

Arizona Fruit and Veggie – More Matters Class Evaluation 2013

Arizona Department of Health Services
Bureau of Nutrition and Physical Activity
Research and Development

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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. 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 2008/09 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. Since then Network partners utilizing the curriculum incorporate costs for the class materials into local program budgets through the Local Incentive Award Program, and have had the opportunity to design their own evaluation survey.

CLASS OBJECTIVES

Pre survey data from classrooms of qualifying schools were 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.

T-Tests for differences between independent samples 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 (80.1%) and vegetables (74.8%) 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 fiber and Vitamin A. Overall results are displayed in Table 2 and Table 3. The remainder of the report breaks down results by gender, location, and age.

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 (99.0%) and vegetables (94.8%) 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 2,378 pre-surveys and 2,386 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 (92.1%). Table 1 below displays demographic information.

Table 1 - Demographics

	Pre Survey N = 2378		Post Survey N = 2386	
	N	%	N	%
Age				
Blank	31	1.3	35	1.5
7	31	1.3	22	0.9
8	1134	47.7	1024	42.9
9	1133	47.6	1241	52.0
10	49	2.1	64	2.7
Gender				
Blank	48	2.0	77	3.2
Boy	1139	48.8	1058	44.3
Girl	1185	49.8	1170	49.0
Location				
Maricopa	185	7.8	188	7.9
Washington Elementary District	781	32.8	762	31.9
Yuma	1411	59.3	1436	60.2

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.

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 over 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 5 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 80% of students reported they ate more fruit after taking the class and 75% reported eating more vegetables. See Table 3 for details.

Table 2 - Percentage Answered With Preferred Answer

	Pre Survey N = 2361	Post Survey N = 2369	Percentage Point Change Between Pre and Post	Statistically Significant Difference Between Pre and Post?
Pick one food that is a fruit	99.0	99.4	0.4	
Pick one food that is a vegetable	94.8	94.9	0.1	
Which food has fiber?	44.8	84.2	39.4	Yes
Which food has a lot of Vitamin A?	31.2	70.0	38.8	Yes
Which food has a lot of Vitamin C?	72.1	92.9	20.8	Yes
The words "More Matters" help me to remember to eat more of what?	96.6	98.8	2.2	Yes
Do you eat fruits and veggies as snacks?	85.3	89.9	4.6	Yes
How many grams of fiber do you need every day to stay healthy?	39.2	82.5	43.3	Yes
How do you know you are getting enough fiber every day?*** Eat fruits and veggies with every meal	67.0	83.5	16.5	Yes

*T-Tests used to calculate whether differences between groups were statistically significant.

***This question was only asked in some (but not all) Maricopa schools. There were 182 pre-surveys and 188 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	80.1
The Same Amounts of Fruit	19.9
More Vegetables	74.8
The Same Amount of Vegetables	25.2

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. As indicated by Table 4 and Table 5 below, boys and girls scored differently on some specific questions on each survey.

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 2.1 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 10.4 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 = 1142	Girl N = 1182	Statistically Significant Difference between Boys and Girls?*
Pick one food that is a fruit	99.1%	99.2%	
Pick one food that is a vegetable	93.5%	96.5%	Yes
Which food has fiber?	43.3%	46.6%	
Which food has a lot of Vitamin A?	31.0%	31.9%	
Which food has a lot of Vitamin C?	70.9%	73.8%	
The words “More Matters” help me to remember to eat more of what?	95.6%	97.7%	Yes
Do you eat fruits and veggies as snacks?	80.2%	90.3%	Yes
How many grams of fiber do you need every day to stay healthy?	37.3%	40.4%	

*T-Tests used to calculate whether differences between groups were statistically significant.

Boys and girls showed three statistically significant differences in the post-survey. The results show that girls snack on fruits and vegetables at a statistically significantly higher rate than boys, which has also been seen in previous years. 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 (5.9 percentage points) in reporting they ate fruits and vegetables as a snack between the pre-survey and post-survey, while girls showed a 2.7 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 = 1133	Percentage Point Change (Boys) from Pre-Survey	Girl N = 1166	Percentage Point Change (Girls) from Pre-Survey	Statistically Significant Difference between Boys and Girls? **
Pick one food that is a fruit	99.3%	0.2	99.8%	7.6	
Pick one food that is a vegetable	93.8%	0.3	96.6%	0.1	Yes
Which food has fiber?	83.4%	40.1*	84.9%	38.3*	
Which food has a lot of Vitamin A?	69.2%	38.2*	71.5%	39.6*	
Which food has a lot of Vitamin C?	93.4%	22.5*	92.8%	19*	
The words "More Matters" help me to remember to eat more of what?	98.0%	2.4*	99.7%	2*	Yes
Do you eat fruits and veggies as snacks?	86.7%	6.5*	93.3%	3*	Yes
How many grams of fiber do you need every day to stay healthy?	82.4%	45.1*	83.3%	42.9*	

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

**T-Tests 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 three locations: Maricopa, Washington Elementary School District, and Yuma. There were some significant differences between the locations. In the pre-test, Yuma students scored significantly higher on three knowledge questions than Washington students. Interestingly, students from Maricopa and Washington saw much larger increases in knowledge from between the pre and post-test. In the post-test, students from Maricopa scored significantly higher on these three questions than Yuma and students from Washington scored significantly higher than those from Yuma on the questions about food that has vitamin A and vitamin C.

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

	Maricopa N = 185	Washington Elementary School District N = 779	Yuma N = 1397	Statistically Significant Difference between locations?
Pick one food that is a fruit	99.5	99.5	98.7	
Pick one food that is a vegetable	96.2	95.5	94.2	
Which food has fiber?	41.8	37.2	49.4	Yuma significantly higher than Washington
Which food has a lot of Vitamin A?	28.0	25.2	35.0	Yuma significantly higher than Washington
Which food has a lot of Vitamin C?	73.4	67.7	74.3	Yuma significantly higher than Washington
The words "More Matters" help me to remember to eat more of what?	98.3	96.4	96.4	
Do you eat fruits and veggies as snacks?	85.8	84.3	85.8	
How many grams of fiber do you need every day to stay healthy?	n/a	36.8	40.4	

*T-Tests used to calculate whether differences between groups were statistically significant.

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

	Maricopa N = 188	Washington Elementary School District N = 761	Yuma N = 1423	Statistically Significant Difference between locations?
Pick one food that is a fruit	100.0	99.7	99.1	
Pick one food that is a vegetable	95.2	96.3	94.1	
Which food has fiber?	90.9	85.5	82.7	Maricopa significantly higher than Yuma

	Maricopa N = 188	Washington Elementary School District N = 761	Yuma N = 1423	Statistically Significant Difference between locations?
Which food has a lot of Vitamin A?	87.1	75.4	64.9	All statistically different from each other
Which food has a lot of Vitamin C?	95.7	94.7	91.6	Maricopa and Washington significantly higher than Yuma
The words "More Matters" help me to remember to eat more of what?	99.5	98.7	98.7	
Do you eat fruits and veggies as snacks?	91.9	88.5	90.4	
How many grams of fiber do you need every day to stay healthy?	n/a	92.8	76.7	Yuma significantly higher than Washington

*T-Tests used to calculate whether differences between groups were statistically significant.

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

	Maricopa	Washington Elementary School District	Yuma
Pick one food that is a fruit	0.5	0.2	0.4
Pick one food that is a vegetable	1.0	0.8	-0.1
Which food has fiber?	49.1*	48.3*	33.3*
Which food has a lot of Vitamin A?	59.1*	50.2*	29.9*
Which food has a lot of Vitamin C?	22.3*	27.0*	17.3*
The words "More Matters" help me to remember to eat more of what?	1.2	2.3*	1.2*
Do you eat fruits and veggies as snacks?	6.1	4.2*	4.6*
How many grams of fiber do you need every day to stay healthy?	n/a	56.0*	36.3*

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

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 Table 12 for details.

Table 9 - Percentage of Preferred Answers Age 7

	Pre-Survey N = 31	Post-Survey N = 22	Percentage Point Difference	Statistically Significant Difference Between Pre and Post?
Pick one food that is a fruit	100.0	95.5	-4.5	
Pick one food that is a vegetable	93.6	100.0	6.4	
Which food has fiber?	45.2	81.8	36.6	Yes
Which food has a lot of Vitamin A?	41.4	68.2	26.8	
Which food has a lot of Vitamin C?	80.0	81.8	1.8	
The words "More Matters" help me to remember to eat more of what?	86.2	100.0	13.8	
Do you eat fruits and veggies as snacks?	86.2	95.5	9.3	
How many grams of fiber do you need every day to stay healthy?	57.1	75.0	17.9	

*T-Tests used to calculate whether differences between groups were statistically significant.

Table 10 - Percentage of Preferred Answers Age 8

	Pre-Survey N = 1132	Post-Survey N = 1021	Percentage Point Difference	Statistically Significant Difference Between Pre and Post?
Pick one food that is a fruit	98.9	99.7	0.8	
Pick one food that is a vegetable	94.9	94.2	-0.7	
Which food has fiber?	46.1	85.1	39	Yes
Which food has a lot of Vitamin A?	30.2	69.2	39	Yes
Which food has a lot of Vitamin C?	69.8	92.9	23.1	Yes
The words "More Matters" help me to remember to eat more of what?	96.8	99.6	2.8	Yes
Do you eat fruits and veggies as snacks?	85.0	89.9	4.9	Yes
How many grams of fiber do you need every day to stay healthy?	38.9	82.3	43.4	Yes

*T-Tests used to calculate whether differences between groups were statistically significant.

Table 11 - Percentage of Preferred Answers Age 9

	Pre-Survey N = 1131	Post-Survey N = 1237	Percentage Point Difference	Statistically Significant Difference Between Pre and Post?
Pick one food that is a fruit	99.4	99.4	0	
Pick one food that is a vegetable	95.4	95.7	0.3	
Which food has fiber?	44.1	84.0	39.9	Yes
Which food has a lot of Vitamin A?	32.1	71.8	39.7	Yes
Which food has a lot of Vitamin C?	74.7	93.5	18.8	Yes
The words "More Matters" help me to remember to eat more of what?	97.2	98.6	1.4	Yes
Do you eat fruits and veggies as snacks?	85.7	89.9	4.2	Yes
How many grams of fiber do you need every day to stay healthy?	39.2	82.9	43.7	Yes

*T-Tests used to calculate whether differences between groups were statistically significant.

Table 12 - Percentage of Preferred Answers Age 10

	Pre-Survey N = 49	Post-Survey N = 64	Percentage Point Difference	Statistically Significant Difference Between Pre and Post?
Pick one food that is a fruit	98.0	98.4	0.4	
Pick one food that is a vegetable	93.8	95.2	1.4	
Which food has fiber?	40.8	82.3	41.5	Yes
Which food has a lot of Vitamin A?	30.6	58.7	28.1	Yes
Which food has a lot of Vitamin C?	69.4	88.9	19.5	Yes
The words "More Matters" help me to remember to eat more of what?	95.2	93.3	-1.9	
Do you eat fruits and veggies as snacks?	83.7	87.3	3.6	
How many grams of fiber do you need every day to stay healthy?	36.4	86.8	50.4	Yes

*T-Tests 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**?



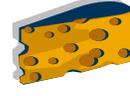
Eggs



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