

Arizona Fruit and Veggie – More Matters

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INTRODUCTION

Since 1998, the Arizona Department of Health Services (ADHS) has funded Arizona Nutrition Network Partners to conduct nutrition education promoting fruit and vegetable consumption for low-income children and their families. The overall goal of the Fruits and Veggies - More Matters™ (FVMM) classes is to provide community and school-based nutrition services to low-income children and their families. The FVMM curriculum is targeted at 3rd grade students and teaches the importance of including fruits and vegetables in a well-balanced diet. During the 2010-2011 school year, a total of 734 students participated in the FVMM classes (a 9.4% decrease from the 2009-2010 school year) and submitted pre and post surveys. All of the participating schools surveyed had at least 50% of students receiving a free or reduced lunch through the National School Lunch Program.

The Arizona Department of Health Services has evaluated this effort by administering pre and post surveys each year since 1999. From 1999 to 2008, the surveys measured the improvement in knowledge produced by this school-based nutrition class. For the 2008-2009 school year and beyond, new survey instruments measuring improvement in knowledge and eating preferences were used and the surveys became optional for partners. From 1999 to 2008, the Network provided standardized teaching materials for the classes to promote fruit and vegetable consumption. For the 2008-2009 school year and beyond, Network partners utilizing the curriculum incorporate costs for the class materials into local program budgets through the Local Incentive Award Program, and had the opportunity to design their own evaluation survey.

CLASS OBJECTIVES

Pre survey data from first through fourth grade classrooms of qualifying schools was collected prior to the presentation of a four part curriculum.

Selected objectives of the lesson plans are that students will be able to:

- 1) Identify the recommended amount of fruits and vegetables to eat every day.
- 2) Recognize fruits, vegetables, dried beans, and grains as sources of fiber.
- 3) Recognize fruits and vegetables that are good sources of vitamin A, vitamin C, or fiber.
- 4) Choose a meal with at least two fruits and two vegetables.
- 5) Identify at least two fruits and or/vegetables on their school cafeteria menu or the Fruits and Veggies More Matters™ Café menu.
- 6) Correctly classify at least 10 fruits and vegetables into their respective food groups.

Lesson plans also include a produce field trip to a local grocery store, or a grocery store tour video. Following the completion of the Fruits and Veggies - More Matters™ (FVMM) classes, students were given a post survey. The questions were identical on pre and post surveys, except for Maricopa County where one question varied between pre- and post- surveys.

METHODS

All students in the participating classrooms were asked to complete a pre survey prior to the first session, and a post survey upon completion of the class series. The surveys were not matched, as no identifying information regarding the respondent was collected on the survey. The survey contained 10 questions regarding a student's knowledge of the benefits of fruits and vegetables and preference in eating and preparing fruits and vegetables and recognition of nutritional campaign logos. A sample survey is provided in Appendix A.

Z-scores for proportional differences were calculated to evaluate whether improvements between pre- and post-surveys were statistically significant at the 95% confidence level. In other words, for statistically significant results, the probability that the difference between the scores was due to chance is five percent or less.

SUMMARY OF FINDINGS

Students showed overall improvement in all questions except for the two questions where they had to identify the fruit or vegetable. Students scored very high on those two questions in the pre-survey so there was little room for improvement. Students also indicated on the post-survey that they ate more fruits (78.1%) and vegetables (73.2%) after taking the class. In addition, more students indicated they ate fruits and vegetables as snacks on the post-survey than the pre-survey. Students made the largest gains in their knowledge of the amount of fiber they needed to eat every day, followed closely by the questions about foods containing Vitamin A and fiber. Overall results are displayed in Table 2 and Table 3. The remainder of the report breaks down results by gender, location, and age.

Students in Navajo county were analyzed separately because they took a different version of the survey than the rest of the students. Detailed results for Navajo county begin on page 13. Students in Navajo county showed similar results as the rest of the sample on identical questions, showing gains in knowledge about fiber, Vitamin A, and Vitamin C.

CONCLUSIONS

Overall, students made significant improvements on almost all measures, indicating that students' nutritional knowledge increased as a result of the training. Almost all students correctly identified fruits (98.6%) and vegetables (94.7%) on the pre-survey indicating that students come to the training with the ability to identify a common fruit and vegetable, so those questions may not be necessary on future surveys, or could be made slightly more difficult by changing the alternate answers from (for example) chocolate milk, hamburger, and cheese to produce items. Students also indicated high levels of eating fruits and vegetables as snacks and knowing what the phrase, "More Matters" means on the pre-survey.

DESCRIPTIVE STATISTICS

A total of 2,207 pre-surveys and 2,187 post-surveys were completed. The average age was 8.5 and the surveys were evenly distributed between boys and girls. The majority of students were from Yuma or the Washington Elementary District (67.5%). Table 1 below displays demographic information.

Table 1 - Demographics

	Pre Survey N = 2207		Post Survey N = 2187	
	N	%	N	%
Age				
Blank	30	1.4	23	1.1
7	58	2.6	53	2.4
8	952	43.1	884	40.4
9	1073	48.6	1103	50.4
10	94	4.3	124	5.7
Gender				
Blank	34	1.5	35	1.6
Boy	1089	49.3	1058	48.4
Girl	1084	49.1	1094	50.0
Location				
Maricopa	387	17.5	280	12.8
Mohave	331	15.0	415	19.0
Washington Elementary District	870	39.4	883	40.4
Yuma	618	28.0	609	27.9

Students made gains between the pre- and post-surveys on almost every question. The only two questions that did not show a statistically significant improvement between the pre- and post-surveys are the two questions asking students to identify the fruit or the vegetable. These two questions were statistically equivalent between the pre- and post-surveys, most likely because students had very high fruit and vegetable recognition in the pre-survey. While Table 2 shows a decrease in the score for identifying the vegetable, the difference is not statistically significant, indicating that the difference between the two is likely to be due to chance.

The question “How many grams of fiber do you need every day to stay healthy” showed the greatest improvement between the pre- and post-surveys, followed by questions about which food has fiber, and which food has a lot of Vitamin A. The question about Vitamin C showed less improvement, but that is most likely because almost 70% of students answered that question correctly on the pre-survey. The same can be said for the “More Matters” and snack questions which each showed improvement of less than 6 percentage points. See Table 2 below for details.

There were two questions on the post-survey that were used to gauge behavior change related to fruit and vegetable consumption. About 78% of students reported they ate more fruit after taking the class and 73% reported eating more vegetables. See Table 3 for details.

Table 2 - Percentage Answered With Preferred Answer

	Pre Survey N = 2207	Post Survey N = 2187	Percentage Point Change Between Pre and Post	Statistically Significant Difference Between Pre and Post?
Pick one food that is a fruit	98.6	98.9	0.3	
Pick one food that is a vegetable	94.7	94.4	-0.3	
Which food has fiber?	44.4	86.6	42.2	Yes
Which food has a lot of Vitamin A?	30.0	73.8	43.8	Yes
Which food has a lot of Vitamin C?	69.6	93.5	23.9	Yes
The words "More Matters" help me to remember to eat more of what?	91.3	96.7	5.4	Yes
Do you eat fruits and veggies as snacks?	86.3	91.2	4.9	Yes
How many grams of fiber do you need every day to stay healthy?	21.5	74.4	52.9	Yes
How do you know you are getting enough fiber every day?*				
Never eat fruits and veggies	0.9	0.1	-0.8	Yes
Eat fruits and veggies sometimes	5.3	2.2	-3.1	Yes
Eat fruits and veggies with every meal	7.6	10.2	2.6	Yes

*Z-Scores used to calculate whether differences between groups were statistically significant.

**This question was only asked in some (but not all) Maricopa schools. There were 293 pre-surveys and 272 post-surveys with this question. Because this question was not consistent across all surveys, it will not be included in the results from this point forward.

Table 3 - Post-Survey Behavior Change Question Percentages

After the Fruits and Veggies Matters More Class, I Now Eat:	
More Fruits	78.1
The Same Amounts of Fruit	20.9
More Vegetables	73.2
The Same Amount of Vegetables	25.4

COMPARISONS BY GENDER

There are few statistically significant differences between boys and girls in the results for both the pre-survey and post-survey answers. A univariate regression analysis showed that there was not a statistically significant difference in improvement between pre- and post-surveys based on gender. In other words, the average increase in correct answers between the pre- and post-surveys was 17%, the same for both boys and girls. As indicated by Table 4 and Table 5 below, boys and girls scored differently on some specific questions on each survey, however the average improvement between the pre- and post-surveys were the same for boys and girls. Girls scored very slightly higher than boys on the post-survey, and the result is statistically significant. However, girls only outscored boys on the post-survey by 1.6%, a very small difference.

In the pre-survey, there was no statistically significant difference in nutritional knowledge between boys and girls except for the question about the meaning of “More Matters”. While the difference in correct answers for the “More Matters” question was statistically significant, it was small: only 2.4 percentage points. Girls reported eating fruits and vegetables as a snack at a statistically significantly higher rate than boys on the pre-survey, a difference of 8.9 percentage points. See Table 4 below for all pre-survey results by gender.

Table 4 - Comparison of Pre-Survey Answers by Gender

Pre-Survey – Percentage Answering With Preferred Answer			
	Boy N = 1088	Girl N = 1084	Statistically Significant Difference between Boys and Girls?*
Pick one food that is a fruit	98.6%	99.2%	
Pick one food that is a vegetable	94.2%	95.5%	
Which food has fiber?	45.5%	42.9%	
Which food has a lot of Vitamin A?	30.7%	29.4%	
Which food has a lot of Vitamin C?	69.4%	70.2%	
The words “More Matters” help me to remember to eat more of what?	90.3%	92.7%	Yes
Do you eat fruits and veggies as snacks?	81.9%	90.8%	Yes
How many grams of fiber do you need every day to stay healthy?	22.3%	20.8%	

*Z-Scores used to calculate whether differences between groups were statistically significant.

Boys and girls showed three statistically significant differences in the post-survey. Interestingly, all of the questions with statistically significant differences between boys and girls related to behavior, not to nutritional knowledge. The results show that girls snack on fruits and vegetables at a statistically significantly higher rate than boys. In addition, girls report eating more vegetables after attending the class than boys, while the rates of fruit consumption were statistically equivalent. In both the pre-

survey and post-survey, girls reported eating fruits and vegetables as snacks at a statistically significantly higher rate than boys. However, boys had a greater increase (6.2 percentage points) in reporting they ate fruits and vegetables as a snack between the pre-survey and post-survey, while girls showed a 3.6 percentage point increase. See Table 5 below for all post-survey results by gender.

Table 5 - Comparison of Post-Survey Answers by Gender

	Boy N = 1058	Percentage Point Change (Boys) from Pre-Survey	Girl N = 1094	Percentage Point Change (Girls) from Pre-Survey	Statistically Significant Difference between Boys and Girls?***
Pick one food that is a fruit	99.2%	0.6	98.8%	-0.4	
Pick one food that is a vegetable	93.8%	-0.4	95.2%	-0.3	
Which food has fiber?	86.8%	41.3*	86.7%	43.8*	
Which food has a lot of Vitamin A?	73.0%	42.3*	74.9%	45.5*	
Which food has a lot of Vitamin C?	93.0%	23.6*	93.9%	23.7*	
The words "More Matters" help me to remember to eat more of what?	96.5%	6.2*	97.0%	4.3*	
Do you eat fruits and veggies as snacks?	88.1%	6.2*	94.4%	3.6*	Yes
How many grams of fiber do you need every day to stay healthy?	73.4%	51.1*	75.4%	54.6*	
After attending class are you eating more fruit?	76.7	n/a	80.1	n/a	
After attending class are you eating the same amount of fruit	22.4	n/a	19.3	n/a	
After attending class are you eating more vegetables?	69.9	n/a	76.3	n/a	Yes
After attending class are you eating the same amount of vegetables?	28.6	n/a	22.5	n/a	Yes

* Indicates a statistically significant difference between pre- and post- survey results.

***Z-Scores used to calculate whether differences between groups were statistically significant. This measure only compares whether there is a statistically significant difference between post-survey answers for boys and girls. It does not compare pre- to post- survey results which were not significantly different between boys and girls.

COMPARISONS BY LOCATION

Location comparisons were made at the LIA Name level. There were four locations: Maricopa, Mohave, Washington Elementary School District, and Yuma. There were some significant differences between the locations, especially concerning Mohave.

Mohave had statistically significantly higher scores on the pre-survey than the other three locations for three out of eight measures. Mohave students made significant gains between the pre- and post-surveys and had statistically significantly higher scores on seven of the measures. In addition, Mohave had the greatest percentage point change between pre- and post-survey scores, indicating that on several measures, Mohave students not only started at a higher level, but finished at a higher level as well.

This pattern did not hold for the behavioral questions. For example, in the post-survey, Mohave students reported a lower rate of eating fruits and vegetables as snacks than Washington and Yuma. For the behavioral questions that were only asked on the post-survey, Mohave students reported the lowest level of eating more fruit after participating in the class, and the highest level of eating the same number of fruit. In other words, Mohave students had the lowest reported rate of behavior change related to eating fruit. A similar pattern was seen with eating more or the same amount of vegetables, with Mohave statistically equivalent to Maricopa but lower than both Washington and Yuma in terms of behavior change. So while Mohave students seemed to learn the information at a high level, the corresponding behavior change was lower than in other locations.

Table 6 - Pre-Survey Percentage of Preferred Answers By Location

	Maricopa N = 387	Mohave N = 331	Washington Elementary School District N = 870	Yuma N = 618	Statistically Significant Difference between locations?
Pick one food that is a fruit	98.4	98.8	98.9	98.5	
Pick one food that is a vegetable	93.0	93.7	95.6	95.0	
Which food has fiber?	43.2	51.4	41.6	45.6	Mohave significantly higher than Maricopa and Washington
Which food has a lot of Vitamin A?	29.7	38.4	26.6	30.7	Mohave significantly higher than others
Which food has a lot of Vitamin C?	65.1	80.1	67.1	70.4	Mohave significantly higher than others
The words "More Matters" help me to remember to eat more of what?	93.8	92.7	88.9	92.6	Washington significantly lower than others
Do you eat fruits and veggies as snacks?	86.8	83.4	87.7	85.6	

	Maricopa N = 387	Mohave N = 331	Washington Elementary School District N = 870	Yuma N = 618	Statistically Significant Difference between locations?
How many grams of fiber do you need every day to stay healthy?	9.3	29.6	23.3	22.2	Mohave significantly higher than all others; Washington and Yuma statistically equal to each other but significantly higher than Maricopa

*Z-Scores used to calculate whether differences between groups were statistically significant.

Table 7 - Post-Survey Percentage of Preferred Answers by Location

	Maricopa N = 280	Mohave N = 415	Washington Elementary School District N = 883	Yuma N = 609	Statistically Significant Difference between locations?
Pick one food that is a fruit	97.5	100	98.9	89.9	Mohave significantly higher than others
Pick one food that is a vegetable	88.9	97.3	94.7	94.4	Mohave significantly higher than others; Washington and Yuma statistically the same and higher than Maricopa
Which food has fiber?	85.7	96.6	85.7	81.6	Mohave significantly higher than others; Washington significantly higher than Yuma
Which food has a lot of Vitamin A?	70.7	93.0	69.6	68.0	Mohave significantly higher than others
Which food has a lot of Vitamin C?	91.4	99.5	91.7	92.8	Mohave significantly higher than others
The words "More Matters" help me to remember to eat more of what?	94.3	98.8	96.4	96.7	Mohave significantly higher than others
Do you eat fruits and veggies as snacks?	88.2	87.7	93.0	92.4	Washington and Yuma statistically equivalent to each other but higher than Mohave and Maricopa
How many grams of fiber do you need every day to stay healthy?	n/a	94.0	85.6	79.0	All statistically different from each other.

	Maricopa N = 280	Mohave N = 415	Washington Elementary School District N = 883	Yuma N = 609	Statistically Significant Difference between locations?
After attending class are you eating more fruit?	78.9	66.3	82.1	80.1	Mohave statistically lower than others; Washington, Maricopa & Yuma all statistically equivalent to each other
After attending class are you eating the same amount of fruit?	18.2	33.3	17.2	19.2	Mohave statistically higher than others; Washington, Maricopa & Yuma all statistically equivalent to each other
After attending class are you eating more vegetables?	65.4	66.3	77.8	74.9	Washington & Yuma significantly higher than Maricopa & Mohave
After attending class are you eating the same amount of vegetables?	31.1	33.7	21.2	23.2	Maricopa & Mohave significantly higher than Washington & Yuma

*Z-Scores used to calculate whether differences between groups were statistically significant.

Table 8 - Percentage Point Change Between Pre-Survey and Post-Survey By Location

	Maricopa	Mohave	Washington Elementary School District	Yuma
Pick one food that is a fruit	-0.9	1.2*	0.0	0.4
Pick one food that is a vegetable	-4.1	3.6*	-0.9	-0.6
Which food has fiber?	42.5*	45.2*	44.1*	36.0*
Which food has a lot of Vitamin A?	41.0*	54.6*	43.0*	37.3*
Which food has a lot of Vitamin C?	26.3*	19.4*	24.6*	22.4*
The words "More Matters" help me to remember to eat more of what?	0.5	6.1*	7.5*	4.1*
Do you eat fruits and veggies as snacks?	1.4	4.3	5.3*	6.8*
How many grams of fiber do you need every day to stay healthy?	n/a	64.4*	62.3*	56.8*

* Indicates a statistically significant difference between pre- and post-survey results based on Z-Scores.

COMPARISONS BY AGE

The majority of students participating in the pre- and post-surveys were eight or nine years of age. Students aged eight through 10 showed similar rates of improvement between the pre- and post-surveys with students aged 7 showing lower rates of improvement. See Table 9 through *Z-Scores used to calculate whether differences between groups were statistically significant.

Table 12 for details.

Table 9 - Percentage of Preferred Answers Age 7

	Pre-Survey N = 57	Post-Survey N = 53	Percentage Point Difference	Statistically Significant Difference Between Pre and Post?
Pick one food that is a fruit	98.2	98.1	-0.1	
Pick one food that is a vegetable	86.0	79.2	-6.8	
Which food has fiber?	49.1	81.1	32.0	Yes
Which food has a lot of Vitamin A?	40.4	60.4	20.0	Yes
Which food has a lot of Vitamin C?	75.4	83.0	7.6	
The words "More Matters" help me to remember to eat more of what?	94.7	94.3	-0.4	
Do you eat fruits and veggies as snacks?	86.0	92.5	6.5	
How many grams of fiber do you need every day to stay healthy?	10.5	28.3	17.8	Yes

*Z-Scores used to calculate whether differences between groups were statistically significant.

Table 10 - Percentage of Preferred Answers Age 8

	Pre-Survey N = 952	Post-Survey N = 884	Percentage Point Difference	Statistically Significant Difference Between Pre and Post?
Pick one food that is a fruit	98.3	98.6	0.3	
Pick one food that is a vegetable	95.2	94.6	-0.6	
Which food has fiber?	40.5	87.4	46.9	Yes
Which food has a lot of Vitamin A?	27.5	74.0	46.5	Yes
Which food has a lot of Vitamin C?	68.0	92.1	24.1	Yes
The words "More Matters" help me to remember to eat more of what?	91.1	97.2	6.1	Yes
Do you eat fruits and veggies as snacks?	85.6	91.9	6.3	Yes
How many grams of fiber do you need every day to stay healthy?	21.8	74.3	52.5	Yes

*Z-Scores used to calculate whether differences between groups were statistically significant.

Table 11 - Percentage of Preferred Answers Age 9

	Pre-Survey N = 1073	Post-Survey N = 1103	Percentage Point Difference	Statistically Significant Difference Between Pre and Post?
Pick one food that is a fruit	99.4	99.2	-0.2	
Pick one food that is a vegetable	95.2	95.5	0.3	
Which food has fiber?	47.6	86.8	39.2	Yes
Which food has a lot of Vitamin A?	31.4	75.0	43.6	Yes
Which food has a lot of Vitamin C?	70.9	95.1	24.2	Yes
The words "More Matters" help me to remember to eat more of what?	92.5	96.9	4.4	Yes
Do you eat fruits and veggies as snacks?	87.5	91.3	3.8	Yes
How many grams of fiber do you need every day to stay healthy?	21.6	76.5	54.9	Yes

*Z-Scores used to calculate whether differences between groups were statistically significant.

Table 12 - Percentage of Preferred Answers Age 10

	Pre-Survey N = 94	Post-Survey N = 124	Percentage Point Difference	Statistically Significant Difference Between Pre and Post?
Pick one food that is a fruit	98.9	100.0	1.1	
Pick one food that is a vegetable	95.7	91.9	-3.8	
Which food has fiber?	41.5	83.1	41.6	Yes
Which food has a lot of Vitamin A?	37.2	68.5	31.3	Yes
Which food has a lot of Vitamin C?	73.4	94.4	21.0	Yes
The words "More Matters" help me to remember to eat more of what?	85.1	94.4	9.3	Yes
Do you eat fruits and veggies as snacks?	84.0	87.1	3.1	
How many grams of fiber do you need every day to stay healthy?	24.5	75.8	51.3	Yes

*Z-Scores used to calculate whether differences between groups were statistically significant.

NAVAJO COUNTY RESULTS

A total of 810 pre-surveys and 895 post-surveys were completed. The average age was 7.6 and the surveys were evenly distributed between boys and girls. Table 13 below displays demographic information.

Table 13 - Demographics Navajo County

	Pre Survey N = 810		Post Survey N = 895	
	N	%	N	%
Age				
Blank	3	0.4	6	0.7
7	448	55.3	422	47.2
8	309	38.1	394	44.0
9	44	5.4	68	7.6
10	6	0.7	5	0.6
Gender				
Blank	5	0.6	7	0.8
Boy	413	51.0	450	50.3
Girl	392	48.4	438	48.9

Navajo county students took a different survey than the rest of the sample, but had similar results on questions that were the same between the two surveys. For example, students in Navajo county showed similar gains in knowledge concerning fiber, Vitamin A and Vitamin C as students in other counties. Students also showed increases in confidence that they could fix fruits and vegetables for a snack. In addition, more students indicated they liked carrots and bananas after attending the class. Results are listed in Table 14.

Table 14 - General Results Navajo County

	Pre Survey N = 810	Post Survey N = 895	Percentage Point Change Between Pre and Post	Statistically Significant Difference Between Pre and Post?
Did you eat fruit yesterday?	79.8	80.2	0.4	
Did you eat a vegetable yesterday?	64.9	69.1	4.2	
Which food has fiber?	19.4	62.0	42.6	Yes
Which food has a lot of Vitamin C?	77.7	85.8	8.1	Yes
Which food has a lot of Vitamin A?	23.2	36.6	13.4	Yes

	Pre Survey N = 810	Post Survey N = 895	Percentage Point Change Between Pre and Post	Statistically Significant Difference Between Pre and Post?
How sure are you that you can fix fruit snacks at home?				
Not Sure	23.1	14.3	-8.8	Yes
Sure	26.0	22.8	-3.2	
Very Sure	48.4	60.9	12.5	Yes
How sure are you that you can fix vegetable snacks at home?				
Not Sure	28.1	21.1	-7.0	Yes
Sure	28.3	26.6	-1.7	
Very Sure	41.7	50.6	8.9	Yes
Why is it important to eat fruits and vegetables with Vitamin A?	42.5	65.0	22.5	Yes
Why is it important to eat fruits and vegetables with Vitamin C?	15.2	63.9	48.7	Yes
What does fiber do in our digestive system?	47.3	82.6	35.3	Yes
How can eating more fruits and vegetables help you?	76.0	80.9	4.9	Yes
How many grams of fiber do you need every day to stay healthy?	34.1	50.4	16.3	Yes
Have you seen the logo – FV more matters	67.3	85.9	18.6	Yes
Have you seen the logo – MyPyramid.gov	79.8	84.2	4.4	Yes
Have you seen the logo – Bobby B. Well	60.0	72.7	12.7	Yes
Do you like to eat - Broccoli				
Don't know what it is	5.4	4.5	-0.9	
Don't like it	21.9	23.7	1.8	
Like it	70.0	69.5	-0.5	
Do you like to eat - Banana				
Don't know what it is	2.0	1.7	-0.3	
Don't like it	8.8	6.4	-2.4	
Like it	87.3	90.3	3.0	Yes
Do you like to eat - Kiwi				
Don't know what it is	15.1	13.6	-1.5	
Don't like it	15.7	13.7	-2.0	
Like it	66.0	70.2	4.2	
Do you like to eat - Lettuce				
Don't know what it is	9.4	8.9	-0.5	
Don't like it	19.9	20.7	0.8	
Like it	67.7	68.3	0.6	
Do you like to eat - Orange				
Don't know what it is	3.6	2.9	-0.7	
Don't like it	8.1	6.6	-1.5	
Like it	85.4	88.0	2.6	

	Pre Survey N = 810	Post Survey N = 895	Percentage Point Change Between Pre and Post	Statistically Significant Difference Between Pre and Post?
Do you like to eat - Carrot				
Don't know what it is	3.7	2.1	-1.6	
Don't like it	13.8	11.7	-2.1	
Like it	78.9	83.4	4.5	Yes
Do you like to eat - Watermelon				
Don't know what it is	1.0	2.1	1.1	
Don't like it	5.6	5.4	-0.2	
Like it	90.7	90.7	0.0	
Do you like to eat - Tomato				
Don't know what it is	11.1	8.4	-2.7	
Don't like it	35.1	36.6	1.5	
Like it	50.2	52.5	2.3	
Do you like to eat - Apple				
Don't know what it is	0.9	0.6	-0.3	
Don't like it	4.6	6.4	-1.8	
Like it	91.5	90.4	-1.1	

*Z-Scores used to calculate whether differences between groups were statistically significant.

COMPARISONS BY GENDER – NAVAJO COUNTY

There are some statistically significant differences between boys and girls in the results for both the pre-survey and post-survey answers. In the pre-survey, girls scored statistically significantly higher on questions involving eating fruit, confidence in fixing vegetable snacks, Vitamin C, reasons for eating more fruits and vegetables, the MyPyramid.gov logo, and preferences for broccoli, bananas, kiwi, and lettuce. See Table 15 for all pre-survey results by gender.

Table 15 - Pre-Survey Results by Gender Navajo County

	Boys N = 413	Girls N = 392	Statistically Significant Difference Between Boys and Girls?*
Did you eat fruit yesterday?	75.8	84.2	Yes
Did you eat a vegetable yesterday?	62.0	68.4	
Which food has fiber?	18.2	20.7	
Which food has a lot of Vitamin C?	75.8	79.6	
Which food has a lot of Vitamin A?	22.5	24.2	
How sure are you that you can fix fruit snacks at home?			
Not Sure	24.9	20.9	
Sure	25.7	26.8	
Very Sure	45.8	51.3	
How sure are you that you can fix vegetable snacks at home?			Yes
Not Sure	32.7	23.2	
Sure	25.7	30.9	
Very Sure	39.2	44.9	
Why is it important to eat fruits and vegetables with Vitamin A?	42.9	41.8	
Why is it important to eat fruits and vegetables with Vitamin C?	12.6	17.9	Yes
What does fiber do in our digestive system?	45.5	49.5	
How can eating more fruits and vegetables help you?	71.4	81.1	Yes
How many grams of fiber do you need every day to stay healthy?	35.6	32.4	
Have you seen the logo – FV more matters	64.6	70.2	
Have you seen the logo – MyPyramid.gov	76.5	83.2	Yes
Have you seen the logo – Bobby B. Well	58.6	61.7	
Do you like to eat - Broccoli			
Don't know what it is	5.6	5.4	
Don't like it	25.7	17.9	Yes
Like it	65.4	75.0	Yes
Do you like to eat - Banana			
Don't know what it is	2.9	1.0	
Don't like it	11.1	6.4	Yes
Like it	83.5	91.3	Yes

		Boys N = 413	Girls N = 392	Statistically Significant Difference Between Boys and Girls?*
Do you like to eat - Kiwi	Don't know what it is	16.9	13.3	Yes
	Don't like it	17.2	13.8	
	Like it	62.0	70.9	
Do you like to eat - Lettuce	Don't know what it is	10.4	8.4	Yes
	Don't like it	22.0	17.9	
	Like it	63.9	71.4	
Do you like to eat - Orange	Don't know what it is	3.9	3.3	
	Don't like it	8.7	7.7	
	Like it	84.0	87.0	
Do you like to eat - Carrot	Don't know what it is	4.4	3.1	
	Don't like it	14.8	12.8	
	Like it	76.8	81.4	
Do you like to eat - Watermelon	Don't know what it is	1.0	1.0	
	Don't like it	5.8	5.4	
	Like it	89.3	92.3	
Do you like to eat - Tomato	Don't know what it is	11.1	11.2	
	Don't like it	36.6	32.9	
	Like it	48.2	53.1	
Do you like to eat - Apple	Don't know what it is	0.7	1.0	
	Don't like it	5.6	3.6	
	Like it	89.8	93.4	

*Z-Scores used to calculate whether differences between groups were statistically significant.

Boys and girls showed more statistically significant differences in the post-survey than in the pre-survey, with girls consistently scoring higher than boys on questions with statistically significant differences. However, like the results for the non-Navajo counties, boys and girls scored the same on questions related to nutritional knowledge, but differed in reported behaviors and preferences. Differences in knowledge about Vitamin C and reasons for eating more fruits and vegetables between boys and girls on the pre-survey did not exist on the post-survey. But reported preferences showed more differences between boys and girls in the post-survey. For example, except for lettuce, girls reported liking all of the fruits and vegetables listed more than boys in the post-survey. See Table 16 below for all post-survey results by gender.

Table 16 - Post-Survey by Gender Navajo County

	Boys N = 450	Percentage Point Difference Between Pre and Post	Girls N = 438	Percentage Point Difference Between Pre and Post	Statistically Significant Difference Between Boys and Girls on Post-Survey?***
Did you eat fruit yesterday?	75.6	-0.2	85.2	1.0	Yes
Did you eat a vegetable yesterday?	64.0	2.0	74.4	6.0	Yes
Which food has fiber?	60.7	42.5*	63.2	42.5*	
Which food has a lot of Vitamin C?	86.0	10.2*	86.3	6.7*	
Which food has a lot of Vitamin A?	38.0	15.5*	35.6	11.4*	
How sure are you that you can fix fruit snacks at home?					
Not Sure	18.4	-6.5*	10.0	-10.9*	Yes
Sure	22.7	-3.0	23.3	-3.5	
Very Sure	56.9	11.1*	65.3	14.0*	Yes
How sure are you that you can fix vegetable snacks at home?					
Not Sure	25.1	-7.6*	17.1	-6.1*	Yes
Sure	29.8	4.1	23.5	-7.4*	Yes
Very Sure	43.3	4.1	58.4	13.5*	Yes
Why is it important to eat fruits and vegetables with Vitamin A?	64.2	21.3*	66.0	24.2*	
Why is it important to eat fruits and vegetables with Vitamin C?	62.4	49.8*	66.0	48.1*	
What does fiber do in our digestive system?	82.9	37.4*	82.6	33.1*	
How can eating more fruits and vegetables help you?	80.4	9.0*	81.7	0.6	
How many grams of fiber do you need every day to stay healthy?	49.1	13.5*	51.4	19.0*	
Have you seen the logo – FV more matters	82.0	17.4*	90.2	20.0*	Yes
Have you seen the logo – MyPyramid.gov	82.9	6.4*	85.8	2.6	
Have you seen the logo – Bobby B. Well	70.0	11.4*	75.8	14.1*	
Do you like to eat - Broccoli					
Don't know what it is	5.1	-0.5	3.7	-1.7	
Don't like it	26.7	1.0	20.5	2.6	Yes
Like it	65.8	0.4	74.0	-1.0	Yes
Do you like to eat - Banana					
Don't know what it is	2.2	-0.7	1.1	0.1	
Don't like it	7.3	-3.8	5.5	-0.9	
Like it	88.2	4.7*	92.7	1.4	Yes

	Boys N = 450	Percentage Point Difference Between Pre and Post	Girls N = 438	Percentage Point Difference Between Pre and Post	Statistically Significant Difference Between Boys and Girls on Post-Survey?***
Do you like to eat - Kiwi					
Don't know what it is	15.8	-1.1	11.6	-1.7	
Don't like it	17.8	0.6	9.6	-4.2	Yes
Like it	63.1	1.1	77.6	6.7*	Yes
Do you like to eat - Lettuce					
Don't know what it is	8.9	-1.5	9.1	0.7	
Don't like it	22.9	0.9	18.3	0.4	
Like it	65.6	1.7	71.5	0.1	
Do you like to eat - Orange					
Don't know what it is	2.9	-1.0	3.0	-0.3	
Don't like it	8.2	-0.5	5.0	-2.7	
Like it	85.6	1.6	90.9	3.9	Yes
Do you like to eat - Carrot					
Don't know what it is	2.9	-1.5	1.4	-1.7	
Don't like it	14.2	-0.6	9.4	-3.4	Yes
Like it	79.3	2.5	87.7	6.3*	Yes
Do you like to eat - Watermelon					
Don't know what it is	2.4	1.4	1.8	0.8	
Don't like it	6.4	0.6	4.3	-1.1	
Like it	88.9	-0.4	92.9	0.6	Yes
Do you like to eat - Tomato					
Don't know what it is	10.7	-0.4	5.9	-5.3*	Yes
Don't like it	40.4	3.8	32.9	0.0	Yes
Like it	45.6	-2.6	60.0	6.9*	Yes
Do you like to eat - Apple					
Don't know what it is	0.9	0.2	0.2	-0.8	
Don't like it	8.7	3.1	4.1	0.5	Yes
Like it	86.4	-3.4	94.7	1.3	Yes

* Indicates a statistically significant difference between pre- and post-survey results

***Z-Scores used to calculate differences between groups. This measure only compares whether there is a statistically significant difference between post-survey answers for boys and girls. It does not compare pre- to post- survey results.

COMPARISONS BY AGE – NAVAJO COUNTY

Students aged seven and eight had similar results on the pre- and post-surveys. While these results do not compare results between ages, there are some similar trends. For example, both seven and eight year olds scored statistically significantly higher on the post-survey on questions regarding knowledge, such as knowing which food has a lot of Vitamin A. Nine year olds did not see as many statistically significant gains on the knowledge questions between the pre- and post-surveys. Results for the behavior and preference questions were similar between all ages with very few statistically significant changes between pre- and post- surveys. Detailed results by age are displayed in Table 17 through Table 19.

**Note, only 11 students were age 10 (six pre-survey and five post-survey), so those results have not been included.

Table 17 - Percentage of Preferred Answers Age 7 Navajo County

	Pre-Survey N = 448	Post-Survey N = 422	Percentage Point Difference Between Pre and Post	Statistically Significant Difference Between Pre and Post?
Did you eat fruit yesterday?	78.6	78.4	-0.2	
Did you eat a vegetable yesterday?	62.7	66.6	3.9	
Which food has fiber?	20.1	64.7	44.6	Yes
Which food has a lot of Vitamin C?	76.1	84.8	8.7	Yes
Which food has a lot of Vitamin A?	22.8	36.7	13.9	Yes
How sure are you that you can fix fruit snacks at home?				
Not Sure	28.3	15.4	-12.9	Yes
Sure	24.3	23.5	-0.8	
Very Sure	44.6	59.5	14.9	Yes
How sure are you that you can fix vegetable snacks at home?				
Not Sure	31.3	23.0	-8.3	Yes
Sure	27.2	27.0	-0.2	
Very Sure	40.0	49.3	9.3	Yes
Why is it important to eat fruits and vegetables with Vitamin A?	40.6	63.5	22.9	Yes
Why is it important to eat fruits and vegetables with Vitamin C?	16.1	63.0	46.9	Yes
What does fiber do in our digestive system?	43.3	82.7	39.4	Yes
How can eating more fruits and vegetables help you?	73.2	83.4	10.2	Yes

	Pre-Survey N = 448	Post-Survey N = 422	Percentage Point Difference Between Pre and Post	Statistically Significant Difference Between Pre and Post?
How many grams of fiber do you need every day to stay healthy?	35.7	51.9	16.2	Yes
Have you seen the logo – FV more matters	65.6	87.4	21.8	Yes
Have you seen the logo – MyPyramid.gov	76.8	83.6	6.8	Yes
Have you seen the logo – Bobby B. Well	56.3	71.3	15.0	Yes
Do you like to eat - Broccoli				
Don't know what it is	5.1	4.3	-0.8	
Don't like it	22.8	24.4	1.6	
Like it	69.4	69.9	0.5	
Do you like to eat - Banana				
Don't know what it is	1.8	2.1	0.3	
Don't like it	8.9	5.0	-3.9	Yes
Like it	87.5	92.2	4.7	Yes
Do you like to eat - Kiwi				
Don't know what it is	14.5	13.5	-1.0	
Don't like it	17.4	14.5	-2.9	
Like it	64.5	69.7	5.2	
Do you like to eat - Lettuce				
Don't know what it is	8.0	10.9	2.9	
Don't like it	22.5	22.3	-0.2	
Like it	66.3	65.6	-0.8	
Do you like to eat - Orange				
Don't know what it is	4.0	3.3	-0.7	
Don't like it	8.5	6.4	-2.1	
Like it	84.8	88.9	4.1	
Do you like to eat - Carrot				
Don't know what it is	2.7	1.9	-0.8	
Don't like it	15.0	14.0	-1.0	
Like it	78.1	82.2	4.1	
Do you like to eat - Watermelon				
Don't know what it is	0.2	2.8	2.6	Yes
Don't like it	5.6	5.0	-0.6	
Like it	91.3	91.2	-0.1	
Do you like to eat - Tomato				
Don't know what it is	9.6	9.7	0.1	
Don't like it	38.2	36.3	-1.9	
Like it	48.2	52.1	3.9	

	Pre-Survey N = 448	Post-Survey N = 422	Percentage Point Difference Between Pre and Post	Statistically Significant Difference Between Pre and Post?
Do you like to eat - Apple				
Don't know what it is	0.9	0.5	-0.4	
Don't like it	4.9	6.6	1.7	
Like it	91.1	90.8	-0.3	

*Z-Scores used to calculate whether differences between groups were statistically significant.

Table 18 - Percentage of Preferred Answers Age 8 Navajo County

	Pre-Survey N = 309	Post-Survey N = 394	Percentage Point Difference Between Pre and Post	Statistically Significant Difference Between Pre and Post?
Did you eat fruit yesterday?	79.9	81.2	1.3	
Did you eat a vegetable yesterday?	67.6	70.1	2.5	
Which food has fiber?	19.1	61.2	45.1	Yes
Which food has a lot of Vitamin C?	79.6	86.8	7.2	Yes
Which food has a lot of Vitamin A?	24.6	38.3	13.7	Yes
How sure are you that you can fix fruit snacks at home?				
Not Sure	17.2	14.0	-3.2	
Sure	27.2	22.1	-5.1	
Very Sure	53.7	62.4	8.7	Yes
How sure are you that you can fix vegetable snacks at home?				
Not Sure	25.2	19.8	-5.4	
Sure	27.8	25.6	-2.2	
Very Sure	44.7	52.5	7.8	Yes
Why is it important to eat fruits and vegetables with Vitamin A?	43.7	67.0	23.3	Yes
Why is it important to eat fruits and vegetables with Vitamin C?	14.2	65.7	51.5	Yes
What does fiber do in our digestive system?	51.5	83.5	32.0	Yes
How can eating more fruits and vegetables help you?	80.9	79.2	-1.7	
How many grams of fiber do you need every day to stay healthy?	31.4	49.7	18.3	Yes
Have you seen the logo – FV more matters	68.0	85.8	17.8	Yes
Have you seen the logo – MyPyramid.gov	84.1	86.0	1.9	

	Pre-Survey N = 309	Post-Survey N = 394	Percentage Point Difference Between Pre and Post	Statistically Significant Difference Between Pre and Post?
Have you seen the logo – Bobby B. Well	63.8	74.1	10.3	Yes
Do you like to eat - Broccoli				
Don't know what it is	6.1	4.3	-1.8	
Don't like it	21.0	23.9	2.9	
Like it	69.6	68.8	-0.8	
Do you like to eat - Banana				
Don't know what it is	1.9	1.0	-0.9	
Don't like it	8.4	7.4	-1.0	
Like it	87.1	89.3	2.2	
Do you like to eat - Kiwi				
Don't know what it is	16.5	14.5	-2.0	
Don't like it	13.6	13.7	0.1	
Like it	66.7	69.8	3.1	
Do you like to eat - Lettuce				
Don't know what it is	11.3	7.6	-3.7	
Don't like it	15.9	18.8	2.9	
Like it	69.3	71.1	1.8	
Do you like to eat - Orange				
Don't know what it is	2.9	3.0	0.1	
Don't like it	6.8	6.6	-0.2	
Like it	89.7	87.1	-2.6	
Do you like to eat - Carrot				
Don't know what it is	4.2	2.0	-2.2	
Don't like it	11.0	9.9	-1.1	
Like it	81.6	84.8	3.2	
Do you like to eat - Watermelon				
Don't know what it is	1.3	1.8	0.5	
Don't like it	5.2	5.8	0.6	
Like it	90.6	90.4	-0.2	
Do you like to eat - Tomato				
Don't know what it is	12.3	7.4	-4.9	Yes
Don't like it	32.0	36.0	4.0	
Like it	52.1	54.1	2.0	
Do you like to eat - Apple				
Don't know what it is	0.6	0.8	0.2	
Don't like it	3.9	5.6	1.7	
Like it	91.9	90.9	-1.0	

*Z-Scores used to calculate whether differences between groups were statistically significant.

Table 19 - Percentage of Preferred Answers Age 9 Navajo County

	Pre-Survey N = 44	Post-Survey N = 68	Percentage Point Difference Between Pre and Post	Statistically Significant Difference Between Pre and Post?
Did you eat fruit yesterday?	88.6	86.8	-1.8	
Did you eat a vegetable yesterday?	65.9	82.4	16.5	Yes
Which food has fiber?	13.6	54.4	40.8	Yes
Which food has a lot of Vitamin C?	79.5	88.2	8.7	
Which food has a lot of Vitamin A?	15.9	26.5	10.6	
How sure are you that you can fix fruit snacks at home?				
Not Sure	15.9	11.8	-4.1	
Sure	29.5	23.5	-6.0	
Very Sure	52.3	61.8	9.5	
How sure are you that you can fix vegetable snacks at home?				
Not Sure	20.5	19.1	-1.4	
Sure	43.2	30.9	-12.3	
Very Sure	36.4	48.5	12.1	
Why is it important to eat fruits and vegetables with Vitamin A?	52.3	66.2	13.9	
Why is it important to eat fruits and vegetables with Vitamin C?	11.4	64.7	53.3	Yes
What does fiber do in our digestive system?	56.8	82.4	25.6	Yes
How can eating more fruits and vegetables help you?	72.7	77.9	5.2	
How many grams of fiber do you need every day to stay healthy?	29.5	42.6	13.1	
Have you seen the logo – FV more matters	75.0	79.4	4.4	
Have you seen the logo – MyPyramid.gov	77.3	80.9	3.6	
Have you seen the logo – Bobby B. Well	68.2	76.5	8.3	
Do you like to eat - Broccoli				
Don't know what it is	4.5	5.9	1.4	
Don't like it	20.5	20.6	0.1	
Like it	75.0	72.1	-2.9	
Do you like to eat - Banana				
Don't know what it is	4.5	2.9	-1.6	
Don't like it	11.4	8.8	-2.6	
Like it	84.1	86.8	2.7	

	Pre-Survey N = 44	Post-Survey N = 68	Percentage Point Difference Between Pre and Post	Statistically Significant Difference Between Pre and Post?
Do you like to eat - Kiwi				
Don't know what it is	11.4	11.8	0.4	
Don't like it	13.6	8.8	-4.8	
Like it	75.0	76.5	1.5	
Do you like to eat - Lettuce				
Don't know what it is	11.4	4.4	-7.0	
Don't like it	22.7	23.5	0.8	
Like it	65.9	69.1	3.2	
Do you like to eat - Orange				
Don't know what it is	4.5	0.0	-4.5	
Don't like it	11.4	5.9	-5.5	
Like it	84.1	92.6	8.5	
Do you like to eat - Carrot				
Don't know what it is	9.1	4.4	-4.7	
Don't like it	20.5	7.4	-13.1	Yes
Like it	70.5	85.3	14.8	
Do you like to eat - Watermelon				
Don't know what it is	6.8	0.0	-6.8	Yes
Don't like it	9.1	4.4	-4.7	
Like it	84.1	92.6	8.5	
Do you like to eat - Tomato				
Don't know what it is	15.9	7.4	-8.5	
Don't like it	25.0	41.2	16.2	
Like it	59.1	48.5	-10.6	
Do you like to eat - Apple				
Don't know what it is	2.3	0.0	-2.3	
Don't like it	6.8	8.8	2.0	
Like it	90.9	88.2	-2.7	

*Z-Scores used to calculate whether differences between groups were statistically significant.

APPENDIX A – SURVEY QUESTIONS

ARIZONA DEPARTMENT OF HEALTH SERVICES

Bureau of Nutrition and Physical Activity - Community Nutrition Program

School Code

Date

1. How **old** are you?

6 7 8 9 10

2. Are you a **boy** or a **girl**?

Boy Girl

3. Pick one food that is a fruit:



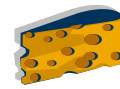
Chocolate Milk



Hamburger



Strawberry



Cheese

4. Pick one food that is a vegetable:



Rice



Apple



Grilled Cheese



Carrots

5. Which food has **fiber**?



Soda



Broccoli



Milk



Chicken

6. Which food has a lot of **vitamin A**?



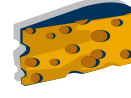
Eggs



Oranges



Carrots



Cheese

7. Which food has a lot of **vitamin C**?



Grilled Cheese



Soda



Hamburger



Oranges

8. The words “More Matters” help me remember to eat more of what?

Fruits and Vegetables

Pizza

Chicken Nuggets

Don't Know

9. Do you eat fruits and vegetables as snacks?

Yes

No

There were two versions of question 10. Most students were presented with the following question:

10. How many grams of fiber do you need every day to stay healthy?

5

10

25

Don't Know

There were 293 pre-surveys and 272 post-surveys that replaced question 10 above with question 10a below:

10a. How do you know you are getting enough fiber every day?

Never eat fruits and veggies

Eat fruits and veggies sometimes

Eat fruits and veggies with every meal