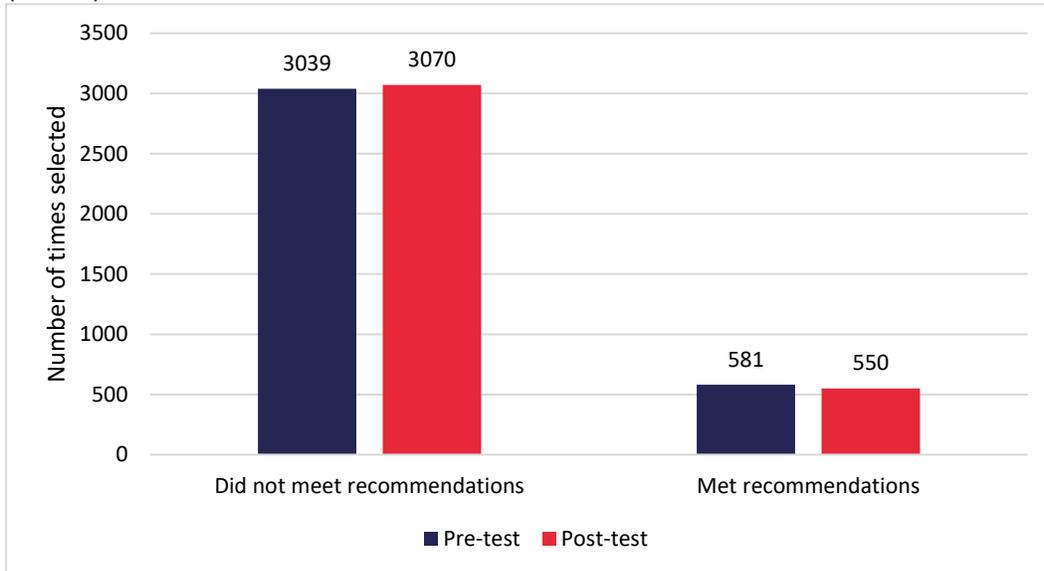


Figure 18. At pre-test, 581 participants (16.0%) met the recommendation, whereas at post-test, 550 participants (15.2%) met the recommendation.

### Child Direct Education Results

Results for children are reported by each MT1 indicator. One IA reported data for only a subset of MT1 indicators related to water (MT1g;  $n = 4,441$ ), SSBs (MT1h;  $n = 4,828$ ), and low-fat or fat-free milk (MT1i;  $n = 4,376$ ) consumption; therefore, the total number of child participants for statistical analyses of these indicators differs from results reported for consumption of fruits (MT1c;  $n = 422$ ) and vegetables (MT1d;  $n = 422$ ).

#### MT1c. Ate more than one kind of fruit.

A total of 422 child participants reported whether they ate more than one kind of fruit each day. A McNemar test showed a significant increase in reports of eating fruit each day ( $\chi^2(1) = 4.80, p < .05, g = 0.09$ ).

Figure 19 "Do you eat more than one kind of fruit each day?" (Children)

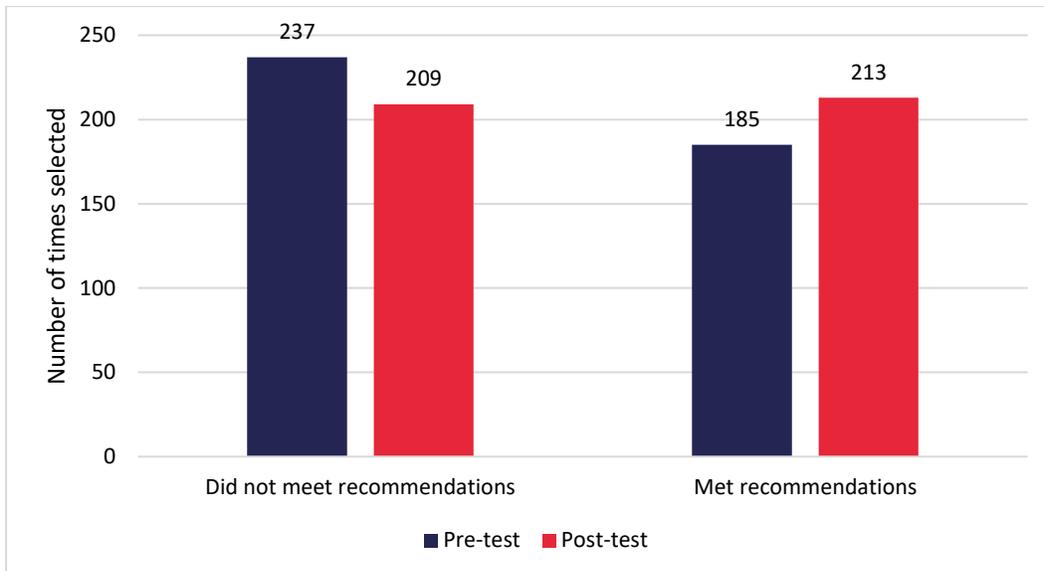


Figure 19. At pre-test, 185 participants (43.8%) met the recommendation, whereas at post-test, 213 participants (50.5%) met the recommendation.

**MT1d. Eating more than one kind of vegetable.**

A total of 422 child participants were asked whether they ate more than one kind of vegetable each day. A McNemar test showed no significant change in reports of eating vegetables each day ( $X^2(1) = 1.43 p > .05$ ).

Figure 20 "Do you eat more than one kind of vegetable each day?" (Children)

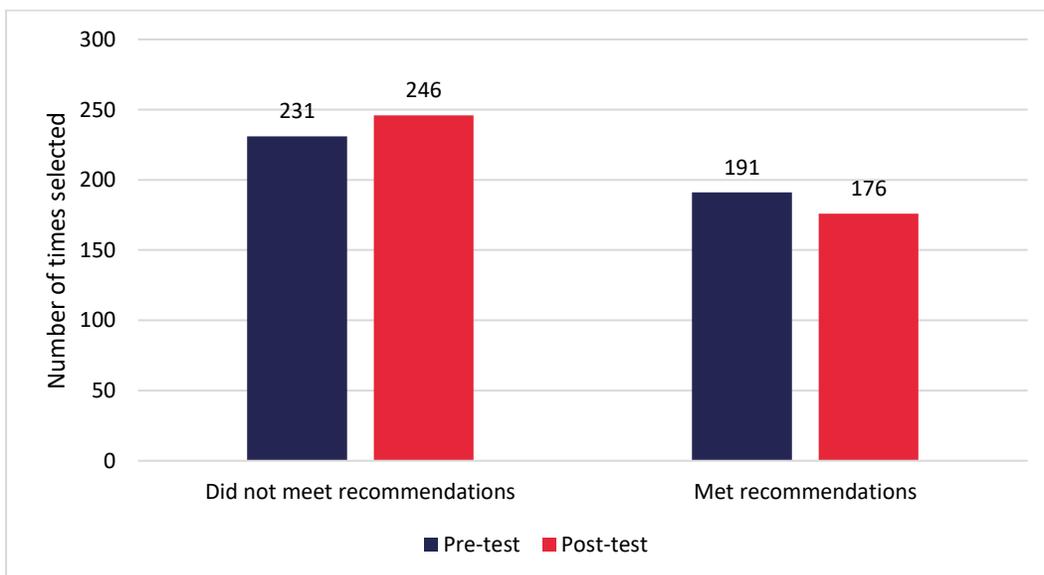


Figure 20. At pre-test, 191 participants (45.3%) met the recommendation, whereas at post-test, 176 participants (41.7%) met the recommendation.

### MT1g. Drinking water.

A total of 4,441 child participants were asked to indicate whether they drank water the previous day. A McNemar test showed no significant change in reports of drinking water ( $\chi^2(1) = 0.05, p > .05$ ).

Figure 21 "Yesterday, did you drink any water, such as from a glass, a bottle, or a water fountain?" (Children)

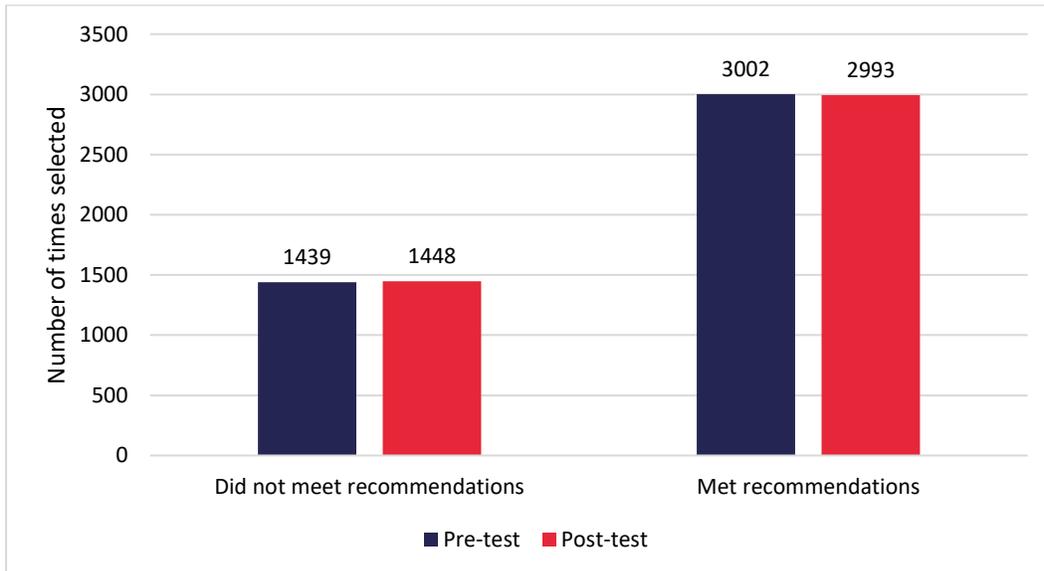


Figure 21. At pre-test, 3,002 participants (67.6%) met the recommendation, whereas at post-test, 2,993 participants (67.4%) met the recommendation.

### MT1h. Drinking fewer sugar-sweetened beverages.

A total of 4,828 child participants were asked the frequency with which they drank any SSBs during the previous day. A McNemar test showed that there was a significant decrease in the number of participants who met recommendations at pre-test compared to post-test ( $\chi^2(1) = 43.71, p < .001, g = 0.10$ ). That is, compared to pre-test, more children reported drinking SSBs at post-test.

Figure 22 "Yesterday, did you drink any punch, sports drinks or other fruit-flavored drinks?" (Children)

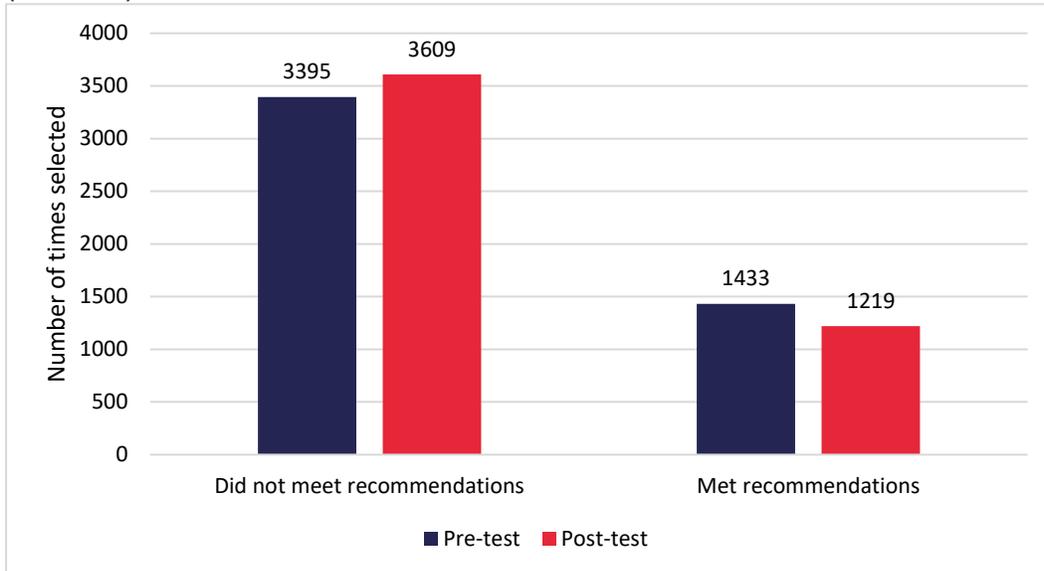


Figure 22. At pre-test, 1,433 participants (29.7%) met the recommendation, whereas at post-test, 1,219 participants (25.2%) met the recommendation.

**MT1i. Consuming low-fat or fat-free milk, milk products, or fortified soy beverages.**

A total of 4,376 child participants were asked the frequency with which they consumed low-fat or fat-free milk. A McNemar test showed a significant increase in the number of children who reported consuming low-fat or fat-free milk ( $\chi^2(1) = 4.40, p < .05, g = 0.03$ ).

Figure 23 "How often do you consume low-fat or fat-free milk?" (Adults)

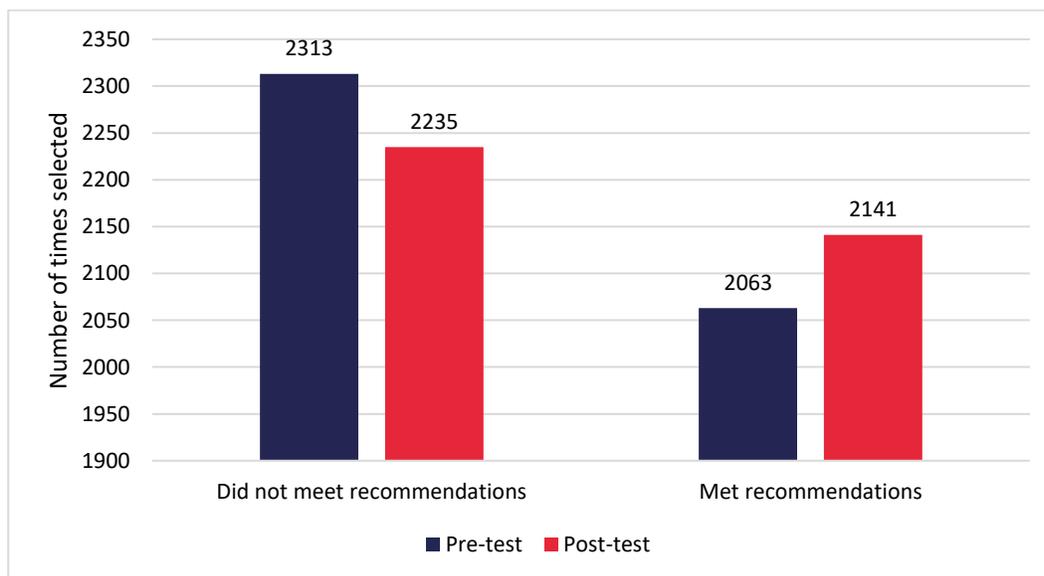


Figure 23. At pre-test, 2,063 participants (47.1%) met the recommendation, whereas at post-test, 2,141 participants (48.9%) met the recommendation.

## Direct Education Summary of Results

The overall results of the aggregated analyses for FFY 2019 direct education programs were mixed, with several encouraging findings indicating likely improvements at the conclusion of direct education program participation. The analyses revealed that compared to pre-test, the post-test results showed that there were statistically significant improvements in fruit consumption among children, teens, and adults and vegetable consumption among adults. There was also a statistically significant improvement in the consumption of low-fat or fat-free milk among children. Analyses of adults' food resource management behaviors showed that from pre-test to post-test, there was a statistically significant improvement in the extent to which adults chose healthy foods for their families when on a budget.

However, analyses also revealed that there were statistically significant decreases in certain healthy behaviors from pre- to post-test. In terms of MT1 indicators, post-test results, compared to pre-test, showed that children reported higher SSB consumption and adults reported lower water consumption. For MT2 indicators, more adults reported running out of food before month's end and fewer adults reported comparing prices before buying food, identifying foods on sale, or using coupons to save money, and shopping with a list from pre- to post-test.

One way of making sense of a set of contradictory findings is to examine effect sizes to see which findings are clinically relevant. Whereas the statistical significance of analyses reported for this evaluation indicate whether observed differences from pre- to post-test are likely to be real, and not a result of chance variation over time, effect sizes indicate whether the changes observed are likely to be clinically relevant. Effect sizes are especially informative when dealing with large sample sizes, such as the ones analyzed, because unlike statistical significance, they are not likely to be inflated when the number of participants is large (Kim, 2015; Sullivan, 2012).

As the Table 6 shows, the largest effect sizes were for adults' consumption of fruits and vegetables. Results indicated that compared to pre-test, adults reported eating more fruits and vegetables at post-test. Analyses also indicated that compared to pre-test, results at post-test showed more children and teens reported eating a variety of fruits. Taken together, these findings suggested that North Carolina direct education programs were contributing to improvements in SNAP-Eligible North Carolinians' fruit and vegetable consumption in FFY 2019, a key goal in SNAP-Eligible direct education programming.

Table 6. Interpretation of Effect Size

Indicator	Description	Direction of Change from Pre-Test to Post-Test	Effect Size	Effect Size Interpretation
MT1g	Drinking water frequency (adults)***	Decreased water consumption	$g = 0.12$	Small
MT1l	Cups of fruits consumed per day (adults)***	Increased fruit consumption	$d = 0.45$	Small
MT1m	Cups of vegetables consumed per day (adults)***	Increased vegetable consumption	$d = 0.29$	Small
MT2a	Choose healthy foods for a family on a budget (adults)*	Increased healthy food choice for a family on a budget	$g = 0.07$	Small
MT2g	Not run out of food before month's end (adults)**	Increased running out of food before month's end	$g = 0.09$	Small
MT2h	Compare prices before buying foods (adults)*	Decreased comparison of prices before buying food	$g = 0.07$	Small
MT2i	Identify foods on sale or use coupons to save money (adults)***	Decreased identification of foods on sale or use of coupons to save money	$g = 0.11$	Small
MT2j	Shop with a list (adults)**	Decreased shopping with a list	$g = 0.09$	Small
MT1c	Ate more than one kind of fruit through the day or week (teens)*	Increased fruit consumption	$g = 0.13$	Small
MT1c	Ate more than one kind of fruit through the day or week (children)*	Increased fruit consumption	$g = 0.09$	Small
MT1h	Drinking fewer sugar-sweetened beverages (children)***	Increased sugar-sweetened beverage consumption	$g = 0.10$	Small
MT1i	Consuming low-fat or fat-free milk (children)*	Increased low-fat or fat-free milk consumption	$g = 0.03$	Trivial

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$

Unfortunately, clinically meaningful decreases in water consumption and four food resource management behaviors were found among adults and increased SSB consumption in children. The nontrivial effect sizes related to these findings indicate that they are likely to be of practical significance. Due to limitations inherent in the data, follow-up tests to probe the meaning of these effects were not possible. Although the authors are aware of substantial variation in SNAP-Ed direct education programming, they were unable to examine the data to confirm that participants who reported on a specific behavior received the relevant programming. For example, it is possible that some proportion of the adults who reported that they did not shop with a list participated in direct education activities that did not specifically address shopping with a list.

Another possible contributor to the unexpected findings, in particular those for children's consumption of SSBs and adults' consumption of water, is the time of year when participants took the pre-test and post-test surveys. People's beverage consumption may vary across seasons. Although evidence on the seasonality of overall beverage intake is mixed, there is some evidence of greater intake during the summer months in warm climates. Unfortunately, it was not possible to determine the time of year during which participants gave their pre-test and post-test responses. It is also likely that the amount of time between pre-test and post-test varied, which could have contributed to variation in the data that was not due to the effects of direct education programming. It would be useful to examine or control for the extent to which season and duration between pre- and post-test could affect beverage choice findings in future analyses.

Modifications to data collection and reporting methodologies would support deeper levels of analysis and interpretation. The direct education outcome data available for analysis were categorized so that participant data indicated whether participants met or did not meet recommendations. When data are dichotomized in this way, it limits analysts' ability to detect subtle changes and conduct follow-up tests. Individual level data would increase both the range of analyses that could be used and their sensitivity. The data could have also been prone to misclassification bias if values were entered incorrectly.

As a final methodological consideration, the unexpected findings could be due to misunderstandings about which data IAs should report. Understandably, IAs want to provide as many data as possible; however, if programs do not address certain behaviors, it is not appropriate to evaluate whether participants change their behaviors.



Therefore, IAs should keep programming in mind not only when selecting appropriate measures, but also when deciding which questions should be included in analyses. For the reasons above, recommendations regarding direct education should be construed as tentative and subject to consideration of all the factors affecting programming. Given this caveat, we found that areas of opportunity for North Carolina SNAP-Education included SSB consumption among children, as well as water consumption and food resource management among adults.

# POLICY, SYSTEMS, AND ENVIRONMENTAL (PSE) CHANGES

Nutrition supports implementation (MT5) PSE changes that served as nutrition supports were documented using direct observation, repeated assessments or surveys, and/or photographic evidence as recommended in the SNAP-Ed Evaluation Framework (USDA-FNS, 2016).

IAs reported a total of 516 PSE changes at 428 sites with a combined reach of 556,555. Of those changes, there were 67 (13.0%) policy changes, 267 (51.7%) systems changes, and 182 (35.3%) environmental changes.

## Policy Changes

The most common policy change was the establishment or improvement of a nutrition policy (n = 38; 56.7%), followed by the implementation of a school or childcare wellness policy (n= 15; 22.4 %) and the establishment or maintenance of standards for healthier food policies in other settings (n = 8; 12.0%). Please refer to Table 7 for all policy change descriptions, frequencies, and percentages.

Table 7. Policy changes (MT5b)

Policy Change Description	Frequency	Percent
Established or improved a nutrition policy	38	56.7%
School wellness or childcare wellness policy implemented	15	22.4%
Standards for healthier food policy in other setting	8	11.9%
Rules on foods served in meetings or in classrooms	4	6.0%
Policies for working mothers	1	1.5%
Established or improved a monitoring and reporting system for school or childcare wellness policies	1	1.5%
<b>Total number of policy changes</b>	<b>67</b>	

## Systems Changes

The three most common systems changes were the improvement in hours of operation to improve access and convenience (n = 68, 25.47%), the prioritization of farm-to-table and increase in fresh or local produce (n = 34; 12.73%), and the implementation of federal food programs, such as the Child and Adult Care Food Program (CACFP), the Emergency Food Assistance Program (TEFAP), and summer meals (n = 28; 10.49%). All systems change descriptions, frequencies, and percentages can be found in Table 8.

Table 8. Systems changes (MT5c)

<b>Systems Change Description</b>	<b>Frequency</b>	<b>Percent</b>
Improved hours of operation to improve access/convenience	68	25.5%
Prioritized farm-to-table/increase in fresh or local produce	34	12.7%
Began offering a federal food program (CACFP, TEFAP, summer meals, etc.)	28	10.5%
Change in/improved menus (variety, quality, offering lighter fares)	22	8.2%
Implemented guidelines for healthier snack options	17	6.4%
Improvements in free water access, taste, quality, smell, or temperature	17	6.4%
Implemented, improved or expanded healthy fundraisers	12	4.5%
Enhanced training on menu design and healthy cooking techniques	10	3.8%
Implemented a system for youth, parent, and/or client leadership or involvement in decision-making	8	3.0%
Fresh produce made accessible in food pantries	8	3.0%
Improved child feeding practices (e.g. served family style, adults role model healthy behaviors, etc.)	7	2.6%
Restrictions on use of food as rewards or during celebrations	6	2.3%
Improved or increased healthy beverage options	5	1.9%
Implemented nutrition standards for foods accepted and distributed in food pantries and food banks	5	1.9%
Improved enrollment procedures to increase NSLBP meal participation including universal breakfast/ lunch	4	1.5%
Use of standardized, healthful recipes	4	1.5%
Implemented a system to involve youth in food service decision-making	3	1.1%
Removing sugar-sweetened beverages from children's menus	3	1.1%
Change in/improved vendor agreement towards healthier food(s)	2	0.8%
Implemented novel distribution systems to reach high-risk population (e.g. home delivery of the elderly, farmers' markets)	2	0.8%
Change in/improved food purchasing/donation specifications towards healthier food(s)	1	0.4%
Collected or accepted donations of excess wholesome food to distribute to clients	1	0.4%
<b>Total number of systems changes</b>	<b>267</b>	

## Environmental Changes

The majority of environmental changes were the establishment, reinvigoration, or maintenance of food gardens (n = 63, 34.62%); the establishment of new food banks, pantries, or distribution sites (n = 51, 28.02%); and the improvement or expansion of cafeteria, dining, and servicing areas and facilities (n = 22; 12.09%). All systems change descriptions and frequencies are presented in Table 9.

Table 9. Environmental changes (MT5d)

Environmental Change Description	Frequency	Percent
Edible gardens (establish, reinvigorate or maintain food gardens)	63	34.6%
Established a new food bank, pantry or distribution site	51	28.0%
Improved or expanded cafeteria/dining/serving areas or facilities	22	12.1%
Improved facilities or equipment to accommodate healthier options or make them more convenient/appealing/accessible - if allowable	13	7.1%
Improved appeal, layout or display of foods to encourage healthy and discourage unhealthy selections	10	5.5%
Improvements in layout or display of food (Smarter Lunchrooms, worksite cafeterias)	9	5.0%
Improved quality of healthy options	3	1.7%
Improved appeal, layout or display of healthy snack foods	2	1.1%
Eliminated or reduced amount of competitive foods	2	1.1%
Established a new healthy retail outlet	1	0.6%
Improved or expanded kitchen/food preparation facilities - if allowable	1	0.6%
Lactation supports or dedication lactation space	1	0.6%
Healthier vending machine initiatives (e.g., access to healthier foods and beverages)	1	0.6%
Other	3	1.7%
<b>Total number of environmental changes</b>	<b>182</b>	

## Promotional Changes

PSE changes were supported by 227 promotional efforts. The most frequent promotions were the use of outreach and promotion conducted to increase awareness and access to sites (n = 130, 57.27%); the use of elements such as posters and visual displays, taste testing, live demonstrations, audiovisuals, and celebrities (n = 61; 26.87%); and meal service staff members' encouragement of healthy selections (n = 14; 6.17%). Table 10 presents all promotional change descriptions, frequencies, and percentages.

Table 10. Promotional changes (MT5e)

Promotional Change Description	Frequency	Percent
Outreach and promotion conducted to increase awareness and access to the site(s) (pantries, farmer's markets, new stores)	130	57.3%
Used posters/visual displays, taste testing, live demonstrations, audiovisuals, celebrities, etc.	61	26.9%
School meal foods promoted outside of mealtimes	14	6.2%
Meal service staff encourages healthy selections	13	5.7%
Point-of-purchase/distribution prompts	5	2.2%
Took promotional steps to encourage new food distribution sites	2	0.9%
Implemented or enhanced limits on marketing/promotion of less healthy options	2	0.9%
<b>Total number of promotional changes</b>	<b>227</b>	

### PSEs by Domain

PSE changes took place in a variety of settings where North Carolinians eat, learn, live, play, shop, and work. The majority of PSEs took place in settings where people learn (n = 181; 46.1%), eat (n = 121; 30.9%), and live (n = 54; 13.9%). All domains and frequencies are presented in Figure 24. In addition to reporting the domain, IAs also reported the reach of programs. IAs reported that programs at places where people shop had the greatest reach (n = 213,801; 38.4%), followed by places where people learn (n = 201,181; 36.2%), and eat (n = 74,649; 13.4%). Table 11 shows reach by domain.

Figure 24 PSEs by Domain

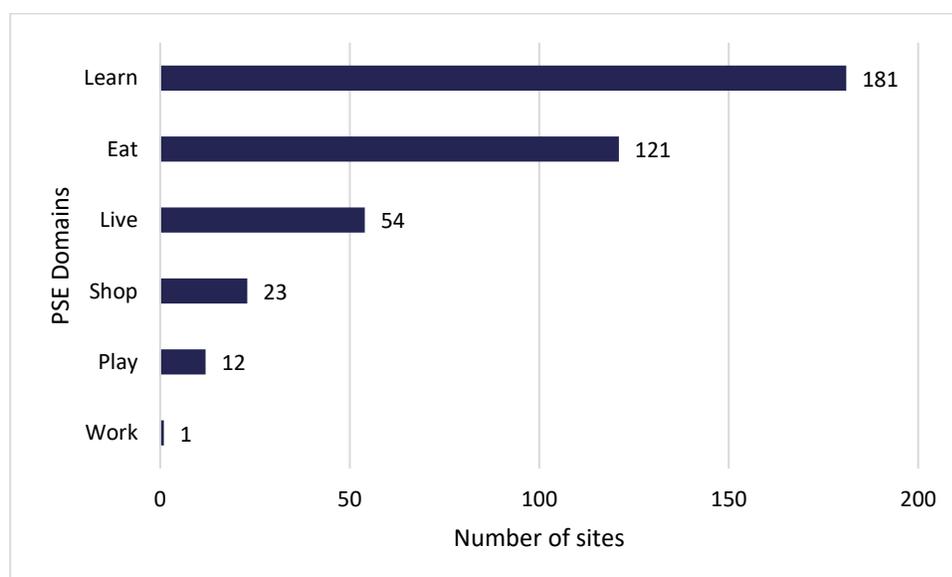


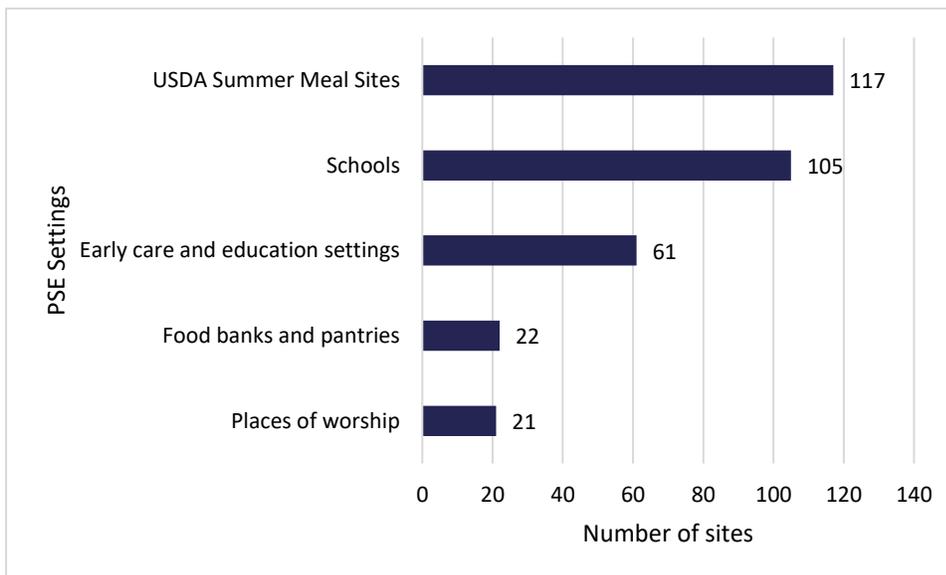
Table 11. Reach by Domain

Domains	Frequency	Percent
Shop	213,801	38.4%
Learn	201,181	36.2%
Eat	74,649	13.4%
Live	59,276	10.7%
Play	7,583	1.4%
Work	65	<0.1%
<b>Total Reach</b>	<b>556,555</b>	

### PSEs by Setting

IAs reported the specific settings where PSE changes took place. The most common setting was USDA summer meal sites (n = 117; 27.2%), followed by schools (n = 105; 26.3%) and early care and education sites (n = 61, 19.0%). Figure 25 shows how many PSE changes took place in each setting. In addition to the settings included in Figure 25, SNAP-Ed also benefited eligible North Carolinians at afterschool programs, community centers, community organizations, congregate meal sites and other senior nutrition centers, family resource centers, food banks and pantries, food stores, group living facilities, libraries, parks and open spaces, places of worship, public housing, residential treatment centers, shelters, worksites with low-wage workers, and YMCAs.

Figure 25 PSEs by Setting\*



\*Only settings reported by 20 or more sites are depicted in the graph (total settings = 22).

## PSE Summary of Results

IAs reported a total of 516 PSE changes at 428 sites, which had a combined reach of 556,555. Of those changes, there were 67 (13.0%) policy changes, 267 (51.7%) systems changes, and 182 (35.3%) environmental changes. The majority of policy changes were geared toward nutrition or child wellness. The most common systems changes were improvements in access and convenience, increased availability of fresh or local produce, and federal food program implementation. The majority of environmental changes took place in food gardens; food banks, pantries, and distribution sites; and cafeteria, dining, and servicing areas.

The most frequent environmental change was the establishment, reinvigoration, or maintenance of food gardens (n = 63, 34.6%) followed by the establishment of new food banks, pantries, or distribution sites (n = 51, 28.0%) and the improvement or expansion of cafeteria, dining, and servicing areas and facilities (n = 22; 12.1%; Table 9).

PSE changes were supported by 227 promotional efforts (Table 10). The most frequent promotion was the use of outreach and promotion conducted to increase awareness and access to sites (n = 130, 57.3%), followed by the use of elements such as posters and visual displays, taste testing, live demonstrations, audiovisuals, and celebrities (n = 61; 26.9%) and meal service staff members' encouragement of healthy selections (n = 14; 6.2%).

The overall results of the aggregated PSE data for FFY 2019 shows that a wide variety of nutrition-related PSE work has been done in North Carolina with a total reach of 556,555. PSE activity primarily took place where people learn and eat, including USDA summer meal sites, schools, early care and education settings, and food banks and pantries. PSE reach was highest in settings where people shop and learn.

Although nationally the bulk of SNAP-Ed PSE work tends to be in the area of nutrition supports, SNAP-Ed also supports PSEs that aim to increase the access to, and the appeal of, opportunities for physical activity. Physical activity supports are frequently assessed using the MT6 SNAP-Ed Evaluation Framework (USDA-FNS, 2016) indicator. For the current evaluation, North Carolina's SNAP-Ed program elected to focus on nutrition-related PSEs. This had the benefit of simplifying reporting. Now that North Carolina's IAs have proven successful in recording their PSE data for evaluation using Framework indicators, an option for future years would be to broaden PSE programs and evaluations to include physical activity supports.

North Carolina's IAs reported 516 PSE changes across 428 sites. These changes were supported by 227 promotional efforts, or about one promotion for every two sites. Although measurement of promotions is complicated by the lack of clear, dichotomous distinctions in the SNAP-Ed Evaluation Framework (USDA-FNS, 2016) between those promotional activities that, in themselves, constitute PSEs and those that publicize the presence or availability of healthful changes, the small number of promotional efforts in North Carolina in 2019 points to an area of opportunity. Changes to policies and environments, in particular, might benefit from publicity. North Carolina SNAP-Ed might identify a few key PSE changes to support with coordinated promotional efforts throughout the state, such as school wellness policies, healthy menu options, or healthy vending machine PSE changes.

## LIMITATIONS

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As with all data analyses, it is important to keep potential limitations in mind. For North Carolina's FFY 2019 SNAP-Ed data, these limitations were based on the way in which data were collected and reported. First, direct education data were collected with an unknown duration between pre-test and post-test and subsequently recoded. Second, issues related to memory and the tendency to report desirable behavior should always be kept in mind when evaluating self-reported data.

The direct education outcome data that were available for analysis were recoded so that participant data indicated whether participants did or did not meet recommendations. As described in the Direct Education Summary of Results, when the data were recoded, the ability of the analyses to detect changes was substantially reduced. This recoding could, in part, explain the unexpected direct education findings. There were also concerns related to the methods by which the data were recoded. Ideally, a statistical software program would have been used to compile and then algorithmically recode data, limiting the potential for human error.

## CONCLUSIONS AND RECOMMENDATIONS

The 2019 evaluation of North Carolina’s SNAP-Ed program highlights the number of North Carolinians served, provides support for the likely efficacy of direct education to improve fruit and vegetable intake, and informs areas of improvement expansion. A total of 13,421 North Carolinians provided at least one pre-test or post-test questionnaire response. This likely underestimates the total number of people served throughout the state. The primary audiences for direct education were children and teens, who made up 86.5% of all direct education participants.

Direct education analyses revealed that several health behaviors improved among all participants, from pre- to post-test. These were increased fruit consumption among adults, teens, and children. Analyses also showed increased low-fat and fat-free milk consumption among children and increases in vegetable consumption and choosing healthy foods when on a budget among adults. These findings demonstrate strengths of North Carolina SNAP-Ed programming.

There were also direct education analyses that indicated participants’ self-reported health behaviors decreased from pre- to post-test, including children’s SSB consumption and adults’ water consumption and certain food resource management behaviors. These findings highlight the importance of **targeting programs specifically toward increasing water and reducing SSB consumption for North Carolinians of all ages**. Children’s increased consumption of low-fat and fat-free milk from pre-test to post-test, suggests that important groundwork related to beverage choice has already been laid for this age group. It is possible that children, in particular, would be open to programs addressing SSBs. Reducing SSB consumption is also a key area where teens can take a leadership role and have peer influence over other students. Research suggests that using a youth empowerment model for teens may be effective (Wang, 2019). An example may be to **have youth lead activities** in elementary, middle, and high schools where youth leaders teach their peers about the benefits of drinking water and reducing SSB consumption. The Youth Engagement program, referred to as Teens as Teachers, could be used as a model in which teens teach peers and younger students about health risks and benefits. Additionally, Media Smart and other, similar curricula with youth could help teens identify the deceptive marketing practices the soda industry uses. Studies have shown youth of color to be particularly targeted by fast food and sugary beverage companies (Harris, Frazier III, Kumanyika, & Ramirez, 2019). Helping youth understand how they are targeted by advertising, and how targeting can promote health disparities, may help them to make more healthful beverage choices.

Food resource management questions were only asked of adults. Many of the analyses of these data indicated that healthy behaviors decreased from pre- to post-test, including not running out of food before month’s end, comparing



prices before buying foods, identifying food on sale, or using coupons to save money, and shopping with a list. However, adults reported increases in choosing healthy foods for their family on a budget. The latter finding suggests that SNAP-Eligible adults are open to learning food resource management skills but might need additional programs and resources to implement these strategies. For example, recent changes to federal policies like stricter SNAP work requirements and public charge may have reduced participation in supplemental food programs, resulting in less food resources for families.

It is also possible that IAs focused on teaching skills related to choosing healthy foods on a budget but did not address other food resource management skills. Doing this would have led to evaluation of behavioral changes that were not addressed with direct education programs. If possible, **direct education pre-post data should be reported at the individual level and linked to curricula and demographic information.** Doing so would permit examination of such potential issues during analysis. Additionally, the direct education outcome data that were available for analysis were recoded such that participant data indicated whether participants did or did not meet recommendations. As described in the Direct Education Summary of Results, when the data were recoded, the ability of the analyses to detect changes was substantially reduced. Although guidelines were set in place to standardize participant responses, the best way to avoid these issues would have been to analyze original response data. **Analyses of original responses would have enhanced understanding of the outcomes in different age groups and detected more subtle changes between pre- and post-test responses.** This recoding could in part explain the unexpected direct education findings. Further, due to limitations inherent in the data, follow-up tests to probe the meaning of these effects were not possible. The ability to more effectively detect changes could have allowed for analyses that demonstrated more meaningful outcomes that could have better informed SNAP-Ed program development.

Like direct education activities, PSEs had a large impact, reaching North Carolinians a total of 556,555 times across 428 sites throughout the state. PSE activity primarily took place where people learn and eat, including USDA summer meal sites, schools, early care and education settings, and food banks and pantries. PSE reach was highest in settings where people shop and learn. IAs should **consider the utility of future PSE programs in settings where people live, play, and work.** The fewest PSE programs took place where people work, which means that worksite wellness might be an area of particular interest in forming future partnerships and PSE changes.

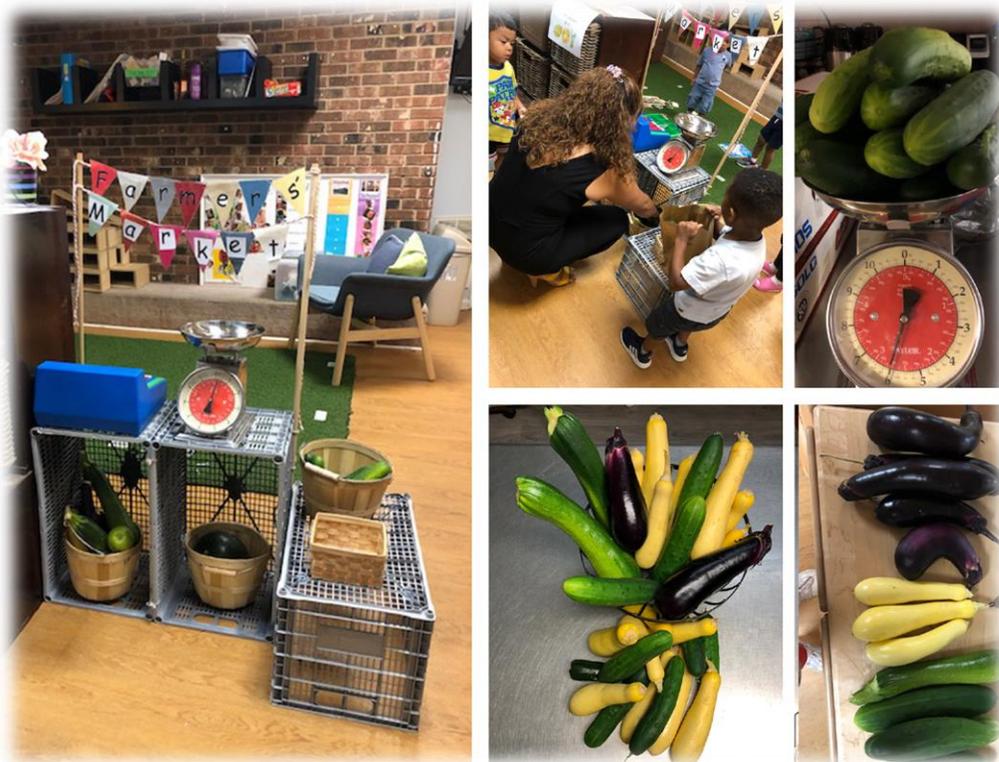
PSE changes were supported by 227 promotional efforts. The most frequently reported promotion was using outreach and promotion to increase awareness and access to sites; followed by the use of such



elements as posters and visual displays, taste testing, live demonstrations, audiovisuals, and celebrities; and meal service staff members' encouragement of healthy selections.

Finally, with regard to PSE evaluation, analyses of the FFY 2019 PSE activity showed an emphasis on improving nutrition. Future PSE work should focus on physical activity among SNAP-Ed-eligible North Carolinians. Additionally, the small number of promotional efforts in North Carolina in 2019 points to an area of opportunity. Changes to policies and environments, in particular, might benefit from more publicity. North Carolina SNAP-Ed might identify a few key PSE changes to support with coordinated promotional efforts throughout the state, such as promoting healthy cafeteria changes using strategies from the Smarter Lunchroom Movement, a statewide healthy beverage campaign, or physical activity campaign. This report highlights the many collective successes of North Carolina SNAP-Ed in FFY 2019 across the nine IAs. The results presented here also point to several opportunity areas for future direct education and PSE work, such as increased focus on water and SSB consumption, youth-led activities, future PSE work focused on physical activity, and increased promotion about PSE activities.

Recommendations related to data reporting will also enable more nuanced analyses that will be better able to detect incremental changes resulting from direct education programs. Program staff are also excited as North Carolina SNAP-Ed transitions to the Program Evaluation And Reporting System (PEARS) to use additional functions in the PSE module which will provide more detailed information related to the PSEs that are being implemented.



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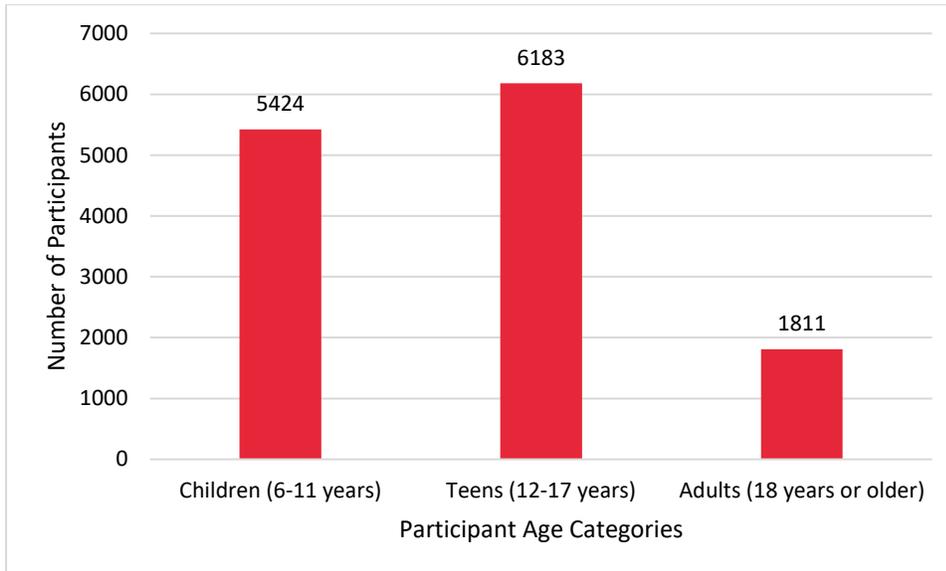
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## APPENDIX 1

A total of 13,421 participants provided a response for at least one indicator at either the pre-test or post-test. Three participants (0.02% of all participants) did not report their age and were, thus, excluded from analyses. Of the remaining 13,418 participants, 5,424 were children (40.42% of all participants), 6,183 were teens (46.08% of all participants), and 1,811 were adults (13.50% of all participants). Figure 1 presents total number of participants by age categories.

Figure 1 Participant Age Categories



In addition to age, participants were asked their ethnicity, race, and sex. Table 1 presents participants' ethnicity, race, and sex by age category.

Table 1. Participant Ethnicity, Race, and Sex by Age Category (N= 13,418)

		Children (6-11 years) N = 5,424	Teens (12-17 years) N = 6,183	Adults (18 years or older) N = 1,811
Demographics	Categories	Count (Percent)	Count (Percent)	Count (Percent)
Ethnicity	Hispanic or Latino	893(16.5%)	245(4.0%)	114(6.3%)
	Not Hispanic or Latino	4,076(75.1%)	301(4.9%)	1,537(84.9%)
	Did not report	455(8.4%)	5,637(91.2%)	160(8.8%)
Race	Asian	103(1.9%)	110(1.8%)	16(0.9%)
	Black	1,375(25.4%)	1,834(29.7%)	1,160(64.1%)
	Pacific Islander	41(0.8%)	8(0.1%)	2(0.1%)
	White	3,161(58.3%)	2,550(41.2%)	466(25.7%)

		<b>Children (6-11 years)</b> N = 5,424	<b>Teens (12-17 years)</b> N = 6,183	<b>Adults (18 years or older)</b> N = 1,811
<b>Demographics</b>	<b>Categories</b>	<b>Count (Percent)</b>	<b>Count (Percent)</b>	<b>Count (Percent)</b>
	Other race	543(10.0%)	1,647(26.6%)	67(3.7%)
	More than 1 race	32(0.6%)	22(0.4%)	20(1.1%)
	Did not report	169(3.1%)	12(0.2%)	80(4.4%)
Sex	Female	2,604(48.0%)	3,418(55.3%)	1,358(75.0%)
	Male	2656(49.0%)	2758(44.6%)	341(18.8%)
	Did not report	164(3.0%)	7(0.1%)	112(6.2%)

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