

NORTH CAROLINA

SNAP-Ed PROGRAM OUTCOME EVALUATION



FEDERAL FISCAL YEAR 2021

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NC DEPARTMENT OF
**HEALTH AND
HUMAN SERVICES**
Division of Child and Family Well-Being

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BACKGROUND

The Supplemental Nutrition Assistance Program Education (SNAP-Ed) is a federal nutrition education program of the United States Department of Agriculture (USDA) Food and Nutrition Service (FNS) Supplemental Nutrition Assistance Program (SNAP). SNAP-Ed 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 *Dietary Guidelines for Americans, 2020-2025 (DGA)* (USDA & U.S. Department of Health and Human Services, 2020) and the implementation of public health approaches.

SNAP-Ed programs are implemented across North Carolina to address nutrition and physical activity for families with low income (i.e., those with incomes at or below 185% of the federal poverty guidelines). Specifically, direct education programs are implemented to engage participants in learning about nutrition, how to make their food dollars stretch further, and ways to be more physically active (USDA-FNS, 2016). Recognizing that consumers' choices take place in a context of what is available, affordable, and accessible in their communities, SNAP-Ed also funds policy, systems, and environmental (PSE) change interventions to complement direct education efforts and support healthy behaviors. These PSE strategies function to help facilitate the adoption of healthy behaviors by changing the policies, systems, and environments in which individuals make decisions and make healthier choices more accessible. SNAP-Ed encourages multi-component and multi-level interventions that include marketing, education, staff trainings, and parent/community involvement to develop sustainable PSE changes.

To improve the health of eligible North Carolinians, the North Carolina Division of Child and Family Well-Being partners with the following nine SNAP-Ed 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
4. East Carolina University – Motivating Adolescents with Technology to Choose Health
5. North Carolina Agricultural and Technical State University – Try Healthy
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 ensure consistent and high-quality evaluation of SNAP-Ed interventions, FNS adopted the SNAP-Ed Evaluation Framework for its programs nationally in 2016 (USDA-FNS, 2016). This framework includes recommendations for assessing and reporting on indicators that evaluate outcomes related to direct education and PSE changes.

This report focuses on an evaluation of SNAP-Education direct nutrition education interventions and PSE changes implemented by nine North Carolina IAs for the federal fiscal year (FFY) 2021. Of particular interest were medium-term (MT) and long-term (LT) indicators focused on healthy eating behavior changes (MT1), nutrition supports (MT5, LT5), and physical activity and reduced sedentary behavior supports (MT6, LT6) that are defined by the Interpretive Guide to the SNAP-Education Evaluation Framework (USDA-FNS, 2016). While data were collected on the MT1, MT5, LT5, MT6, and LT6 indicators, the comprehensive work that is completed by IAs may not be entirely reflected in this evaluation. Activities may be reported under additional SNAP-Education Evaluation Framework indicators specific to the interventions that IAs implement independently.

METHODS

PARTICIPANTS AND PROCEDURE

The sample includes SNAP-Education direct education participants from the SNAP-Education-eligible population (at or below 185% of federal poverty guidelines) in North Carolina. IAs delivered direct education programming for varying age groups including children, teens, adults and seniors. Age group and other demographic information were collected by IAs from direct education surveys. PSE data was reported at the site or organizational level. All nine IAs submitted either direct education or PSE data and seven of those submitted both direct education and PSE data.

DIRECT EDUCATION

Self-reported eating behaviors were assessed for direct education participants using pre- and post-surveys completed at the beginning and end of the direct education program. Participants' responses to questions were compared pre- to post-program to determine whether there were statistically significant changes in self-reported dietary consumption based on MT1 indicators on healthy eating behaviors, shown in Table 1. IAs used a variety of survey instruments and questions to capture this information. To enable the combination of data across IAs accounting for differences between instruments, the Public Health Institute Center for Wellness and Nutrition (PHI CWN) developed guidelines per the SNAP-Education Evaluation Framework (USDA-FNS, 2016) for recoding survey responses. For healthy eating behavior (MT1) changes, PHI CWN established standards and cutoff criteria in consultation with nutrition evaluation experts and an expert committee for recoding responses to indicate whether or not participants' behavior conformed to recommendations of the *Dietary Guidelines for Americans* (USDA & U.S. Department of Health and Human Services, 2020).

Each IA used these recoding guidelines, referred to as PHI CWN scoring, to recode participant responses from each survey before submitting data for evaluation.

Table 1. SNAP-Ed Evaluation Framework indicators relevant to the North Carolina direct education activities

Relevant Indicator	Description
MT1c	Eating more than one kind of fruit throughout the day or week
MT1d	Eating more than one kind of vegetable throughout the day or week
MT1g	Drinking water
MT1h	Drinking fewer sugar-sweetened beverages (SSBs)
MT1i	Cups of fruit consumed per day
MT1m	Cups of vegetables consumed per day

POLICY, SYSTEMS, AND ENVIRONMENTAL CHANGES

PSE changes were reported by North Carolina IAs using the MT5 and MT6 indicators as described in Table 2. Those IAs that worked with sites or organizations to implement nutritional or physical activity supports reported each PSE site, PSE change, promotional effort, estimated reach, and other pertinent information to describe each PSE change. Reporting of reach was not standardized, but IAs were provided with general guidelines to support them in estimating reach counts. North Carolina IAs also reported on LT5 and LT6 indicators for sites that implemented a multi-level and multi-component intervention (i.e., sites with a PSE change and one or more of the following components: evidence-based education, marketing, parent/community involvement, and staff training on continuous program and policy implementation).



Table 2. SNAP-Ed Evaluation Framework indicators relevant to PSE work in North Carolina

Relevant Indicator	Description
MT5b/MT6b	Total number of policy changes
MT5c/MT6c	Total number of systems changes
MT5d/MT6d	Total number of environmental changes
MT5e/MT6e	Total number of promotional efforts for a PSE change
MT5f/MT6f	Reach: Total potential number of individuals who encountered the improved environment or were affected by the policy change on a regular (typical) basis and were assumed to be influenced by it
LT5a/LT6a	Total number of sites or organizations that implemented a multi-component and multi-level intervention with one or more changes in MT5/MT6 (site or organizational adoption of PSE changes and promotion) and one or more of the following additional components: <ol style="list-style-type: none"> 1. Evidence-based education 2. Marketing 3. Parent/community involvement 4. Staff training on continuous program and policy implementation
LT5b/LT6b	Total number of components per site or organization, and types of components implemented during the period assessed

STATISTICAL ANALYSES

The following statistical analyses were performed to evaluate direct education and PSE changes across all nine North Carolina IAs.

DIRECT EDUCATION

Direct education participant demographics and survey data were recorded by the North Carolina SNAP-Ed IAs in a Microsoft Excel template and reported to PHI CWN. Descriptive statistics (frequencies, percentages) of the sample that completed assessments for direct education interventions in North Carolina were computed.

To evaluate changes in the percentage of participants meeting dietary guidelines, statistical analyses were performed comparing pre- and post-survey data. For dichotomous outcomes, such as indicators related to healthy eating (MT1), McNemar tests were conducted to test for differences in the proportion of participants that met guidelines pre- and post-intervention. For continuous outcomes, such as cups of fruit (MT1l) and cups of vegetables (MT1m) consumed per day, paired-samples t-tests were conducted to test for differences in mean self-reported cups of fruits or vegetables pre- to post-intervention. For statistically significant results on McNemar tests or paired-samples t-tests ($p < .05$), an effect size was calculated to report the magnitude of differences between post- and pre-tests.

Since SNAP-Ed interventions are tailored for specific age groups to address different dietary needs for each age group, statistical analyses for direct education were conducted by age group and not combined.

POLICY, SYSTEMS, AND ENVIRONMENTAL CHANGES

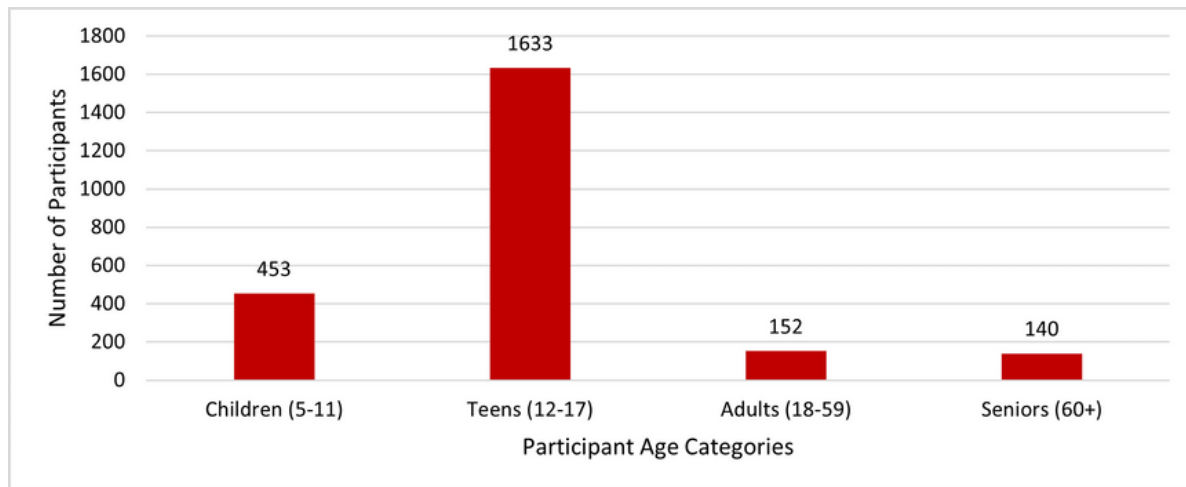
Nutrition and physical activity supports were assessed to identify the number of PSE sites and changes that were implemented within various community settings throughout North Carolina. For the MT5 and MT6 indicators listed previously in Table 2, the total number of policy (MT5b, MT6b), systems (MT5c, MT6c), and environmental (MT5d, MT6d) changes, the number of promotional efforts (MT5e, MT6e), and the top settings where PSEs occurred were reported. Estimated reach (MT5f, MT6f) was reported for PSE changes. For LT5 and LT6 indicators the total number of sites that implemented a multi-component and multi-level intervention with one or more changes in MT5/MT6 (LT5a, LT6a) as well as the total number of components per site, and types of components implemented (LT5b/LT6b) were reported. PSE activities were reported in the Program Evaluation and Reporting System (PEARS), and an export was generated for this analysis. Descriptive statistics were conducted to analyze PSE outcomes of interest.

FINDINGS

DIRECT EDUCATION

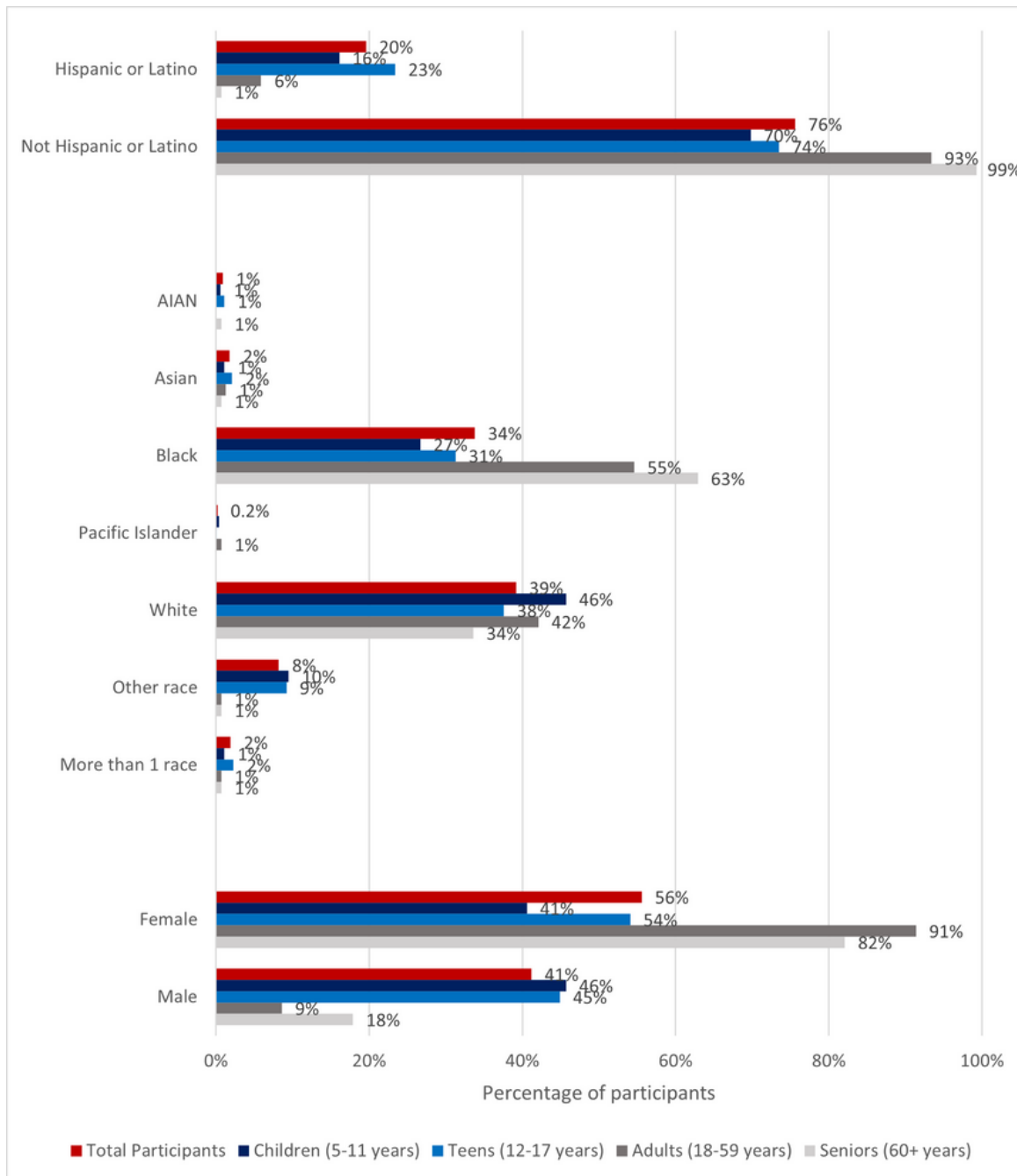
There were 4,148 SNAP-Ed participants who responded to at least one indicator on either the pre- or post-survey. This evaluation focuses, however, on the 2,378 participants who provided data for both pre- and post-intervention for at least one MT1 indicator. As shown in Figure 1, 453 participants were children (ages 5-11), 1,633 were teens (ages 12-17), 152 were adults (ages 18-59), and 140 were seniors (ages 60+). Appendix 1 has the demographics of the entire sample (Table A1).

Figure 1. Direct education participants with pre- and post-intervention data by age group (N = 2,378)



In addition to age, participants were asked to report their ethnicity, race, and sex. Figure 2 represents participants' ethnicity, race, and sex by age category. These results are also presented in a table format in Appendix I (Table A2).

Figure 2. Direct education participants with pre- and post-intervention data by, by ethnicity, race, and sex by age category (N=2,378)

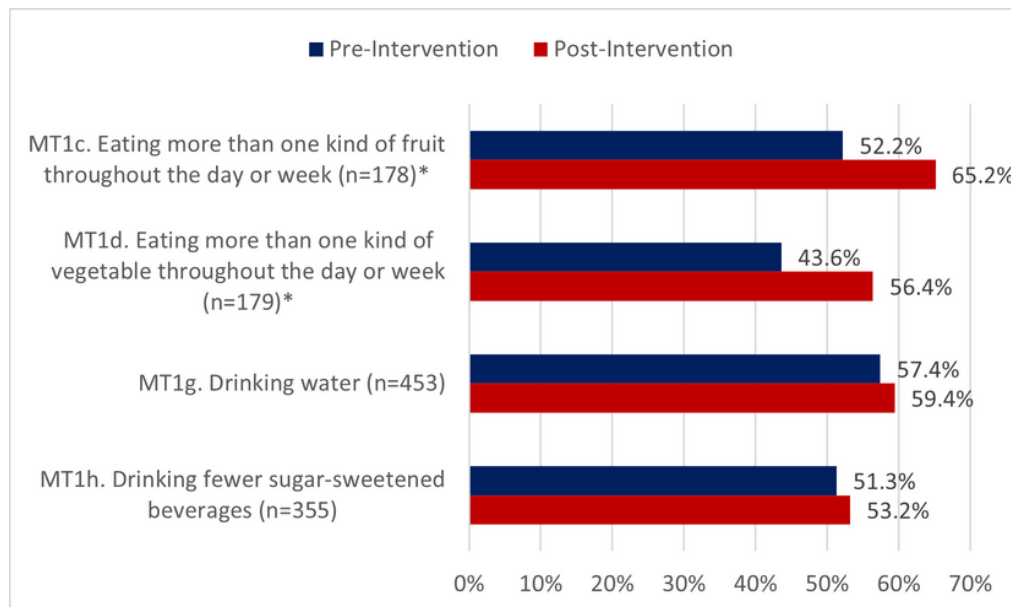


Note: Percentages may not add to 100% due to missing data. AIAN = American Indian and Alaska Native

CHILD DIRECT EDUCATION RESULTS

This section presents the results for children (ages 5-11) for each MT1 indicator and is visually presented in Figure 3.

Figure 3. Percentage of children (ages 5-11) who met *Dietary Guidelines for Americans* recommendations for MT1 indicators



Note: * indicates statistically significant change pre- to post-intervention based on McNemar's test at a significance level of $\alpha=0.05$.

MT1c. Eating more than one kind of fruit throughout the day or week.

A total of 178 children reported whether they ate more than one kind of fruit throughout the day or week. A McNemar test showed a statistically significant increase in the number of participants who met recommendations of eating more than one kind of fruit throughout the day or week ($X^2(1) = 7.68$, $p = 0.006$, $g = 0.183$). Compared to the pre-test, more children reported more than one kind of fruit throughout the day or week at post-test. In the pre-test, 93 participants (52.2%) met the recommendation, whereas, in the post-test, 116 participants (65.2%) met the recommendation.

MT1d. Eating more than one kind of vegetable throughout the day or week

A total of 179 children reported whether they ate more than one kind of vegetable throughout the day or week. A McNemar test showed a statistically significant increase in the number of participants who met recommendations for eating more than one kind of vegetable throughout the day or week ($X^2(1) = 8.20$, $p = 0.004$, $g = 0.195$). Compared to the pre-test, more children reported more than one kind of vegetable throughout the day or week at post-test. In the pre-test, 78 participants (43.6%) met the recommendation, whereas, in the post-test, 101 participants (56.4%) met the recommendation.

MT1g. Drinking water

A total of 453 children reported whether they drank water the previous day. A McNemar test showed no significant change in reports of meeting the dietary guidelines recommendation for drinking water from pre-test to post-test ($X^2(1) = 0.65$, $p = 0.421$). In the pre-test, 260 participants (57.4%) met the recommendation, whereas, in the post-test, 269 participants (59.4%) met the recommendation.

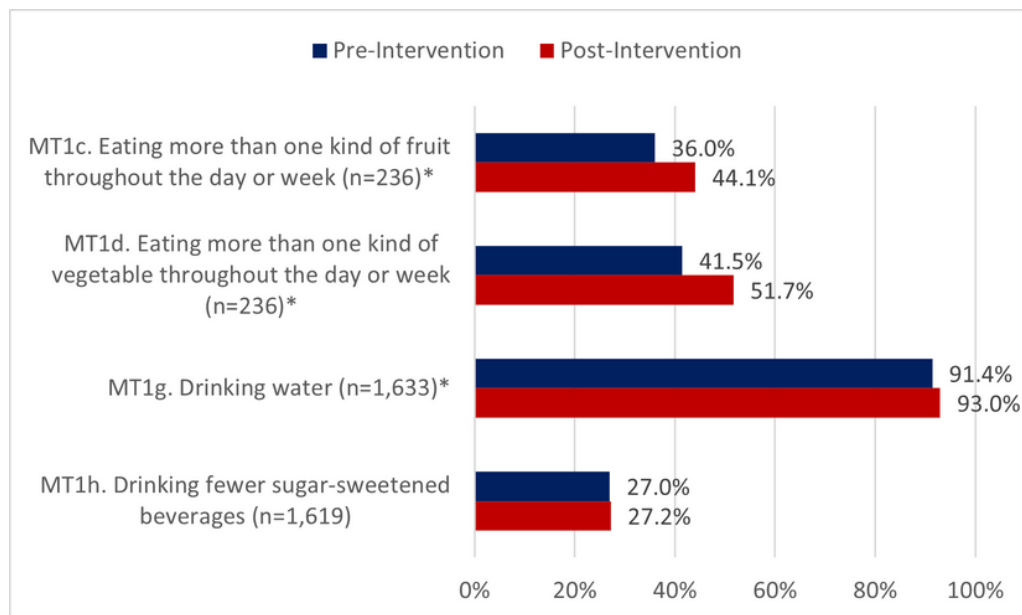
MT1h. Drinking fewer sugar-sweetened beverages.

A total of 355 children reported the frequency with which they drank any sugar-sweetened beverages (SSBs) during the previous day. A McNemar test showed no significant change in reports of meeting the dietary guidelines recommendation for drinking SSBs from pre-test to post-test ($\chi^2(1) = 0.44$, $p = 0.505$). In the pre-test, 182 participants (51.3%) met the recommendation, whereas, in the post-test, 189 participants (53.2%) met the recommendation.

TEEN DIRECT EDUCATION RESULTS

This section presents the results for teenagers (ages 12-17) for each MT1 indicator and is visually presented in Figure 4.

Figure 4. Percentage of teens (ages 12-17) who met *Dietary Guidelines for Americans* recommendations for MT1 indicators



Note: * indicates statistically significant change pre- to post-intervention based on McNemar's test at a significance level of $\alpha=0.05$.

MT1c. Eating more than one kind of fruit throughout the day or week

A total of 236 teenagers reported whether they ate more than one kind of fruit throughout the day or week. A McNemar test showed a statistically significant increase in the number of participants who met recommendations for eating more than one kind of fruit throughout the day or week ($\chi^2(1) = 4.44$, $p = 0.035$, $g = 0.130$). Compared to pre-test, more teens reported more than one kind of fruit throughout the day or week at post-test. In the pre-test, 85 participants (36.0%) met the recommendation, whereas, in the post-test, 104 participants (44.1%) met the recommendation.

MT1d. Eating more than one kind of vegetable throughout the day or week

A total of 236 teens reported whether they ate more than one kind of vegetable throughout the day or week. A McNemar test showed a statistically significant increase in the number of participants who met recommendations for eating more than one kind of vegetable throughout the day or week ($\chi^2(1) = 6.78$, $p = 0.009$, $g = 0.154$). Compared to the pre-test, more teens reported more than one kind of vegetable throughout the day or week at post-test. In the pre-test, 98 participants (41.5%) met the recommendation, whereas, in the post-test, 122 participants (51.7%) met the recommendation.

MT1g. Drinking water

A total of 1,633 teens reported whether they drank water the previous day. A McNemar test showed a statistically significant change in reports of meeting the dietary guidelines recommendation for drinking water from pre-test to post-test ($\chi^2(1) = 4.42$, $p = 0.036$, $g = 0.088$). Compared to the pre-test, more teens reported meeting the dietary guidelines recommendations for drinking water in the post-test. In the pre-test, 1492 participants (91.4%) met the recommendation, whereas, in the post-test, 1519 participants (93.0%) met the recommendation.

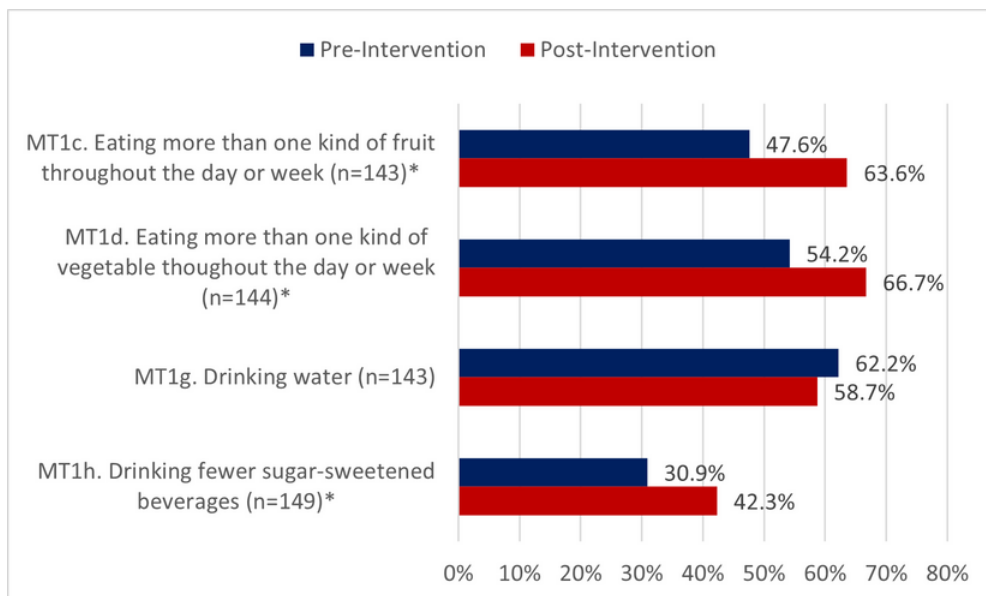
MT1h. Drinking fewer sugar-sweetened beverages

A total of 1,619 teens reported the frequency with which they drank any SSBs during the previous day. A McNemar test showed no significant change in reports of meeting the dietary guidelines recommendation for drinking SSBs from pre-test to post-test ($\chi^2(1) = 0.01$, $p = 0.918$). In the pre-test, 437 participants (27.0%) met the recommendation, whereas, in the post-test, 440 participants (27.2%) met the recommendation.

ADULT DIRECT EDUCATION RESULTS

This section presents the results for adults (ages 18-59) for each MT1 indicator and is visually presented in Figure 5.

Figure 5. Percentage of adults (ages 18-59) who met *Dietary Guidelines for Americans* recommendations for MT1 indicators



Note: * indicates statistically significant change pre- to post-intervention based on McNemar's test at a significance level of $\alpha=0.05$.

MT1c. Eating more than one kind of fruit throughout the day or week

A total of 143 adults reported whether they ate more than one kind of fruit throughout the day or week. A McNemar test showed a statistically significant increase in the number of participants who met recommendations for eating more than one kind of fruit throughout the day or week ($\chi^2(1) = 10.76$, $p = 0.001$, $g = 0.256$). Compared to the pre-test, more adults reported more than one kind of fruit throughout the day or week at post-test. In the pre-test, 68 participants (47.6%) met the recommendation, whereas, in the post-test, 91 participants (63.6%) met the recommendation.

MT1d. Eating more than one kind of vegetable throughout the day or week

A total of 144 adults reported whether they ate more than one kind of vegetable throughout the day or week. A McNemar test showed a statistically significant increase in the number of participants who met recommendations for eating more than one kind of vegetable throughout the day or week ($\chi^2(1) = 7.61$, $p = 0.006$, $g = 0.237$). Compared to the pre-test, more adults reported more than one kind of vegetable throughout the day or week at post-test. In the pre-test, 78 participants (54.2%) met the recommendation, whereas, in the post-test, 96 participants (66.7%) met the recommendation.

MT1g. Drinking water

A total of 143 adults reported whether they drank water the previous day. A McNemar test showed no significant change in reports of meeting the dietary guidelines recommendation for drinking water from pre-test to post-test ($\chi^2(1) = 0.70$, $p = 0.404$). In the pre-test, 89 participants (62.2%) met the recommendation, whereas, in the post-test, 84 participants (58.7%) met the recommendation.

MT1h. Drinking fewer sugar-sweetened beverages

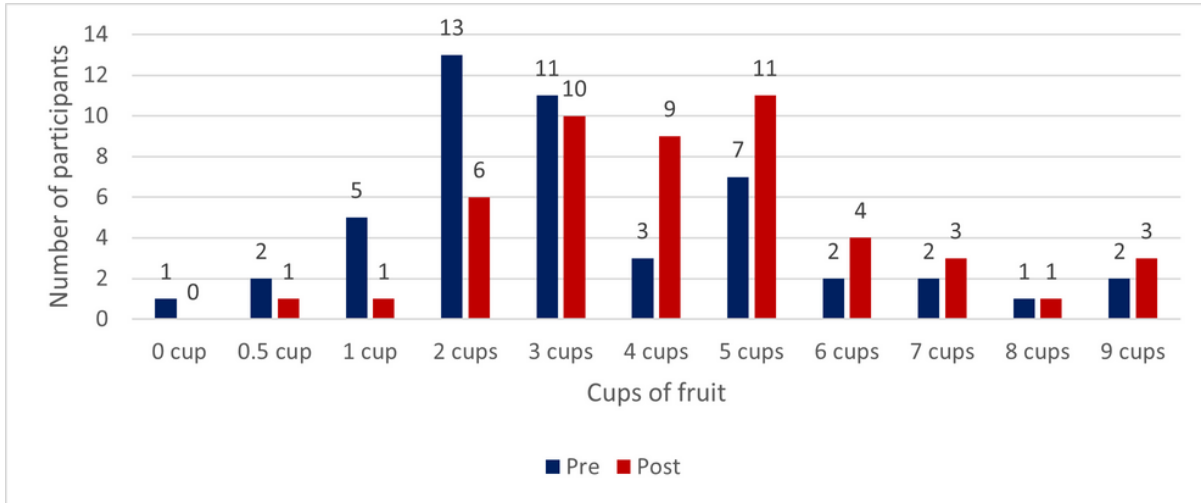
A total of 149 adults reported the frequency with which they drank any SSBs during the previous day. A McNemar test showed a statistically significant increase in reports of meeting the dietary guidelines, which indicates a decrease in the reported frequency of drinking SSBs from pre- to post-test ($\chi^2(1) = 13.47$, $p < 0.001$, $g = 0.447$). In the pre-test, 46 participants (30.9%) met the recommendation, whereas, in the post-test, 63 participants (42.3%) met the recommendation.

MT1i. Cups of fruit consumed per day

A total of 49 adult participants reported the number of cups of fruit they ate each day. The DGA recommends consuming two or more cups of fruit per day (USDA & U.S. Department of Health and Human Services, 2020). At the pre-test, 83.7% of participants ($n = 41$) reported that they ate two or more cups of fruit, whereas, at the post-test, 95.9% of participants ($n = 47$) reported that they ate two 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 ($t(48) = -4.13$, $p < .001$, $d = 0.491$). At the pre-test, the mean amount of fruit reported was 3.32 cups (Standard Deviation [SD] = 2.16). At post-test, the mean amount of fruit reported was 4.38 cups (SD = 2.01). Figure 6 shows the distribution of the number of cups of fruit adults reported consuming per day.

Figure 6. Cups of fruit consumed per day (adults)

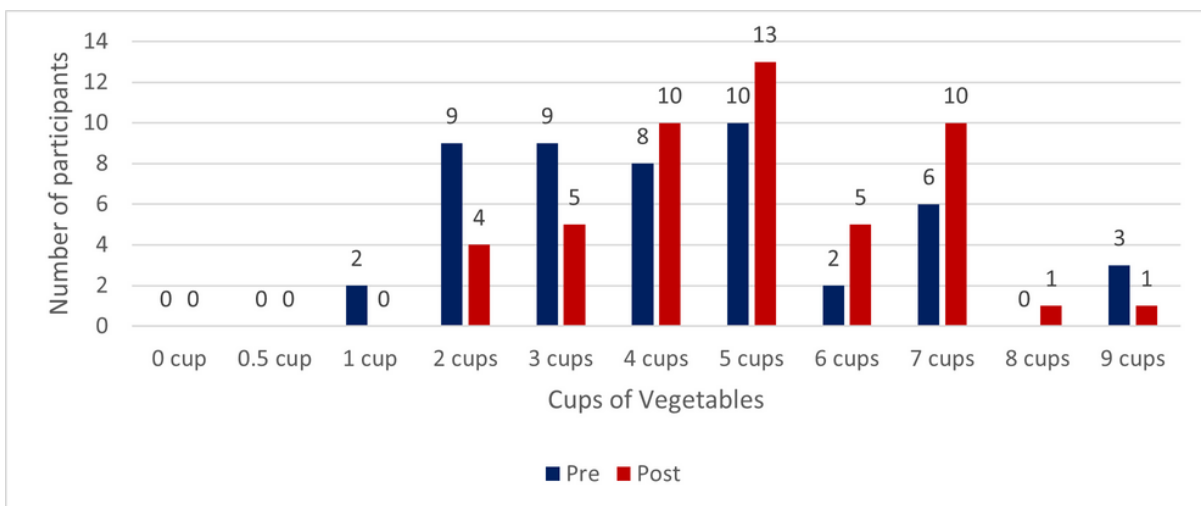


MT1m. Cups of vegetables consumed per day

A total of 49 adult participants reported the number of cups of vegetables they ate each day. The DGA recommends consuming 2.5 or more cups of vegetables per day (USDA & U.S. Department of Health and Human Services, 2020). In the pre-test, 77.6% of participants (n = 38) reported that they ate 2.5 or more cups of vegetables, whereas, in the post-test, 91.8% of participants (n = 45) reported that they ate 2.5 or more cups of vegetables.

A paired-samples t-test showed that there was a statistically significant increase in the number of cups of vegetables participants reported consuming ($t(48) = -3.04, p < .001, d = 0.371$). In the pre-test, the mean number of vegetables reported was 4.22 cups (SD = 2.10). In the post-test, the mean number of vegetables reported was 5.00 cups (SD = 1.68). Figure 7 shows the distribution of the number of cups of vegetables consumed per day.

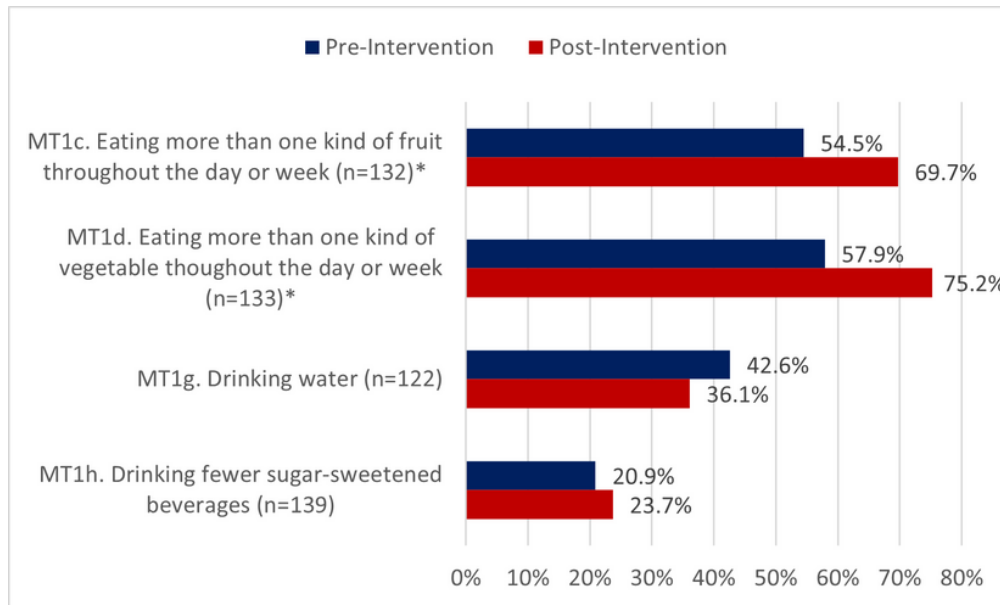
Figure 7. Cups of vegetables consumed per day (adults)



SENIOR DIRECT EDUCATION RESULTS

This section presents the results for seniors (ages 60+) for each MT1 indicator and is visually presented in Figure 8.

Figure 8. Percentage of seniors (ages 60+) who met *Dietary Guidelines for Americans* recommendations for MT1 indicators



Note: * indicates statistically significant change pre- to post-intervention based on McNemar's test at a significance level of $\alpha=0.05$.

MT1c. Eating more than one kind of fruit throughout the day or week

A total of 132 seniors reported whether they ate more than one kind of fruit throughout the day or week. A McNemar test showed a statistically significant increase in the number of participants who met recommendations for eating more than one kind of fruit throughout the day or week ($\chi^2(1) = 8.20, p = 0.004, g = 0.227$). Compared to pre-test, more seniors reported consuming more than one kind of fruit throughout the day or week at post-test. In the pre-test, 72 participants (54.5%) met the recommendation, whereas, in the post-test, 92 participants (69.7%) met the recommendation.

MT1d. Eating more than one kind of vegetable throughout the day or week

A total of 133 seniors reported whether they ate more than one kind of vegetable throughout the day or week. A McNemar test showed a statistically significant increase in the number of participants who met recommendations for eating more than one kind of vegetable throughout the day or week ($\chi^2(1) = 11.26, p < 0.001, g = 0.267$). Compared to the pre-test, more seniors reported more than one kind of vegetable throughout the day or week at post-test. In the pre-test, 77 participants (57.9%) met the recommendation, whereas, in the post-test, 100 participants (75.2%) met the recommendation.

MT1g. Drinking water

A total of 122 seniors reported whether they drank water the previous day. A McNemar test showed no significant change in reports of meeting the dietary guidelines recommendation for drinking water from pre-test to post-test ($\chi^2(1) = 2.45, p = 0.118$). In the pre-test, 52 participants (42.6%) met the recommendation, whereas, in the post-test, 44 participants (36.1%) met the recommendation.

MT1h. Drinking fewer sugar-sweetened beverages

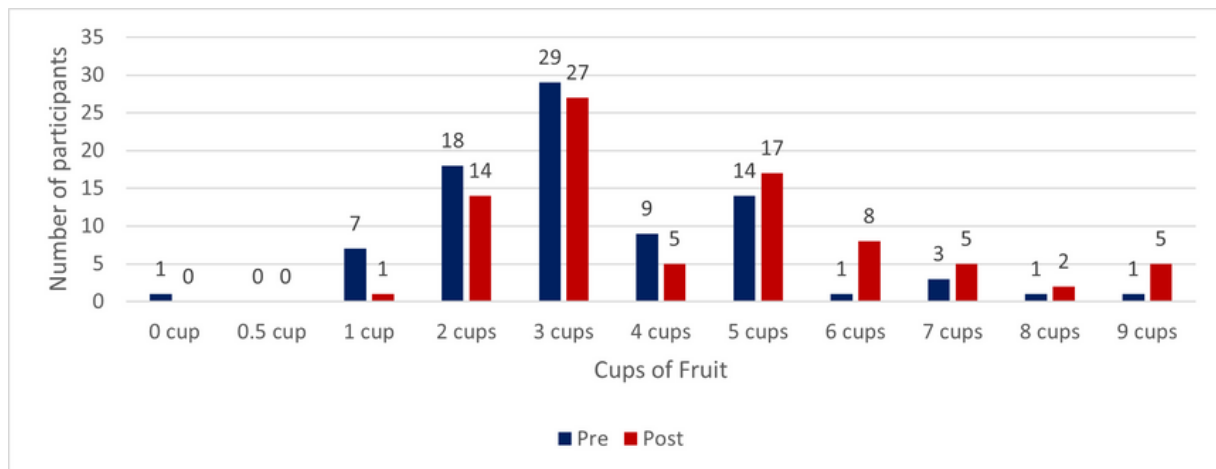
A total of 139 seniors reported the frequency with which they drank any SSBs during the previous day. A McNemar test showed no significant change in reports of meeting the dietary guidelines recommendation for drinking SSBs from pre-test to post-test ($\chi^2(1) = 0.75, p = 0.387$). In the pre-test, 29 participants (20.9%) met the recommendation, whereas, in the post-test, 33 participants (23.7%) met the recommendation.

MT1i. Cups of fruit consumed per day

A total of 84 senior participants reported the number of cups of fruit they ate each day. The DGA recommends consuming two or more cups of fruit per day (USDA & U.S. Department of Health and Human Services, 2020). In the pre-test, 90.5% of participants (n = 76) reported that they ate two or more cups of fruit, whereas, in the post-test, 98.8% of participants (n = 83) reported that they ate two 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 ($t(83) = -4.59, p < .001, d = 0.510$). In the pre-test, the mean amount of fruit reported was 3.33 cups (SD = 1.66). In post-test, the mean amount of fruit reported was 4.27 cups (SD = 2.01). Figure 9 shows the distribution of the number of cups of fruit seniors reported consuming per day.

Figure 9. Cups of fruit consumed per day (seniors)

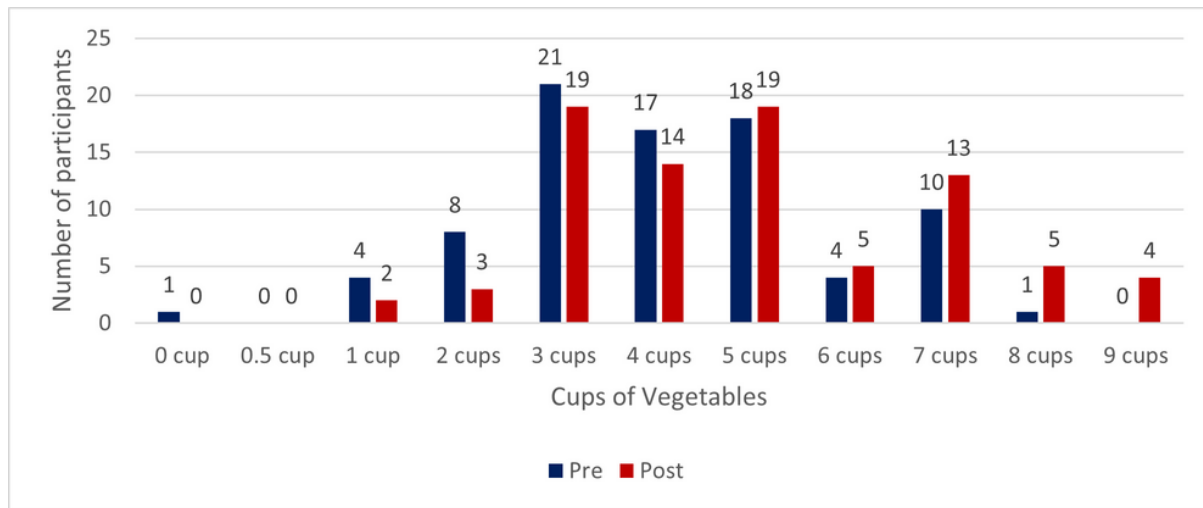


MT1m. Cups of vegetables consumed per day

A total of 84 senior participants reported the number of cups of vegetables they ate each day. The DGA recommends consuming 2.5 or more cups of vegetables per day (USDA & U.S. Department of Health and Human Services, 2020). In the pre-test, 84.5% of participants (n = 71) reported that they ate 2.5 or more cups of vegetables, whereas, in the post-test, 94.0% of participants (n = 79) reported that they ate 2.5 or more cups of vegetables.

A paired-samples t-test showed that there was a statistically significant increase in the number of cups of vegetables participants reported consuming ($t(83) = -4.32, p < .001, d = 0.456$). In the pre-test, the mean number of vegetables reported was 4.08 cups (SD = 1.72). In the post-test, the mean number of vegetables reported was 4.92 cups (SD = 1.95). Figure 10 shows the distribution of the number of cups of vegetables consumed per day.

Figure 10. Cups of vegetables consumed per day (seniors)



DIRECT EDUCATION SUMMARY OF RESULTS

The overall results of the aggregated analyses for FFY 2021 direct education programs were generally positive with several findings that indicate improvements in healthy eating behaviors after participating in a direct education program. The analyses revealed that from pre- to post-intervention, more participants of all age groups reported eating more than one kind of fruit and vegetable per day or week. Additionally, adult and senior participants reported eating more cups of fruits and vegetables, on average at the post-test. Positive healthy beverage intake findings were more limited, though significant findings were found for teens drinking more water and adults drinking fewer SSBs.

Table 3 shows effect size estimates and interpretations for direct education results that showed a statistically significant change from pre-test to post-test. Children and teens had small and medium impact improvements in eating more than one kind of fruit and vegetable, while adults and seniors had medium and large impact improvements in the same outcomes. Small and medium impact improvements were seen among adults and seniors for increasing intake of fruits and vegetables (reported as cups of fruits and vegetables). It is worth noting that the majority of participants already reported consuming more than the recommended amount of fruits and vegetables at the pre-test.

In addition to the positive findings in fruit and vegetable intake, there were two encouraging findings for healthy beverage intake. There was a small impact improvement in water drinking among teens and a large impact improvement in drinking fewer SSBs among adults. Significant findings were not found for the child nor senior groups for either beverage outcome (water or SSBs).

Table 3. Interpretation of effect size for direct education results

Indicator	Description	Direction of Change from Pre-test to Post-test	Effect Size	Effect Size Interpretation
MT1c	Ate more than one kind of fruit (child)	Increased fruit consumption**	$g = 0.183$	Medium
MT1d	Ate more than one kind of vegetable (child)	Increased vegetable consumption**	$g = 0.195$	Medium
MT1c	Ate more than one kind of fruit (teen)	Increased fruit consumption**	$g = 0.130$	Small
MT1d	Ate more than one kind of vegetable (teen)	Increased vegetable consumption**	$g = 0.154$	Medium
MT1g	Drinking water frequency (teen)	Increased water consumption*	$g = 0.088$	Small
MT1c	Ate more than one kind of fruit (adult)	Increased fruit consumption**	$g = 0.256$	Large
MT1d	Ate more than one kind of vegetable (adult)	Increased vegetable consumption**	$g = 0.237$	Large
MT1h	Drinking fewer sugar-sweetened beverages (adult)	Decreased SSB consumption***	$g = 0.447$	Large
MT1l	Cups of fruits consumed per day (adult)	Increased fruit consumption**	$d = 0.491$	Small
MT1m	Cups of vegetables consumed per day (senior)	Increased vegetable consumption**	$d = 0.371$	Small
MT1c	Ate more than one kind of fruit (senior)	Increased fruit consumption**	$g = 0.227$	Medium
MT1d	Ate more than one kind of vegetable (senior)	Increased vegetable consumption**	$g = 0.267$	Large
MT1l	Cups of fruits consumed per day (senior)	Increased fruit consumption**	$d = 0.510$	Medium
MT1m	Cups of vegetables consumed per day (senior)	Increased vegetable consumption**	$d = 0.456$	Small

* $p < .05$, ** $p < .01$, *** $p < .001$, g = Cohen's g statistic, d = Cohen's d statistic

POLICY, SYSTEMS, AND ENVIRONMENTAL CHANGES

Eight IAs reported a total of 285 PSE changes at 115 sites with a combined reach of 66,286. Of those changes, there were 12 (4.2%) policy changes, 144 (50.5%) systems changes, and 129 (45.3%) environmental changes.

POLICY CHANGES

In total, 12 policy changes were reported across IAs, with 5 changes related to nutrition and 7 changes related to physical activity.

Most nutrition policy changes were for establishing or improving food/beverage or nutrition-related policies (n=3), followed by a breastfeeding support policy (n=1), and a policy to increase healthy foods and beverages (n=1) (Table 4).

Table 4. Nutrition-related policy changes (MT5b)

Policy Change Description	Frequency
Established or improved food/beverage or nutrition-related policy (childcare wellness, school wellness, workplace wellness, etc.)	3
Breastfeeding support policy	1
Policy increasing healthy foods and beverages	1

Seven policy changes were reported related to physical activity, with the most frequent as policies to establish or improve physical activity (n=1), and one policy change to increase time spent doing physical activity (Table 5).

Table 5. Physical activity-related policy changes (MT6b)

Policy Change Description	Frequency
Established or improved physical activity policy (childcare wellness, school wellness, workplace wellness, etc.)	6
Policy to increase time spent doing physical activity	1

SYSTEMS CHANGES

In total, 144 systems changes were reported, with 132 changes related to nutrition, 9 changes related to physical activity, and 3 changes related to both nutrition and physical activity.

The most common systems changes related to nutrition were related to initiating or expanding a mechanism for distributing produce to families or communities (n=20), initiating, improving, or expanding opportunities to work in the garden (n=20), and initiating or expanding a mechanism for distributing gardening materials to families or communities for home gardening (n=20). Table 6 lists the top five systems related to nutrition in North Carolina.

Table 6. Nutrition-related systems changes (MT5c)

Systems Change Description	Frequency
Initiated or expanded a mechanism for distributing produce to families or communities (e.g. gardens, or farmer's markets)	20
Initiated, improved or expanded opportunities for parents/students/community to work in the garden	20
Initiated or expanded mechanism for distributing seedlings and/or other materials to families or communities for home gardening	20
Improved menus/recipes (variety, quality, etc.)	8
Initiated, improved or expanded use of food programs (CACFP, TEFAP, summer meals, emergency food, NSLBP, etc.) including improvements in referral and enrollment procedures	8

As shown in Table 7, the systems changes related to physical activity were increasing or improving opportunities for unstructured physical activity (n=5), incorporating physical activity into the school day (n=3), and improving the quality of physical education (n=1).

Table 7. Physical activity-related systems changes (MT6c)

Systems Change Description	Frequency
Increased or improved opportunities for unstructured physical activity time/free play	5
Incorporated physical activity into the school day or during classroom-based instruction (not recess/free play or PE)	3
Improved quality of physical education	1

The three systems changes related to nutrition and physical activity expanded opportunities for parents and youth to participate in wellness committees.

ENVIRONMENTAL CHANGES

In total, 129 environmental changes were reported, with 112 changes related to nutrition and 17 changes related to physical activity.

The most common environmental changes related to nutrition focused on improving edible gardens (n=22), using interactive educational displays to prompt healthy eating behavior choices close to the point of purchase (n=22), using the garden for nutrition education (n=14), and increasing opportunities for nutrition education (n=14). Table 8 lists the top environmental changes related to nutrition in North Carolina.

Table 8. Nutrition-related environmental changes (MT5d)

Environmental Change Description	Frequency
Initiated, improved, expanded, reinvigorated, or maintained edible gardens	22
Used interactive educational display (that will stay at the site), other visual displays, posters, taste testing, live demonstrations, audiovisuals, celebrities, etc. to prompt healthy eating behavior choices close to the point of decision	22
Initiated or expanded use of the garden for nutrition education	14
Increased or improved opportunities for nutrition education	14
Edible gardens (establish, reinvigorate or maintain food gardens)	10

As shown in Table 9, the most common environmental changes related to physical activity reported were improving physical activity spaces (n=4), increasing opportunities for physical activity (n=4), and increasing physical activity or reducing sitting (n=3).

Table 9. Physical activity-related environmental changes (MT6d)

Environmental Change Description	Frequency
Improved or expanded physical activity facilities, equipment, structures, or outdoor space	4
Increased or improved opportunities for structured physical activity	4
Increased, improved, or incorporated physical activity/reduced sitting during usual, on-going site activities and functions	3
Increased or improved opportunities for physical activity during recess	2
Increased access or safety of walking or bicycling paths	2

PROMOTIONAL CHANGES

In total, six promotional changes were directly paired with a PSE and they included educational displays to prompt healthy eating behavior choices close to the point of purchase (n=4), vending machine labeling (n=1), and promoting access to healthy food at food distribution sites (n=1). All promotions were related to nutrition.

PSEs BY DOMAIN

PSE changes took place in multiple settings where North Carolinians eat, learn, live, play, shop, and work. Most PSEs took place at sites where people learn (n=46), live (n=30), and shop (n=23). All domains are shown in Figure 11. In addition to reporting domain, IAs also reported the reach of PSE changes (Table 10). The total estimated reach for all PSEs was 66,286. The highest reach for PSE changes was reported in the learn setting (n=36,354) and the shop setting (25,555).

Figure 11. PSEs by domain

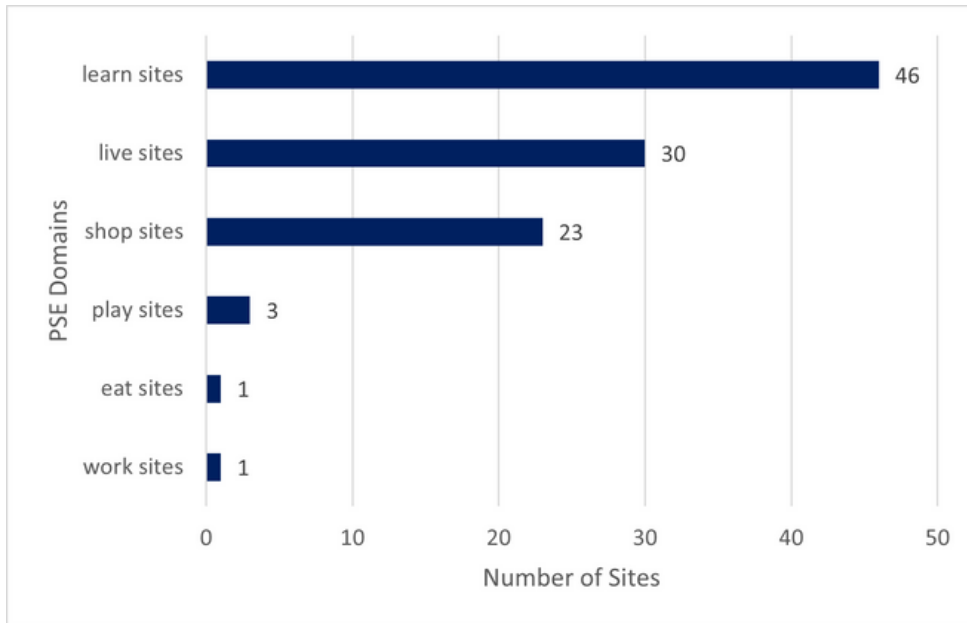


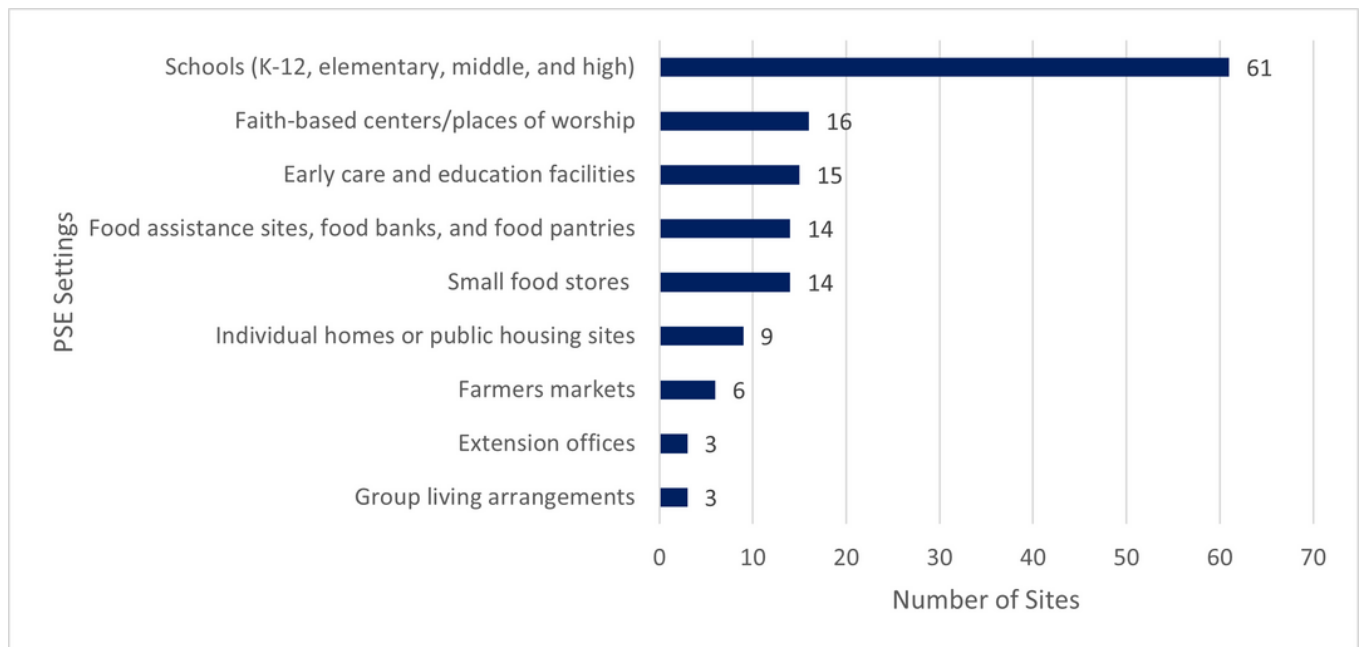
Table 10. Reach by domain

Domain	Frequency	Percent
learn reach	36,354	54.8%
shop reach	25,555	38.6%
live reach	4,180	6.3%
work reach	120	0.2%
eat reach	42	0.06%
play reach	35	0.05%
Total estimated reach	66,286	100%

PSEs BY SETTING

North Carolina IAs reported the specific settings where PSE changes took place. The most reported setting was school sites (n=61) followed by faith-based centers (n=16). Figure 12 shows the settings with PSE changes in North Carolina. Figure 12 shows the number of PSE changes that took place in each setting. In addition to the settings included in Figure 12, North Carolina IAs also reported PSEs at before and after-school programs, community organizations, family resource centers, community and recreation centers, congregate meal sites, gardens, other places people go to work, and youth organizations.

Figure 12. PSEs by setting



Note: *Only settings reported by 3 or more sites are depicted in the graph (total settings=17).

NUTRITION AND PHYSICAL ACTIVITY SUPPORTS IMPLEMENTATION (LT5/LT6)

Implementation of PSE changes was assessed by looking at the number of sites in each type of setting within the eat, learn, live, play, shop, and work domains reporting a multi-component and multi-level intervention. The implementation features are intended to enhance the likelihood of the interventions' impact and sustainability and therefore represent the long-term (LT5 and LT6) indicators from the SNAP-Ed Evaluation Framework (USDA-FSN, 2016). A total of 80 sites reported at least one nutritional support (MT5) PSE change and one or more of the following components:

- Evidence-based education
- Marketing
- Parent/community involvement
- Staff training or continuous program and policy implementation

A total of 16 sites reported at least one physical activity support (MT6) PSE change and one or more of the components listed above.

For MT5 PSE changes, most IAs reported that their MT5 PSE changes were paired with all four components (n=26). The total number of components per site reported by IAs can be found in Table 11.

Table 11. Total number of components per site for sites that implemented at least one MT5 PSE change (LT5b)

Number of components	Number of sites
One component	18
Two components	24
Three components	12
Four components	26
Total	80

IAs most reported two components (n=6) in addition to at least one MT6 PSE change for sites. The total number of components per site with at least one MT6 PSE change can be found in Table 12.

Table 12. Total number of components per site for sites that implemented at least one MT6 PSE change (LT6b)

Number of components	Number of sites
One component	3
Two components	6
Three components	3
Four components	4
Total	16

The most frequently reported component paired with MT5 PSE changes was marketing (n=62), followed by parent/community involvement (n=59). A complete list of the specific components reported can be found in Table 13.

Table 13. Number of sites implementing at least one MT5 PSE change and each type of specific additional component (LT5b)

Specific component	Number of sites
Marketing	62
Parent/community involvement	59
Evidence-based education	52
Staff training or continuous program and policy implementation	33

The most frequently reported component paired with MT6 PSE changes was parent/community involvement (n=15), followed by evidence-based education (n=9) and marketing (n=9). A complete list of the specific components can be found in Table 14.

Table 14. Number of sites implementing at least one MT6 PSE change and each type of specific additional component (LT6b)

Specific component	Number of sites
Parent/community involvement	15
Marketing	9
Evidence-based education	9
Staff training or continuous program and policy implementation	7

COVID-19 IMPACTS

IAs were asked to voluntarily report on how COVID-19 impacted their PSE interventions in 2021. Of those who reported, modified was the most common impact (n=35), followed by new (n=31), and postponed (n=4). Fifteen sites reported that COVID-19 had no impact on their PSE changes. A complete list of the COVID-19 impacts can be found in Table 15.

Table 15. COVID-19 impacts on PSE changes

COVID-19 Impact Description	Frequency
Modified	35
New	31
No impact	15
Postponed	4

PSE SUMMARY OF RESULTS

As reported, 285 PSE changes were implemented at 115 sites, which had a combined reach of 66,286. Of those changes, 12 were policy changes, 144 were systems changes, and 129 were environmental changes. Most PSE changes were related to nutrition (n=249), while 33 changes were related to physical activity. PSE changes were supported by six promotional efforts. Multi-component and multi-level interventions were reported at 80 sites with nutrition-related PSE changes and 16 sites with physical activity-related PSE changes. FFY 2021 was the first full year of SNAP-Education programming during the COVID-19 pandemic; 35 PSE interventions were modified and 31 new PSE interventions were developed because of the pandemic.

CONCLUSIONS AND DISCUSSION

There were improvements in healthy eating among all age groups in FFY 2021. These outcomes were substantially better than those from FFY 2020.

This evaluation provides evidence of positive changes in healthy eating behaviors among participants in SNAP-Ed direct nutrition education programs in North Carolina.

When compared to direct education evaluation results from FFY 2020, there were more positive results in FFY 2021. Results from last year showed decreases in adults reporting eating more than one kind of vegetable, drinking water, and an increase in the number of adults drinking SSBs. For children, results showed an increase in reported SSB consumption. While it is unclear what led to these negative findings last year, there were many improvements shown in the current evaluation. In fact, there was a significant improvement in adults eating more than one kind of vegetable and drinking fewer SSBs. Another difference between the FFY 2020 and the current evaluation was the total number of participants reached through direct education programs. Last year, 6,865 participants matched pre- and post-test responses for at least one MT1 indicator, while 2,378 participants did the same in the current year. This difference may be attributed to the changes in direct education structure prompted by the COVID-19 pandemic, as FFY 2021 was the first full year of programming during the pandemic.

Total number and reach of PSE changes in North Carolina increased from FFY 2020 to FFY 2021.

A total of 285 PSE changes were implemented in North Carolina with a combined reach of 66,286 across 115 sites. By reporting PSE changes in the PEARS for the first time, comprehensive and detailed information on each PSE was reported similarly. Adopting this reporting system will help to ensure consistency in reporting efforts across IAs. Compared to FFY 2020, the total number of PSE changes increased, including increases in the number of systems changes and environmental changes. Additionally, COVID-19 posed fewer impacts to PSE work this year compared to last year. There were also more new PSEs because of COVID-19 this year, which suggests that North Carolina IAs have adapted to the pandemic and found innovative ways to implement PSEs amidst the pandemic.

Aggregating data from nine IAs using different data collection tools was a challenge.

Aggregating data from nine IAs that implement distinct direct education and PSE approaches allows for a comprehensive view of statewide SNAP-Ed efforts in North Carolina. The evaluation includes results for both direct education and PSE efforts across North Carolina, and it considers how the COVID-19 pandemic may have impacted outcomes. Additionally, using the PEARS reporting system for PSE reporting helped to ensure consistency in data collected across IAs. One limitation includes the reliance on self-reported data from matched pre- and post-tests for direct education. Specific limitations of relying on self-reported survey data include literacy concerns for participants taking the surveys independently, recall bias for health behaviors assessed, and loss to follow-up for those who only complete the pre-test. Because IAs use different survey questions, most responses to questions were recoded to identify if an individual met or did not meet dietary guidelines recommendations. While recoding allowed for a comprehensive assessment across all IAs, it creates a less sensitive analysis.

While many aspects of PSE efforts were reported, the PSE evaluation was limited to descriptive analyses of the overall number and types of PSEs changes, sites, and reach. An evaluation of the effectiveness of PSEs was not conducted. Finally, the evaluation was limited to selected MT1 indicators and a description of PSE efforts, which may not encompass the breadth of SNAP-Ed work conducted across North Carolina (e.g., social marketing, partnerships, coalitions, short-term direct education impacts).

RECOMMENDATIONS

Based on the findings of this evaluation, the following recommendations should be considered:

- Implement common survey questions or surveys across direct education classes in North Carolina to allow direct education results to be combined across IAs. This would alleviate the need to recode results into dichotomous variables and allow for a more sensitive analysis to be conducted. This would help capture incremental changes in outcomes. Consideration of participant and IA reporting burden should be taken when making decisions on implementing common surveys.
- Collect information on the topics covered in each direct education program. If some topics are not covered in nutrition lessons (e.g., drinking fewer SSBs), then these individuals would be omitted from the MT1h analysis (i.e., frequency of drinking fewer SSBs). Aligning programmatic activities with evaluation questions will help to create a more sensitive analysis.
- Apply a racial equity lens to direct education evaluation by comparing direct education demographic characteristics to the North Carolina SNAP-Ed eligible population. Disaggregate outcome data by race and ethnicity to compare the impact of direct education programming across racial/ethnic groups.
- Consider alternative approaches to improve healthy beverage indicators. Pair direct nutrition education on healthy beverage intake with PSEs to improve access to healthy beverage options or implement a statewide branded social marketing campaign with common messaging used by all IAs to promote drinking more water and fewer SSBs.
- Ensure accuracy and consistency in PSE reporting across IAs by implementing statewide training and technical assistance. Consider collecting additional information that documents the changes such as direct observation, photographic evidence, repeated self-assessments or surveys, or interviews with key informants to confirm the uptake of the PSE change.
- Include effectiveness measures for PSEs. This will enhance PSE evaluation for LT5 and LT6 indicators and will help tell the story of the impact that PSEs have on individuals and communities.

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APPENDIX I

A total of 4,148 participants responded to at least one indicator at either the pre-test or post-test. Table A1 shows the demographics of the entire sample.

Table A1. Direct Education participants with pre- or post-intervention data, by ethnicity, race, and sex by age category (N=4,148)

	Children (5-11 years) N = 611	Teens (12-17 years) N = 3,242	Adults (18-59 years) N = 154	Seniors (60+ years) N = 141	Number of Total Participants (5-60+ years) N= 4,148
Categories	Count (Percent)	Count (Percent)	Count (Percent)	Count (Percent)	Count (Percent)
Hispanic or Latino	73 (11.9%)	730 (22.5%)	10 (6.5%)	1 (0.7%)	814 (19.6%)
Not Hispanic or Latino	317 (51.9%)	2431 (75.0%)	143 (92.9%)	140 (99.3%)	3031 (73.1%)
Did not report ethnicity	221 (36.2%)	81 (2.5%)	1(0.6%)	0 (0%)	303 (7.3%)
American Indian or Alaska Native	5 (0.8%)	31 (1.0%)	0 (0%)	1 (0.7%)	37 (0.9%)
Asian	5 (0.8%)	79 (2.4%)	2 (1.3%)	1 (0.7%)	87 (2.1%)
Black	121 (19.8%)	961 (29.6%)	84 (54.5%)	89 (63.1%)	1255 (30.3%)
Pacific Islander	2 (0.3%)	4 (0.1%)	1 (0.6%)	0 (0%)	7 (0.2%)
White	207 (33.9%)	1281 (39.5%)	65 (42.2%)	47 (33.3%)	1600 (38.6%)
Other race	43 (7.0%)	285 (8.8%)	1 (0.6%)	1 (0.7%)	330 (7.9%)
More than 1 race	5 (0.8%)	54 (1.7%)	1 (0.6%)	1 (0.7%)	61 (1.5%)
Did not report race	223 (36.5%)	547 (16.9%)	0 (0%)	1 (0.7%)	771 (18.6%)
Female	184 (30.1%)	1735 (53.5%)	140 (90.9%)	116 (82.3%)	2175 (52.4%)
Male	207 (33.9%)	1479 (45.6%)	14 (9.1%)	25 (17.7%)	1725 (41.6%)
Did not report sex	220 (36.0%)	28 (0.9%)	0 (0%)	0 (0%)	248 (5.9%)

Table A2. Direct Education participants with pre- and post-intervention data, by ethnicity, race, and sex by age category (N=2,378)

	Children (5-11 years) N = 453	Teens (12-17 years) N = 1,633	Adults (18-59 years) N = 152	Seniors (60+ years) N = 140	Number of Total Participants (5-60+ years) N= 2,378
Demographic Categories	Count (Percent)	Count (Percent)	Count (Percent)	Count (Percent)	Count (Percent)
Hispanic or Latino	73 (16.1%)	382 (23.4%)	9 (5.9%)	1 (0.7%)	465 (19.6%)
Not Hispanic or Latino	316 (69.8%)	1201 (73.5%)	142 (93.4%)	139 (99.3%)	1798 (75.6%)
Did not report ethnicity	64 (14.1%)	50 (3.1%)	1 (0.7%)	0 (0%)	115 (4.8%)
American Indian or Alaska Native	3 (0.6%)	18 (1.1%)	0 (0%)	1 (0.7%)	22 (0.9%)
Asian	5 (1.1%)	34 (2.1%)	2 (1.3%)	1 (0.7%)	42 (1.8%)
Black	121 (26.7%)	511 (31.3%)	83 (54.6%)	88 (62.9%)	803 (33.8%)
Pacific Islander	2 (0.4%)	2 (0.1%)	1 (0.7%)	0 (0%)	5 (0.2%)
White	207 (45.7%)	614 (37.6%)	64 (42.1%)	47 (33.6%)	932 (39.2%)
Other race	43 (9.5%)	151 (9.2%)	1 (0.7%)	1 (0.7%)	196 (8.2%)
More than 1 race	5 (1.1%)	38 (2.3%)	1 (0.7%)	1 (0.7%)	45 (1.9%)
Did not report race	67 (14.8%)	265 (16.2%)	0 (0%)	1 (0.7%)	333 (14.0%)
Female	184 (40.6%)	883 (54.1%)	139 (91.4%)	115 (82.1%)	1321 (55.6%)
Male	207 (45.7%)	734 (44.9%)	13 (8.6%)	25 (17.9%)	979 (41.2%)
Did not report sex	62 (13.7%)	16 (1.0%)	0 (0%)	0 (0%)	78 (3.3%)

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