



Final Report of the FFY 2009 Impact Evaluation

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Abstract

This report presents results of an impact/outcome evaluation of a federally-funded nutrition education program serving food stamp and other low-income individuals in California. Forty-three contractors representing 6 channels collected data from 8,619 individuals. The sample was 82% youth and 53% female. Contractors measured consumption and physical activity, as well as nine factors influencing those behaviors using pre-test and post-test surveys.

The results show overall fruit and vegetable consumption increased for adults, high school students and some youth. The *Food Behavior Checklist* and *Fruit and Vegetable Checklist* were used to measure consumption among adults. One checklist showed a statistically significant increase in consumption of .47 cups and the other .34 servings between the pre-test day and “yesterday”. Interestingly, adults in comparison groups also reported a statistically significant increase in fruit and vegetable consumption. Low-resource schools that received interventions and completed the youth *Day in the Life Questionnaire* showed a statistically significant increase of 0.41 times between the pre-test day and “yesterday” while the comparison group did not. High school-aged students reported eating fruit, vegetables and juice 1.34 times more during the last 7 days at post-test than pre-test using consumption questions from the *Youth Risk Behavior Survey*. The difference was statistically significant. Youth who reported consumption using the *School and Physical Activity Nutrition* survey showed a statistically significant increase of 0.12 times for fruit consumption. Four of the nine factors related to fruit and vegetable consumption increased significantly including: knowledge, outcome expectations, self-efficacy for eating, asking and preparing fruit and vegetables, and access. There was no significant change in perceived peer behavior, socialization-encouragement, perceived parental consumption, self-efficacy for asking and shopping for fruit and vegetables or eating fruit and vegetables. The increase in physical activity was significant.

The changes reported here resulted from varied interventions implemented primarily in schools in different doses by teachers and LIA staff. The results lead to recommendations for the content of a standardized intervention.

Introduction

This report presents results of an impact/outcome evaluation of a federally funded nutrition education program serving food stamp and other low-income individuals in California. Nutrition educators conducted the evaluation using a theory-based evaluation model to assess change in consumption of fruit and vegetables and related determinants. The results-driven recommendations provide guidance for future nutrition education activities implemented in California.

The *Network for a Healthy California (Network)* is the largest Supplemental Nutrition Assistance Program (SNAP-Ed) in the United States. Funded in part by the United States Department of Agriculture (USDA), its mission is to increase fruit and vegetable consumption, physical activity, full use of food stamps by eligible individuals, and help prevent diet and physical activity-related chronic diseases. The desired long-term goal of these efforts is to reduce obesity, body mass index (BMI), related morbidity and mortality, and improve health outcomes. To achieve these outcomes the *Network* uses social marketing strategies grounded in a social ecological approach and contracts with agencies and institutions (contractors) throughout the state to provide nutrition education to SNAP-Ed eligible populations. In addition to specific *Network* scope of work activities, non-scope of work activities such as nutrition education integrated into academic coursework in schools augments SNAP-Ed.

In Federal Fiscal year (FFY) 2004, contractors began evaluating the immediate impact of their programs to ascertain if their *Network*-funded nutrition education programs led to changes in fruit and vegetable consumption, physical activity, and related factors.

During the first year (FFY 04) of impact evaluation, 12 contractors participated. The second year, FFY 05, the number doubled (n=24), nearly doubled again (n=46) in FFY 06, and peaked at 48 in FY 2007. The number of contractors participating dropped to 47 in FFY 08 and 43 in FFY 09 because some of those who volunteered in earlier years did not continue with impact evaluation in subsequent years. In FFY 09 the 43 participating contractors represented 51% of the total Federal Share received by the *Network* from USDA. Four contractors with Federal Share less than \$350,000 volunteered to conduct impact evaluation: Health Education Council, Kernville, Newport-Mesa, and Ventura.

Evaluation Framework

The Institute of Medicine's framework for evaluating obesity programs is a comprehensive evaluation logic model that includes behavior change and precursors of behavior change. This impact evaluation measured change in behavior and some of the precursors the model refers to as behavioral, cognitive, social, and environmental.

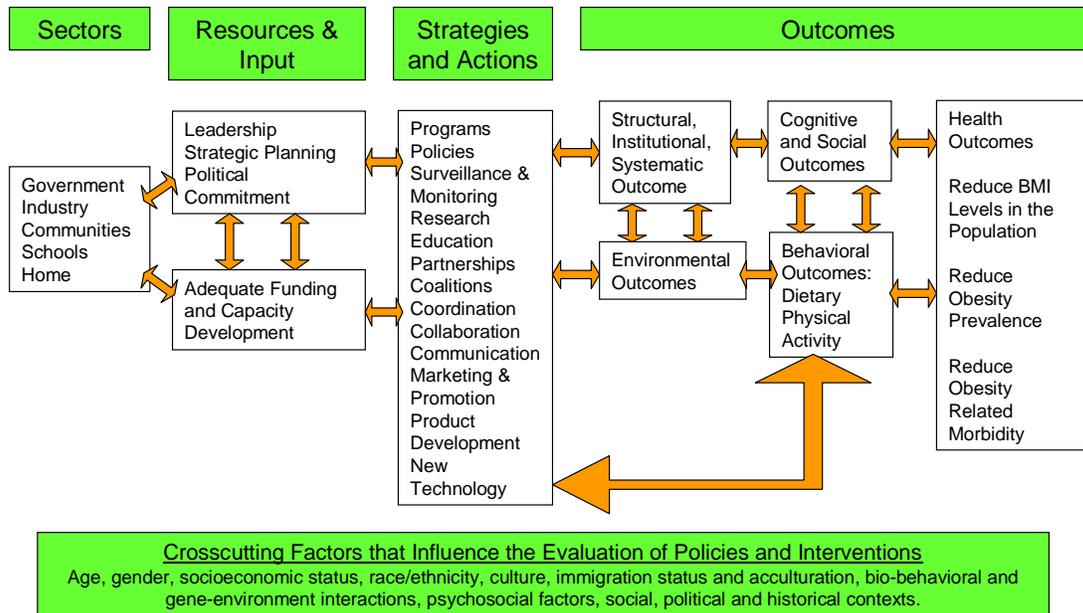
The impact/outcome evaluation reported here aligns with the Institute of Medicine's evaluation framework¹ and with the USDA Office of Research and Analysis's definitions of impact and outcome evaluation. The Office of Research and Analysis defines change in cognitive factors, like knowledge, and change in behavior as outcome measures². Impact evaluation is conducted to determine if changes can be attributed to the nutrition education activities². This type of attribution is commonly established through the use of control or comparison groups. However, it is difficult for the *Network* to use this model

since many eligible populations have already received some nutrition education, and attribution is impractical for agencies that conduct many diverse nutrition education activities funded by other sources. Additionally, it is difficult to withhold nutrition education in qualified settings. Consequently, we use the term impact/outcome evaluation to describe the evaluations in this report as a whole.

Figure 1 shows the desired outcomes of nutrition education efforts as they relate to childhood obesity¹. While some of these go beyond the *Network*'s scope of work, like those at the extreme right of the model, many overlap with the *Network*'s efforts. The *Network*'s contractors target fruit and vegetable consumption and physical activity behaviors. They also target related cognitive outcomes like knowledge, self-efficacy, outcome expectations, food preferences and social indicators such as attitudes and norms. Environmental outcomes, like access and availability, influence these behaviors; nonetheless, due to funder's restrictions, *Network* contractors do not directly target these outcomes. The same restrictions inhibit efforts to change important factors related to structural, institutional, and systemic outcomes. Structural elements govern the way fruit and vegetable consumption opportunities are organized and delivered. Institutional determinants encompass organizational culture, institution-wide policies and practices, and environmental factors within the institution like an office gym or a school fruit stand. The development, revision or implementation of policies are systemic elements that may influence consumption. The model shows how change in these areas influence one another. Interventions targeting behavior may influence the availability of fruit and vegetables in the environment. Such interventions may also impact school wellness policies or the processes through which fruit and vegetables are delivered.

Figure 1.

Institute of Medicine’s Framework for Evaluating Progress in Obesity Prevention



Strategies and Actions

This section describes the diverse strategies and nutrition education activities used to change behavior of the populations served. Overall, contractors implemented over 30 nutrition education activities. Ten or more contractors implemented each of the 13 activities in Table 1 describes below.

Taste tests were the most commonly implemented activity. Over 80% (n=38) of the interventions featured a produce item during the evaluation period. This activity is a structured sensory exploration activity. Students and adults explore the featured produce using their senses to observe, compare, and contrast different forms and varieties of the featured produce.

Almost as many interventions, 37, included **food preparation activities**. Youth and adult involvement in the food preparation varied from site to site. Some contractors involved all participants in the preparation of the tasted item, some only involved four or five volunteers, and some had nutrition educators prepare and distribute tastes to the participants. Children experienced just over two taste tests per month. Adults participated in less than one.

Educators commonly **integrate nutrition education** into science, math or English language core competencies to increase fruit and vegetable-related knowledge, beliefs, and attitudes. For example, a teacher may use drawings of apples to create a graph or introduce the concept of volume by observing the amount of water displaced by submersing a pumpkin in a tub of water. This evaluation assessed only the impact of some of the almost 30,000 classes that generated almost 1,000,000 impressions in FFY 2009.³

In 2009, contractors conducted many more training activities than in the past. Over 60% of the contractors trained teachers or community members to provide nutrition education. These may have occurred during regularly scheduled meetings in schools or special sessions dedicated to training adults to teach nutrition education. The training-of-trainers approach promotes sustainable nutrition education. Just 12 of the contractors had only their staff providing nutrition education, while the others had teachers, other individuals or some combination of those three providing nutrition education.

The newsletters for educators include nine distinct activities ranging from providing information to increasing knowledge about nutrition facts to building skills through

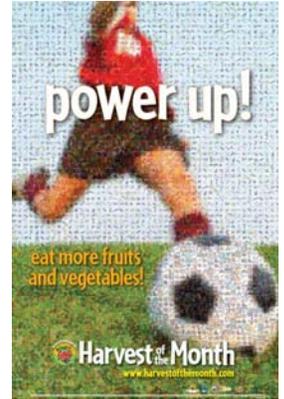
Table 1: Nutrition Education Strategies (# contractors that used the strategy in 2008-09)		
	Youth (39)	Adults (7)
Total Agencies Reporting		
Taste Tests	33	5
Food Preparation Activities	30	7
Integrated Nutrition Education	28	0
Trainings	26	2
Educator Newsletters	25	0
Family Newsletters	22	2
Posters (<i>HOTM</i>)	22	5
Nutrition Education Reinforcement Items (NERI)	21	7
<i>HOTM</i> workbooks	17	0
Partnerships	13	3
Cafeteria Connections	12	0
Power Play	12	0
Garden-Based Nutrition Education	11	1

hands-on activities in areas such as classroom cooking and gardening. Exposure to these activities varies according to the teachers' interest in the newsletter strategy, the feasibility of implementing it with available resources, and buy-in from other school or contractor staff. The contractors may hand deliver these to the teachers or may have school staff place them in the teachers' mailboxes. Over 54% of the interventions used educator newsletters.

The family newsletters were designed to increase knowledge and exposure to

fruit and vegetables through five distinct sets of activities. These range from providing age-appropriate nutrition information to tips for selecting, storing, and preparing produce. Each included a simple recipe for home preparation. These may be mailed through the U.S. postal service to parents, sent home via students, or distributed at school events that attract parents. Some contractors use parts of the newsletters in other school or community publications. Over half of all contractors, including two that served adults, took advantage of these *Harvest of the Month (HOTM)*-based materials.

The contractors used a variety of posters. Some were created by *Network* staff as part of *Harvest of the Month*, others by contractors, and others at schools with student involvement. They were posted in hallways, classrooms and used as visuals in newsletters.



Twenty-seven of the interventions used **Nutrition Education Reinforcement Items** (NERIs). These included items such as t-shirts, aprons, cookbooks, and notepads. Contractors used these to reinforce the nutrition education message and facilitate engagement in healthy eating and physical activity.

The ***Harvest of the Month* Workbooks** were designed by contractors to operationalize the contents of the educator newsletters, for example, holding cooking classes to test the recipes found in the newsletters. Educators can integrate the lessons into grade-based education standards for subjects including reading, math, and science. The workbooks also serve as a resource to implement a specific activity and include materials, like overhead transparencies, teaching points, and kid-friendly recipes. The grade-specific workbooks are available for 24 different fruits and vegetables for grades K-6 on the Los Angeles Collaborative for Healthy, Active Children website:
<http://publichealth.lacounty.gov/nut/lacollab/LACollabAboutUs.htm>

Partnerships were created to broaden the network of agencies and individuals promoting healthy eating and fruit and vegetable consumption and in some cases to acquire supplies and resources that could not be purchased with *Network* funds. Contractors reported partnering with supermarkets for events like grocery store tours, food banks to expose participants to additional sources of food, other contractors, and Regional Network Collaboratives for technical assistance. These relationships expand the net of nutrition education providers and help create a foundation that sustains nutrition education. Over a third of the contractors employed this strategy.

Cafeteria Connections offer strategies for educators, child nutrition staff, and students to utilize the cafeteria as a learning laboratory. This may involve having students name new kinds or varieties of fruits or vegetables served or offered; asking students to describe their favorite way of eating a particular type of fruit or vegetable (FV), or having youth advocates develop leadership skills by encouraging students to eat from the salad bar.

Contractors used other activities such as *Power Play!*, garden-based nutrition education, guest lectures in the classroom by farmers, nutrition advisory councils, goal setting, and modeling lessons for teachers. Several contractors used peer mentoring by pairing older students with younger ones and having the former teach the latter nutrition education over the course of several weeks. In addition to these common *Network* activities, contractors used non-*Network* nutrition education resources and activities like those provided by the Dairy Council and SPARK. A full list of activities is available in Appendix A.

Evaluation Methods

A total of 43 contractors conducted evaluation with 46 distinct groups of individuals. Two contractors conducted evaluations with both elementary and high school students, and another contractor evaluated interventions targeting both parents and students. Thirty-nine of the 46 contractors worked with youth. Seven contractors provided interventions to adults. A total of 8,619 individuals provided pre-test and post-test surveys from contractors representing six intervention channels (Table 2). Over 78% of all survey respondents received an intervention and the remainder, from 19 agencies, served as controls. The same proportion of males (46%) comprised the intervention and control groups. Most (59%) were 5-17 years old from the school channel, followed by adults (20%).

Channel of Impact/Outcome Evaluation Contractor	Number of Matched Surveys-		Total
	Intervention	Control	
School/District (20)	3,096	1,159	4,255
College/University (4)	692	379	1,071
County Office of Education (7)	1,265	135	1,400
First 5 Children and Families Commission (1)	50	0	50
Local Health Department (9)	1,454	162	1,616
University of California Cooperative Extension (1)	59	0	59
Local Food and Nutrition Education Projects (1)	168	0	168
Total (43)	6,784	1,835	8,619

Contractors delivered interventions in diverse sites. Table 3 shows the number of contractors that delivered an intervention for each type of site. Over 75% worked in a school setting. Churches, food stores, Head Start programs, and WIC programs were the setting for one intervention each. Two delivered interventions at other types of sites – an early childhood development center for adult students and parks for youth.

• School Day	40
• After School	21
• School Day and After School	6
• Adult Education & Job Training	3
• Community Centers	3
• Shelters	2
• Emergency Food Assistance Sites	2
• Public/Community Health Centers	2
• Other	2

Impact Measurement Tools

The primary outcome for the impact evaluation project was FV consumption. The secondary outcomes were factors that influence FV consumption; specifically those listed in Table 4. Contractors administered pre-tests before the beginning of intervention and post-tests after the last intervention session.

• Fruit and vegetable consumption	• Perceived parental consumption
• Access to fruit and vegetables	• Perceived peer behavior
• Attitudes and beliefs	• Preferences
• Knowledge	• Self-efficacy
• Outcome expectations	• Teacher encouragement

Table 5 shows the name of the tools used to measure behavior change and the number of contractors that used it. It includes measures of FV consumption and physical activity.

Table 5. Measures of fruit and vegetable consumption and physical activity for adults and childrenⁱ	# of contractors that used the tool (# with statistically significant results)
Measures of fruit and vegetable consumption for adults	
• <i>Food Behavior Checklist (FBC)</i> ⁴	9 (6)
• <i>Fruit and Vegetable Checklist (FVC)</i> ⁵ with instruction guide ⁶	2 (1)
Measures of fruit and vegetable consumption for elementary – middle school age students	
• <i>Day in the Life Questionnaire (DILQ)</i> ⁷	11 (3)
• Consumption questions from <i>School and Physical Activity Nutrition</i> project (SPAN) ⁸	12 (2)
• Consumption questions from the <i>California Health Kids Survey (CHKS)</i>	4 (0)
• Other consumption questions approved by the <i>Network</i>	5 (3)
Measures of fruit and vegetable consumption for elementary – high school age students	
• Consumption questions from the <i>Youth Risk Behavior Survey (YRBS)</i>	2 (2)

ⁱⁱ The number of contractors in Table 4 adds up to 45 because CSU Chico and Del Norte had multiple interventions in sites with varying ages.

Contractors measured change in 11 factors. Table 6 shows the name of the factors used to measure factors influencing fruit and vegetable consumption for adults and children.

Table 6: Measure of factors that influence fruit and vegetable consumption	
Factors that were measured (reference) for elementary – middle school age students	# of contractors that measured this outcome (# with statistically significant results)
• Perceived peer behavior ⁹	5 (1)
• Perceived parental consumption ⁹	4 (0)
• Socialization-encouragement ⁹	4 (0)
• Access ¹⁰	7 (1)
• Self Efficacy for Asking and Shopping ¹⁴	4 (1)
• Self Efficacy for Eating, Asking and Preparing Survey (Reynolds, et al., 2002 ¹¹	1 (1)
• Self Efficacy for Eating Fruits and Vegetables ¹²	1 (0)
• Preferences Survey ¹³	5 ⁱⁱ
• Outcome Expectations Survey ^{11,14}	3 (2)
• Knowledge Survey ^{11,15}	6 (4)
• General Knowledge Survey	2 (1)

Results

Behavioral Outcomes

About 40% of contractors showed a statistically significant improvement in total FVJ consumption. Broken down into change in individual components, 37% showed a statistically significant change for fruit, 27% for vegetables, and 11% for 100% juice.

Measures of Adult Consumption

The *Food Behavior Checklist (FBC)* and *Fruit and Vegetable Checklist (FVC)* were used to measure adult consumption of fruit and vegetables. These surveys were validated in English and Spanish with low-literacy, low-income populations in California, thereby making them a strong measure of consumption for this evaluation. There are two versions of each tool. One version measures consumption in cups and the other in servings by asking respondents “How many servings/cups of fruit/vegetables do you eat each day”. Table 7 shows the results by measure of consumption for intervention and comparison conditions. The data from contractors that used the same consumption measure were aggregated and analyzed together.

Table 7: Consumption in Cups and Servings from the *FBC* and

ⁱⁱ The five contractors measured a number of different produce items. Each contractor showed significant positive changes in some items.

FVC for adults					
FBC Servings	N	Pre-test	Post-test	Difference	p-value
Intervention					
Total FV Servings	246	4.16	4.50	0.34	0.019
Fruit Servings	248	2.86	3.02	0.16	0.104
Vegetable Servings	250	1.30	1.47	0.17	0.010
Control					
Total FV Servings	111	3.14	3.67	0.53	<0.001
Fruit Servings	111	2.21	2.61	0.40	0.001
Vegetable Servings	112	0.91	1.05	0.14	0.004
FBC & FVC Cups	N	Pre-test	Post-test	Difference	p-value
Intervention					
Total FV Cups	493	1.94	2.41	0.47	<0.001
Fruit Cups	511	0.98	1.23	0.25	<0.001
Vegetable Cups	521	0.94	1.15	0.21	<0.001
Control					
Total FV Cups	179	2.65	2.94	0.29	0.001
Fruit Cups	179	1.33	1.49	0.16	0.002
Vegetable Cups	179	1.32	1.46	0.14	0.010

Eleven contractors who tested a variety of interventions provided sound data using the *FBC* or *FVC* from 1,029 individuals. Results in Table 7 indicate that 246 individuals participating in different intervention groups using a “servings” *FBC* or *FVC* for evaluation showed an increase of 0.34 servings of fruit and vegetables. Another 493 respondents who participated in interventions using a “cups” *FBC* or *FVC* reported an increase of 0.47 cups of fruit and vegetables. Both results were statistically significant. The 290 individuals in the comparison groups received a limited set of nutrition education activities or were exposed to some nutrition education in settings, such as WIC offices.

Soda Consumption in Adults

Respondents (n=595) participating in various interventions included on the *FBC* and *FVC* reported a small decrease in soda consumption. Response categories, coded 1 - 4, ranged from “no” [do not drink regular soda] to “yes, [drink regular soda] everyday”. A pre-test mean of 2.31 and post-test mean of 2.21 indicate soda consumption slightly shifted from “often” consuming soda toward “sometimes” consuming soda. The results were statistically significant.

Measures of FV Consumption in Children

Contractors used one of three surveys to measure children’s consumption of fruits and vegetables, the *Day in the Life Questionnaire (DILQ)*, *California Healthy Kids Survey*

(CHKS), and *School and Physical Activity Nutrition* project (SPAN). Tables 8 and 9 show the results by survey.

Day in the Life Questionnaire

The *Day in the Life Questionnaire* is the measure of choice for use with younger students. Eleven contractors delivering distinct interventions collected data from 1,201 primarily 4th and 5th grade students with the *DILQ*. This tool measures the number of times they ate fruit, vegetables or juice “yesterday” on an open-ended scale. Children (n=1,121) receiving *Network* interventions reported eating fruit and vegetables an average of 1.17 times “yesterday” at pre-test and 1.58 times at post-test.

Table 8. Number of times students reported eating fruit and vegetables “yesterday” as measured with the <i>DILQ</i>					
	N	Pre-test	Post-test	Difference	p-value
Intervention					
Total Consumption	1121	1.17	1.58	0.41	<0.001
Fruit	1123	0.78	1.10	0.32	<0.001
Vegetable	1153	0.39	0.55	0.16	<0.001
Control					
Total Consumption	80	0.78	0.90	0.13	0.606
Fruit	80	0.46	0.65	0.19	0.125
Vegetable	80	0.31	0.25	-0.06	0.415

The aggregated results of the 11 contractors indicate there was a statistically significant increase of 0.41 times with more change in fruit than in vegetable consumption ($p < 0.001$). A group of 80 students in a control group showed no statistically significant differences between pre and post.

Measures of FV Consumption – California Healthy Kids Survey

Four contractors used the three questions from *California Healthy Kids Survey* to measure the number of times children, primarily 9-11 years, reported eating fruit/vegetables/juice during the past 24 hours using five response choices with a summary score ranging from 0 to 15. The 718 students who completed this set of consumption questions reported increasing their consumption of fruit, vegetables and juice (FVJ) from 6.93 to 6.99 times, a difference of 0.06 times. None of the changes was statistically significant.

Table 9. FVJ consumption among children, as measured by CHKS					
Survey	N	Pre-test	Post-test	Difference	p-value
Intervention					
<i>CHKS</i> Fruit	730	2.54	2.63	0.09	0.158
<i>CHKS</i> Vegetable	725	2.21	2.19	-0.02	0.872
<i>CHKS</i> Juice	733	2.18	2.14	-0.04	0.518
<i>CHKS</i> FVJ	718	6.93	6.99	0.06	0.717
Control					
<i>CHKS</i> Fruit	218	2.39	2.39	0.00	0.967
<i>CHKS</i> Vegetable	211	1.90	1.83	-0.07	0.490
<i>CHKS</i> Juice	217	1.48	1.45	-0.03	0.719
<i>CHKS</i> FVJ	209	5.75	5.64	-0.11	0.599

Measures of FV Consumption - School and Physical Activity Nutrition Survey

A group of 12 contractors measured consumption using three questions from the *School and Physical Activity Nutrition* project (SPAN). These measure the number of times the child reported eating FV or drinking juice “yesterday”. The score for each question could range from 0 to 3, and the summary score could range from 0-12. The change in fruit consumption for 866 elementary students increased from 1.71 times to 1.83 and it was significant (Table 10). The pretest score for overall FVJ increased from 4.56 to 4.71, a difference of 0.15 times, but it was not statistically significant.

Table 10. FVJ consumption among children, as measured by SPAN (times yesterday)					
Survey	N	Pre-test	Post-test	Difference	p-value
Intervention					
<i>SPAN</i> Fruit	866	1.71	1.83	0.12	0.010
<i>SPAN</i> Vegetable	860	1.41	1.43	0.02	0.558
<i>SPAN</i> Juice	869	1.44	1.44	0.00	0.939
<i>SPAN</i> FVJ	856	4.56	4.71	0.15	0.076
Control					
<i>SPAN</i> Fruit	214	1.70	1.86	0.16	0.060
<i>SPAN</i> Vegetable	213	1.27	1.39	0.12	0.145
<i>SPAN</i> Juice	214	1.38	1.36	-0.02	0.795
<i>SPAN</i> FVJ	213	4.36	4.62	0.26	0.132

Measures of FV Consumption – Youth Risk Behavior Survey

Two contractors used six questions from the Centers for Disease Control and Prevention’s (CDC) *Youth Risk Behavior Survey (YRBS)* to measure consumption among 149 students in grades 9-11. The scores could range from 0-6 for each item and 0-36 for the combined score. Consumption of vegetables was higher than fruit or juice with students reporting eating vegetables more than four times/day. Although change occurred in both groups, the change in fruit, vegetable, juice and total FVJ was statistically significant for all items (Table 11) for youth taking part in interventions, but only for fruit and total FVJ for the control group. It was not significant for vegetable or 100% juice consumption for control group respondents.

Table 11. FVJ consumption among children, as measured by CDC YRBS (times per day)					
Survey	N	Pre-test	Post-test	Difference	p-value
Intervention					
<i>YRBS Fruit</i>	149	1.85	2.21	0.36	0.015
<i>YRBS Vegetable</i>	149	3.82	4.38	0.56	0.022
<i>YRBS Juice</i>	149	1.59	2.01	0.42	0.013
<i>YRBS FVJ</i>	149	7.26	8.60	1.34	0.002
Control					
<i>YRBS Fruit</i>	45	2.18	2.96	0.78	0.005
<i>YRBS Vegetable</i>	45	4.09	4.86	0.77	0.118
<i>YRBS Juice</i>	45	2.18	2.31	0.13	0.607
<i>YRBS FVJ</i>	45	8.44	10.16	1.72	0.024

Physical Activity

Six contractors measured physical activity among children with two questions from the *Nutrition Education Survey (NES)*: “Over the past 7 days, on how many days were you physically active for a total of at least 60 Uminutes per day?” and “Over a typical or usual week, on how many days are you physically active for a total of at least 60 minutes per day?” Response categories ranged from 0 to 7 days and the summary score ranged from 0 to 14. Table 12 shows 647 respondents reported being physically active for 60 minutes for 9.38 times at pre-test. The mean increased to 9.94 at post-test. The change (0.56) was significant.

Table 12. Changes reported in physical activity by children					
Survey	N	Pre-test	Post-test	Difference	p-value
Physical Activity -2-item	647	9.38	9.94	0.56	<0.001

Cognitive, Social and Environmental Outcomes

The interventions implemented by the contractors targeted outcomes found in the inner circles of the social ecological model (SEM), the personal and interpersonal realms. Contractors chose the sets of questions that matched their intervention and administered a survey to capture change in those areas. The data from contractors that used the same set of questions were aggregated and analyzed together.

Cognitive Outcomes

Cognitive outcomes relate to knowledge, attitudes, awareness and beliefs about a behavior. These included outcome expectations, self-efficacy, and preferences.

Table 13 shows the results for several contractors with the exception of preferences which are displayed in Appendix B.ⁱⁱⁱ

"Oh my goodness! My kindergarteners had so much fun with [Harvest of the Month] today. They were interested from the very beginning of the process. While I was preparing...they were doing their own hands-on observation on a stalk of asparagus...some had never seen it before. During the tasting, more than 2/3 of my class liked it..."

Kindergarten teacher

Survey	N	Pre-test	Post-test	Difference	p-value
Knowledge 7-item	100	4.51	4.81	0.30	0.038
Knowledge 5-item	524	2.29	3.02	0.73	0.000
Outcome Expectations	316	17.20	17.78	0.58	0.001
Self Efficacy 8-item (Asking, Shopping)	524	30.41	31.00	0.59	0.123
Self Efficacy 13-item (eating)	80	46.25	44.30	-1.95	0.230
Self Efficacy 17-item (Eating, Asking, Preparing)	117	39.69	42.05	2.36	0.001

ⁱⁱⁱ It is worth noting larger sample sizes allow smaller differences in two means to differ in a statistically significant way. Very large sample sizes will produce significance even when the differences are not qualitatively meaningful. Samples that are too small may fail to detect a difference of statistical significance. This should be considered when interpreting results.

Knowledge

The scores for the five knowledge questions ranged from zero (all incorrect answers) to five (all correct). The score of 3.02 at post-test means the respondents, on average, missed two of the questions. The majority failed to answer correctly: “Fruits and vegetables that are high in Vitamin A are [Yellow-orange and dark green] in color” and “Almost all fruits and vegetables contain a lot vitamins and [fiber]”. The overall increase in knowledge (0.73) was significant. Two contractor measured change in knowledge using two different sets of seven items. Results were significant for both of them.

Outcome Expectations

Change in outcome expectations was assessed by three contractors. The 7-item instrument validated had three response categories: “disagree, not sure, agree” and the summary scale ranged from 7 to 21. The increase of 0.58 to 17.28 at post-test was significant. The question with the lowest average score was “I will get sick more often if I don’t eat fruit and vegetables.”

Self-efficacy for asking and shopping

Four contractors measured self-efficacy for asking and shopping for fruit and vegetables using an eight-item scale. The five response categories ranged from “I disagree very much” to “I agree very much” and scores ranged from 8 to 40. The baseline score for 524 youth increased 0.59 points to 31.00 at post-test. This corresponded to the “agree” category but the difference was not significant for the intervention groups. Two of the four had a comparison group and one of the comparison groups showed a statistically significant increase.

Self-efficacy for eating fruits and vegetables

One contractor used a 13-item tool to assess change in self-efficacy for eating fruits and vegetables. The five response categories ranged from “I disagree very much” to “I agree very much” and scores could range from 13 to 65. The decrease was not statistically significant which means the change cannot be attributed to the intervention.

Self-efficacy for eating asking and preparing fruit and vegetables

One contractor measured change in self-efficacy for eating, asking and preparing fruit and vegetables with questions such as “how sure are you that you can eat fruits I like at breakfast?”. The 17-items had three response categories: not sure, I think so, very sure yielding scores that could range from 17 to 51. The increase from 2.36 point increase from pre-test to post-test was statistically significant.

Social outcomes

Social outcomes included socialization-encouragement, perceived peer behavior, and perceived adult behaviors. These are societal attitudes and norms that influence behavior (Table 14). These may be modeled by the adults in a child's life, for example teachers and parents, or by their peers.

Survey	N	Pre-test	Post-test	Difference	p-value
Perceived Peer Behavior 6-item	531	5.63	5.60	-0.03	0.875
Socialization-Encouragement 8-item (range 0-16)	373	11.88	12.24	0.36	0.074
Perceived Parent Consumption 2-item (range 0-8)	376	5.22	5.43	0.21	0.087

Perceived Peer Behavior

The six perceived peer behavior questions concerned the respondent's perception of what their "friends" and their "best friend" do and like to do regarding consumption of fruit and vegetables. In response to questions like: "do most of your friends like to eat fruit?" the respondents could answer "yes"=2, "no"=1, or "I don't know"=0. There were similar questions about what their best friends like to do or currently do in regard to fruit and vegetable consumption. Scores ranged from 0 to 12. A score less than six would mean respondents did not know if their friends like to eat or eat fruit or vegetables and the means scores in this sample indicate that was the case with the 531 students who responded to the six questions. A score of six would mean they did not like or did not eat fruit or vegetables. In a further analysis that excludes those who "don't know" 423 respondents reported pre-test and post-test means less than seven meaning their friends do not like or do not eat fruit and vegetables. The decrease in the perceived peer behavior score was not statistically significant, which means it was not due to the intervention but likely a random change. The questions that had more "no" responses were related to the consumption of vegetables ("Do most of your friends like to eat...?" "Do they eat...?" and "Does your best friend eat vegetables...?").

Socialization-Encouragement

The eight items for socialization-encouragement captured the messages teachers gave students about fruit and vegetables including: fruit/vegetables are good for them, are healthy, taste good, and to eat them every day (yes=2/no=1/I don't know=0). The scores ranged from 0 to 16. The 0.31 increase to 12.24 at post-test means students said yes to more than six questions. After excluding those who reported they "do not know" the lowest scores were reported for two questions: "Does your teacher tell you vegetables taste good?" and "Does your teacher tell you to eat vegetables every day?"

Perceived Parent Consumption

Perceived parent consumption was measured with two items soliciting children’s perception of their parents’ consumption of fruit and vegetables. They were asked to indicate how often their parents eat fruit/vegetables with five response categories ranging from “never to every day”. An “I don’t know” category was coded as 0 so responses ranged from 2 to 8. The pre-test mean increased from 5.22 to 5.43 at post-test but was significant.

Environmental Outcomes

Access

Access, an environmental outcome, was measured to help explain change or lack thereof. The two access questions were: “At your home do you have fruits/vegetables to eat?” The four response categories ranged from “never to always,” with an “I don’t know” option. This led to scores from 0 to 6 and the increase of 0.16 to 5.20 at post-test was statistically significant (Table 15). At pre-test 0.2% of all respondents said they never have fruit at home compared to 65% who said always (not shown). These numbers were similar for vegetables, 1.6% and 64% respectively. The remaining individuals, about 1/3 for each, had these items available “sometimes.” Contractors did not actively seek to increase access, since it is not a USDA-allowable activity, so it is hypothesized the nutrition education outside the home, e.g., the family newsletters, may have influenced shopping behavior.

Survey	N	Pre-test	Post-test	Difference	p-value
Access -2-item	660	5.04	5.20	0.16	0.001

Key strategies of nutrition education

Taste tests, cooking classes, educator and family newsletters, and garden-based nutrition education are key elements within the nutrition education contractors provide to youth. These strategies build skills, provide methods to integrate nutrition education into classroom curricula, and provide opportunities for families, communities, and school staff to work synergistically. Table 16 shows that using a given strategy in and of itself did not lead to significant change in FVJ consumption. However, the strategies below were not conducted as isolated activities, but were done as part of a multi-component intervention.

Table 16: Number of contractors with statistically significant and non-significant* change in FVJ by strategy used		
Strategy Used	Significant change	No significant change
Taste Tests (n=39)	15	24
Educator Newsletters (n=26)	8	18
Cooking Classes (n=38)	17	21
Family Newsletters (n=25)	11	14
Garden-Based Nutrition Education (n=13)	3	10

*Few contractors had a sample sizes large enough to detect small significant changes.

Diversity of Nutrition Education Activities

Contractors implemented a diverse set and number of activities. Table 17 shows the results for FY 08 and FY 09. By comparing the number of contractors who had significant results for change in FVJ with those that did not show significant change, it can be seen that the results are not strikingly different for any set of activities. FY 09, 33 of contractors did a taste test AND had a food preparation activity. Fewer than half showed a significant change. The results are not very different after educator newsletters are added, with 19 using all three and only 7 demonstrating a significant difference. This similarity persists even after family newsletters and gardens are added, but the total number of contractors who did each combination of those activities decreased to 15 and 6 respectively. So, when considering these 5 key strategies, only 6 of the 43 contractors implemented all 5, and none of them reported a statistically significant difference. Findings suggest there is no single combination of elements that consistently produce positive outcomes. It is important to note that contractors were doing other activities not noted here. In FFY 08-09, quantifiable information about time spent doing these activities was not available; however this will be gathered in the upcoming year.

Table 17: Contractors with statistically significant and non-significant* change in FVJ by combination of interventions used								
Combination of nutrition education activities →	Taste Tests		Taste Tests		Taste Tests		Taste Tests	
	Cooking Class		Cooking Class		Cooking Class		Cooking Class	
	Educator News		Educator News		Educator News			
	Family News		Family News					
	Garden Nut Ed							
Statistical significance ↓	FY 08	FY 09						
	Significant	6	0	9	6	10	7	13
Not Significant	6	6	10	9	12	12	13	19
Total (cumulative)	12	6	19	15	22	19	26	33

*A number of contractors had sample sizes to insufficient to identify significant change.

Table 18 shows the average number of minutes contractors reported spending per session to provide nutrition education. The results are stratified by number of sessions and by change in FVJ, as significant and not significant. The average number of minutes per session delivered to children was very similar for those who reported significant change and those who did not. The same is true for adults. The literature indicates that 10-15 hours of health education are needed to produce a large effect in knowledge, and a minimum of 50 hours are needed to produce a change in behavior.^{16, 17} Because few contractors could reach such an intense level of nutrition education, this might help explain why more did not see significant results. This finding helps the *Network* refine our guidelines for impact evaluation interventions going forward.

Table 18: Contractors with statistically significant and non-significant* change in FVJ by average number of minutes stratified by number of sessions			
		Average Time per Session	
Children		Significant	Not significant
	1 Session		48.13
	2-4 Sessions	75.00	90.00
	5-9 Sessions	52.00	44.38
	10-15 Sessions	42.33	48.75
	16+ Sessions	30.00	31.00
Adult			
	1 Session		
	2-4 Sessions		
	5-9 Sessions	80.00	72.50
	10-15 Sessions		120.00
	16+ Sessions		

*Few contractors had a sample sizes large enough to detect small significant changes.

Contextual Factors that may Influence Consumption

In FFY 08 an online *Checklist for School Nutrition Program Planning* (Appendix D) was pilot tested to determine if schools had or did not have 23 elements that might influence fruit and vegetable consumption. The *Checklist* was administered to help describe the environment in which nutrition education takes place and not to measure impact since these are not areas contractors are authorized to change with *Network* funding.

Contractors collected data from 22 schools in spring of FFY 08, 122 schools in fall of FFY 09 and 112 in winter of FFY 10, totaling 256 schools. Figure 2 shows more than 50% of the contractors had 13 elements in all three years. This lack of variance makes it difficult to differentiate change in consumption based on these systems and environmental elements in and of themselves.

Figure 2: Contractors who reported basic elements being present in the school in FY 08 (n=22), FY 09 (n=112) and FY 10 (n=104)

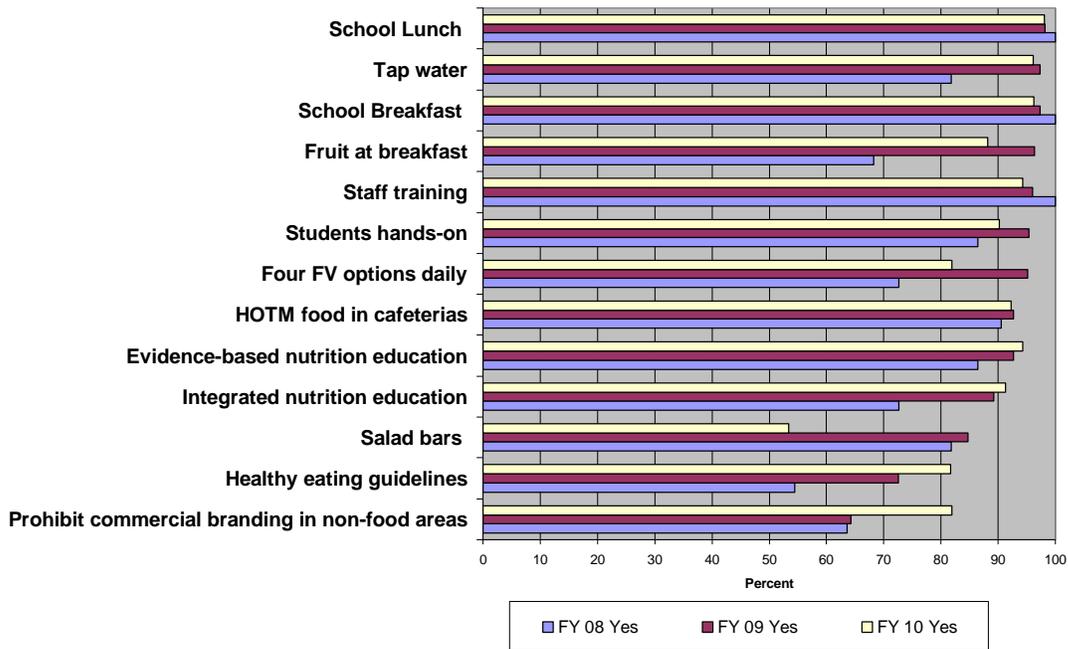
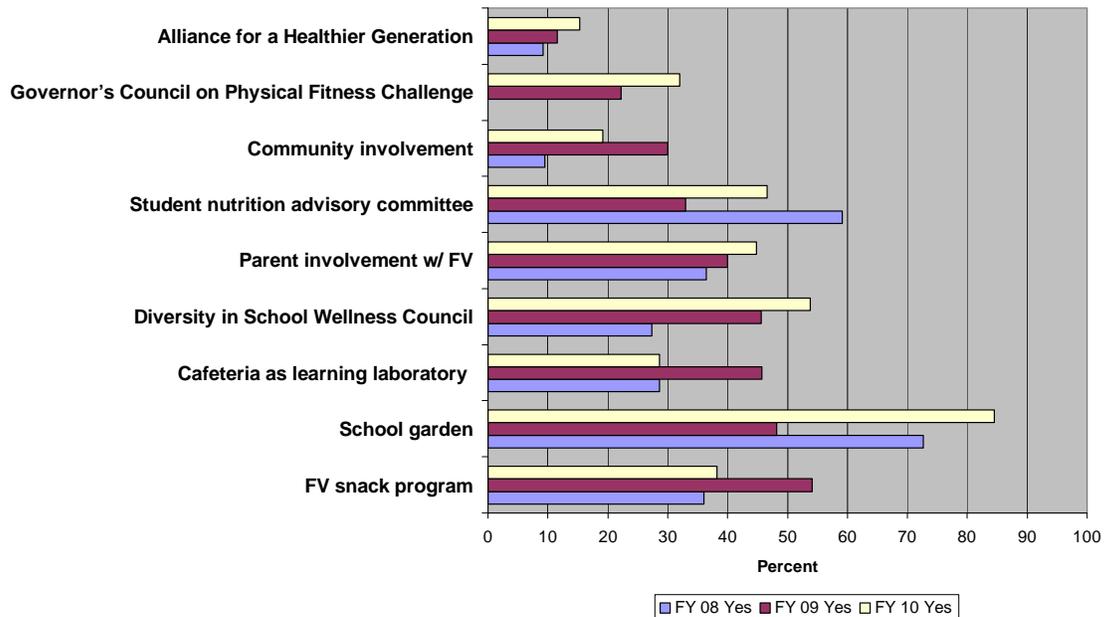


Figure 3 shows the elements present in less than 50% of the schools in all three years. The questions concerning the Governor’s Council on Physical Fitness Challenge were not included on the checklist in 2007-08.

Figure 3: Contractors who reported newer norms being present in FY 08 (n=22), FY 09 (n=112) and FY 10 (n=104)



Challenges and Recommendations

The following challenges and recommendations arise from the evaluation methods and results. They may motivate contractors to shift fiscal resources from one program area to another to focus on effective efforts and then diffuse these to other populations. This evaluation will strategically position fiscal resources for local contractors and decrease inefficiencies. This shift in fiscal resources will not require more money from the *Network* or the California Department of Public Health.

Challenge: What is the best mix of interventions?

Contractors implement a wide variety of nutrition education activities in varied dosages. The results above, especially tables 17 and 18, show it is difficult to attribute change to given set of activities or that more activities are associated with better results. Without this information it is difficult to recommend specific activities or sets of activities to contractors.

Recommendation

The literature indicates that multi-component interventions are the most effective.^{18, 19} We can surmise this is due, in part, to the synergy created when they build upon one another. For this reason, the *Network* encourages contractors to use varied interventions. Going forward, contractors could strengthen nutrition education by standardizing existing interventions and collaborating on evaluations. This began to happen in the Los Angeles region in 2009 when eight contractors that belong to the Healthy Valley group standardized a 5-session intervention for adults and used the *Food Behavior Checklist* to assess change. Contractors in other regions have expressed interest in collaborating with colleagues in their region on this evaluation. Collaborations among contractors in the same region would facilitate face-to-face meetings and resource sharing. They could draw on existing resources for standardized materials such as *Power Play!* and curricula that the *Network* has reviewed and recommended to contractors. In addition, qualitative research is scheduled for fall FFY 2011 that will include interviews with teachers on strategies to improve the execution of *HOTM* in the classroom from which best practices can be developed to share with contractors.

Challenge: Timing for Evaluation

During past evaluations contractors have not administered the pre-test survey at the very beginning of the nutrition education because their contracts begin in October. This has resulted in part from evaluation plans being submitted or approved after the education began.

Recommendation

To overcome this, the *Network* will require contractors to submit an impact evaluation plan with their impact evaluation reports beginning in FY 2010. These will be due July 31 of each year thereby allowing teleconferences to take place as early as August.

Challenge: Measuring changes other than FV

In the years prior to this report contractors have expressed concern about the match between the intervention and the survey, partly because the surveys addressed FVJ and related factors. However, nutrition education activities implemented by LIAs address more than fruit and vegetable consumption as one would expect from educators using My Pyramid and teaching the dietary guidelines, one of USDA's requirements for contractors. Tools that only measure FVJ miss change occurring in other behaviors targeted by nutrition educators.

Recommendation

To address this challenge, in October 2009, the *Network* asked contractors working with students to use new survey tools to improve the match between intervention and measures. The *Network Youth Survey* is required of contractors working with 3rd-8th graders and the *Network High School Survey* is required of contractors working with high school students. The standardized surveys will provide data not only for fruit and vegetables but also other healthy foods and unhealthy foods. The standardized surveys

for youth will also yield a larger number of surveys and more power to generalize findings. The requirement for a standardized youth survey complements the *Network's* requirement for contractors working with adults to use the *Fruit and Vegetable Checklist* or *Food Behavior Checklist*.

Challenge: Sufficient Sample Sizes

In the years prior to this report, contractors were required to collect 50 matched pairs of surveys. In FY 2010, *Network* staff conducted power calculations for the most frequently used FV consumption surveys. These calculations indicated that much larger sample sizes are necessary to detect small changes in FV consumption. This is problematic because, as in this report, the *Network* wants to look at both the collective and individual successes of contractors by comparing those with significant results to those with non-significant results. When many of our contractors have insufficient sample sizes to detect small changes, our data looks mediocre. *Network* interventions may be having positive influence we cannot detect.

Recommendation

In FY 2011, the *Network* will explain the sample size issue to contractors and encourage them to increase the sample sizes for both their intervention and control groups. With the *Network Youth Survey*, for example, by increasing the sample size to 100 an individual contractor would be able to detect a 0.7 serving increase from pre- to post-test. By increasing the sample to 200, the contractor would be able to detect a 0.5 serving increase. With this increased rigor, both the *Network* state staff and individual contractors can learn more about the effectiveness of their interventions and refine them accordingly.

Challenge: Duration of Nutrition Education is Insufficient

As mentioned above, research indicates a minimum of 50 hours of health education are needed to produce a change in behavior. In FY 2009, contractors were only averaging a reported 4 to 12 total hours of nutrition education.

Recommendation

In FY 2011, the *Network* will discuss this issue with contractors, encouraging contractors to increase the duration of their nutrition education interventions. A revised time log system for FY 2011 will enable contractors to better track actual contact time spent with participants. Fifty hours, or more than an hour each week throughout an entire school year, may not be attainable for most contractors. We recognize this, and will support any increase in nutrition education, as it would be expected to produce better results.

Conclusion

Contractors have developed a high level of evaluation capacity since FY 04, when the first data were collected for the impact evaluation. This high level of capacity led the contractors of the Healthy Valley in southern California to create a standardized intervention without encouragement from *Network* staff. This high level of capacity, evaluation related skills, knowledge and attitudes that support it inspire the confidence needed for other contractors to collaborate and evaluate. A culture of evaluation has developed. Evaluation terms are now part of their vocabulary and evaluation is part of their thinking.

The evaluation capacity of *Network* staff has also increased. More of the REU staff members have skills, knowledge and attitudes that support the evaluation. New protocols have evolved that systematize the evaluation more than it has been in the past. Now there is a standardized Scope of Work impact evaluation objective, a standardized survey, matching data entry templates, standard reporting and planning forms. All of these support ongoing evaluation.

The quantitative results of the evaluation have been mixed. The strong findings, i.e., statistically significant change in FVJ, provided evidence that the *Network*-funded contractors are changing lives. Weak findings have prompted contractors to refine and improve interventions. Nevertheless, it must be recognized that the mixed results may reflect individual school and school district policies and resources. Use of evaluation findings in this way is a strong outcome of evaluation.

Qualitative results have consistently shown contractors are making a difference. One mother's story captures the impact the *Network* funding has had on one child and her family.

"My daughter is a fifth grade student in the Newhall School District. Over the past few months she has really expressed concern about what she eats and drinks due to her education in the nutrition activity coordinator (NAC) program. She has shared her experiences with the entire family and encourages all of us to eat healthier at home. This program has had a huge impact on my daughter's view of her body and how to stay healthy. This has been a positive way for young children to make better eating choices without fear of eating disorders or a lack of self esteem about their changing bodies. I am so grateful for this program. As a family, we are eating healthier and discussing exercise and vitamins as essential to overall good health and long living. As a parent, I could not have battled McDonalds and all of the other temptations that have contributed to many overweight and unhealthy children in America and my child possibly becoming one of those kids, but now I have an ally through the NAC program. I am a grateful parent, and I hope this program continues to thrive in our schools and possibly save the health of our children by teaching them fun, new healthy choices in their diets."

It is this type of story that inspires contractors. It motivates *Network* staff in Sacramento. It serves as a reminder that the work the *Network* does is important and makes a difference. It is a story that brings life and understanding to the important and guiding numbers from the quantitative portion. It is the kind of story that gets told over and over and it exemplifies the spirit of the *Network*. It is a good story.

References

- ¹ Institute of Medicine. Progress in preventing childhood obesity : how do we measure up? 2007. The National Academies Press, Washington, DC.
- ² Office of Analysis, Nutrition and Evaluation, 2006. Food Stamp Nutrition Education Systems Review Final Report. Abt Associates Inc. Bethesda, MD. Available at: <http://www.fns.usda.gov/oane/MENU/Published/NutritionEducation/Files/FSNESsystemsReview.pdf#xml=http://65.216.150.153/texis/search/pdfhi.txt?query=systems+review&pr=FNS&order=r&cq=&id=4592d04e11>.
- ³ California Department of Public Health. SAAR data, Unpublished 2009
- ⁴ Townsend MS, Kaiser LL, Allen LH, Joy AB, Murphy SP. Selecting Items for A Food Behavior Checklist for a Limited Resource Audience. *Journal of Nutrition Education and Behavior*. 2003; 35:69-82
- ⁵ Townsend MS, Kaiser LL. University of California Fruit and Vegetable Inventory. University of California Cooperative Extension, 2006. Available at <http://townsendlab.ucdavis.edu>. Accessed March 12, 2007
- ⁶ Townsend MS, Leaven L, Davidson C, Kaiser LL. Administering the Fruit and Vegetable Inventory: Instruction Guide. University of California Cooperative Extension, 2007. (Accompanies Cat II #672.) Available at <http://townsendlab.ucdavis.edu>. Accessed April 26, 2007.
- ⁷ Edmunds LD, Ziebland S. Development and validation of the Day in the Life Questionnaire (DILQ) as a measure of fruit and vegetable questionnaire for 7-9 year olds. *Health Educ Res*. 2002 Apr;17(2):211-20.
- ⁸ Hoelscher DM, Day RS, Kelder SH, Ward JL. Reproducibility and validity of the secondary level school-based nutrition monitoring student questionnaire. *J. Am Dietetic Association*: 2003;103(2):186-194.
- ⁹ Vereecken AC, Damme WV, Maes L. Measuring Attitudes, Self-Efficacy, and Social and Environmental Influences on Fruit and Vegetable Consumption of 11- and 12-Year-Old Children: Reliability and Validity. *J. Am Dietetic Association*. 2005; 105(2) 257-261.
- ¹⁰ Hearn DH, Baranowski T, Baranowski J, Doyle C, Smith M, Lin LS, Resnicow K. Environmental Influences on Dietary Behavior Among Children: Availability and Accessibility of Fruits and Vegetables Enable Consumption. *Journal of Health Education* 1998; 29(1): 26-32.
- ¹¹ Reynolds K, Yaroch A, et al. Testing mediating variables in a school-based nutrition intervention program. *Health Psychol* 2002; 21(1): 51-60.
- ¹² Baranowski T, Davis M, Resnicow K, Baranowski J, Doyle C, Smith M, Lin L, Wang DT. Gimme 5 fruit and vegetables for fun and health: Outcome Evaluation. *Health Education & Behavior* 2000; 27(1):96-111.
- ¹³ Domel SB, Baranowski T, Davis H, Leonard SB, Riley P, Baranowski J: Measuring fruit and vegetable preferences among fourth and fifth grade students. *Prev Med* 22(6):866-879, 1993.

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- ¹⁴ Baranowski T, Davis M, Resnicow K, Baranowski J, Doyle C, Smith M, Lin L, Wang DT. Gimme 5 fruit and vegetables for fun and health: Outcome Evaluation. *Health Education & Behavior* 2000; 27(1):96-111.
- ¹⁵ Hoelscher D, Day RS, Lee ES, Frankowski RF, Kelder SH, Ward JL, Scheurer ME. Measuring the prevalence of overweight in Texas school children. *American Journal of Public Health* 2004; 94: 1002-1008.
- ¹⁶ Bergen D. Authentic performance assessment. *Childhood Education* 1993; 70: 99-101.
- ¹⁷ Connell DB, Turner RR, Manson EF. Summary findings of the School Health Education Evaluation: health promotion effectiveness, implementation and cost. *Journal of School Health* 1985; 55: 316-321.
- ¹⁸ Perry CL, et al. A randomized school trial of environmental strategies to encourage fruit and vegetable consumption among children. *Health Education and Behavior* 2004; 41: 165-176.
- ¹⁹ Perez-Rodrigo C, Aranceta J. Nutrition education in schools: experiences and challenges. *European Journal of Clinical Nutrition* 2003; 57, Suppl 1: s82-s85.

Appendix A: Nutrition Education Activities Implemented by Contractors

	Total Contractors Using Strategy		Total Contractors Using Strategy
Taste Tests	38	Guest Lectures	11
Food Preparation Activities	37	Nutrition Advisory Councils	5
Integrated Nutrition Education	28	SPARK Activities	5
Trainings	28	Peer-led Activities	4
Educator Newsletters	25	Field Trips	3
Family Newsletters	24	PSAs	4
Poster <i>HOTM</i>	27	SPARK	1
NERI	28	Poster Other	1
<i>HOTM</i> workbooks	17	Flyer	1
Partnerships	16	Special Events	1
Cafeteria Connections	12	Nutrition Education Calendars	1
<i>PowerPlay!</i>	12	Model Lessons for Teachers	1
Garden Nutrition Education	12	Cafeteria Display	1
		Handouts	1

Other activities implemented by only one contractor included resource tables, activity sheets, books, worksite newsletters, professional development, training academy, 5 A Day, CATCH nutrition curriculum, adult school, theatre production, healthy vending, and the California Fit Business Kit.

**Appendix B: Preferences Results:
Produce items featured, Pre-test and Post-test Means, and p-value of Difference
Between Pre and Post-test**

Item	N	Pre-test	Post-test	Difference	p-value	Number of Contractors Featuring Item
<i>HOTM Fall Produce</i>						
Kiwifruit	56	3.89	3.75	-0.14	0.073	1
Pear	48	2.13	2.4	0.27	0.046	1
Persimmon	398	1.56	2.59	1.03	0.000	4
Winter Squash	213	2.58	2.99	0.41	0.000	1
<i>HOTM Winter Produce</i>						
Broccoli	49	2.06	2.02	-0.04	0.719	1
Cabbage	368	2.75	3.12	0.37	0.000	2
Mandarins	589	2.39	2.62	0.23	0.000	2
Orange	49	2.78	2.86	0.08	0.420	1
Sweet Potatoes	425	2.87	3.14	0.27	0.000	3
Tangerines	80	3.33	3.28	-0.05	0.728	1
<i>HOTM Spring Produce</i>						
Asparagus	879	1.88	2.17	0.29	0.000	4
Avocado	213	2.61	3.00	0.39	0.000	1
Carrots	646	2.60	2.58	-0.02	0.495	3
Dates	49	0.55	0.76	0.21	0.262	1
Dried Fruit	213	2.89	3.31	0.42	0.000	1
Dried Plums	588	1.54	1.86	0.32	0.000	2
Peas	611	1.40	1.86	0.46	0.000	2
Raisins	49	1.63	1.67	0.04	0.674	1
Spinach	474	2.65	2.94	0.29	0.000	4
Strawberries	575	2.81	2.81	0.00	0.639	2
<i>HOTM Summer Produce</i>						
Figs	48	0.73	1.17	0.44	0.002	1
Grapes	49	2.98	2.84	-0.14	0.070	1
Green Beans	211	2.98	3.15	0.17	0.006	2
Melons	292	3.64	3.73	0.09	0.029	3
Peaches	80	3.68	3.61	-0.07	0.449	1
Salad Greens	106	2.69	2.74	0.05	0.618	2
<i>Non-HOTM Produce</i>						
Banana	48	2.50	2.44	-0.06	0.497	1
Celery	49	1.78	1.63	-0.15	0.197	1
Cherries	526	2.66	2.74	0.08	0.005	1
Jicama	48	1.56	1.65	0.09	0.522	1
Pumpkin	49	1.59	1.61	0.02	0.871	1

Appendix C: Selected Survey Items with Codes

Perceived Peer Behavior (range 0-12)

	Yes	No	I don't know
1. Do most of your friends like to eat fruit?	2 0	1 0	0 0
2. Do most of your friends eat fruit every day?	2 0	1 0	0 0
3. Does your best friend eat fruit everyday?	2 0	1 0	0 0
4. Do most of your friends like to eat vegetables?	2 0	1 0	0 0
5. Do most of your friends eat vegetables every day?	2 0	1 0	0 0
6. Does your best friend eat vegetables everyday?	2 0	1 0	0 0

Perceived Parental Consumption (range 0 – 8)

	Never	A few days a week	Most days a week	Every day	I don't know
1. How often do your parents eat fruit?	1 0	2 0	3 0	4 0	0 0
2. How often do your parents eat vegetables?	1 0	2 0	3 0	4 0	0 0

Self-efficacy for Asking and Shopping (range 8-40)

	I disagree very much	I disagree a little	I am not sure	I agree a little	I agree very much
How sure are you that you can:					
1. write my favorite fruit or vegetable on the family's shopping list	1 0	2 0	3 0	4 0	5 0
2. ask someone in my family to buy my favorite fruit or vegetable	1 0	2 0	3 0	4 0	5 0
3. go shopping with my family for my favorite fruit or vegetable	1 0	2 0	3 0	4 0	5 0
4. pick out my favorite fruit or vegetable at the store and put it in the shopping basket	1 0	2 0	3 0	4 0	5 0
5. ask someone in my family to make my favorite vegetable dish for dinner	1 0	2 0	3 0	4 0	5 0
6. ask someone in my family to serve my favorite fruit at dinner	1 0	2 0	3 0	4 0	5 0
7. ask someone in my family to have fruits and fruit juices out where I can reach them	1 0	2 0	3 0	4 0	5 0
8. ask someone in my family to have vegetables cut up out where I can reach them	1 0	2 0	3 0	4 0	5 0

Outcome Expectations (range 7-21)

	Disagree	Not Sure	Agree
1. I will have more energy for playing (sports, recess or after school) if I eat fruits and vegetables.	1 O	2 O	3 O
2. I will get sick more often if I don't eat fruits and vegetables.	1 O	2 O	3 O
3. Eating fruits and vegetables will help me grow.	1 O	2 O	3 O
4. I will have healthier skin if I eat fruits and vegetables.	1 O	2 O	3 O
5. If I eat fruits and vegetables, I will have stronger eyes.	1 O	2 O	3 O
6. If I eat fruits or vegetables at breakfast, I will be able to think better in class.	1 O	2 O	3 O
7. Eating fruits and vegetables will keep me from getting cavities.	1 O	2 O	3 O

Socialization-encouragement (range 0-16)

Does your teacher tell you...	Yes	No	I don't know
1. ... that vegetables are good for you	2 0	1 0	0 0
2. ... that vegetables are healthy	2 0	1 0	0 0
3. ...that vegetables taste good	2 0	1 0	0 0
4. ...to eat vegetables every day	2 0	1 0	0 0
5. ...that fruit is good for you	2 0	1 0	0 0
6. ...that fruit is healthy	2 0	1 0	0 0
7. ...that fruit tastes good	2 0	1 0	0 0
8. ...to eat fruit every day	2 0	1 0	0 0

Access (range 0-6)

1. At your home do you have fruits to eat?
 - 1 0 Never
 - 2 0 Sometimes
 - 3 0 Always
 - 0 0 I don't know

2. At your home do you have vegetables to eat?
 - 1 0 Never
 - 2 0 Sometimes
 - 3 0 Always
 - 0 0 I don't know

Consumption: School Physical Activity and Nutrition Project (SPAN)

1. Yesterday, did you eat any vegetables?

Vegetables are all cooked and uncooked vegetables; salads; and boiled, baked and mashed potatoes.

Do not count French fries or chips.

- 0 No, I didn't eat any vegetables yesterday.
1 Yes, I ate vegetables 1 time yesterday.
2 Yes, I ate vegetables 2 times yesterday.
3 Yes, I ate vegetables 3 or more times yesterday.

2. Yesterday, did you eat fruit?

Do not count fruit juice.

- 0 No, I didn't eat any fruit yesterday.
1 Yes, I ate fruit 1 time yesterday.
2 Yes, I ate fruit 2 times yesterday.
3 Yes, I ate fruit 3 or more times yesterday.

3. Yesterday, did you drink fruit juice?

Fruit juice is a 100% juice drink like orange juice, apple juice, or grape juice.

Do not count punch, Kool-Aid®, sports drinks and other fruit-flavored drinks.

- 0 No, I didn't drink any fruit juice yesterday.
1 Yes, I drank fruit juice 1 time yesterday.
2 Yes, I drank fruit juice 2 times yesterday.
3 Yes, I drank fruit juice 3 or more times yesterday.

Consumption questions from the YRBS

1. During the past 7 days, how many times did you drink **100% fruit juices** such as orange juice, apple juice, or grape juice? (Do **not** count punch, Kool-Aid, sports drinks, or other fruit-flavored drinks.)
 - A I did not drink 100% fruit juice during the past 7 days
 - B 1 to 3 times during the past 7 days
 - C 4 to 6 times during the past 7 days
 - D 1 time per day
 - E 2 times per day
 - F 3 times per day
 - G 4 or more times per day

2. During the past 7 days, how many times did you eat **fruit**? (Do **not** count fruit juice.)
 - A I did not eat fruit during the past 7 days
 - B 1 to 3 times during the past 7 days
 - C 4 to 6 times during the past 7 days
 - D 1 time per day
 - E 2 times per day
 - F 3 times per day
 - G 4 or more times per day

3. During the past 7 days, how many times did you eat **green salad**?
 - A I did not eat green salad during the past 7 days
 - B 1 to 3 times during the past 7 days
 - C 4 to 6 times during the past 7 days
 - D 1 time per day
 - E 2 times per day
 - F 3 times per day
 - G 4 or more times per day

4. During the past 7 days, how many times did you eat **potatoes**? (Do **not** count french fries, fried potatoes, or potato chips.)
 - A I did not eat potatoes during the past 7 days
 - B 1 to 3 times during the past 7 days
 - C 4 to 6 times during the past 7 days
 - D 1 time per day
 - E 2 times per day
 - F 3 times per day
 - G 4 or more times per day

5. During the past 7 days, how many times did you eat **carrots**?
- A I did not eat carrots during the past 7 days
 - B 1 to 3 times during the past 7 days
 - C 4 to 6 times during the past 7 days
 - D 1 time per day
 - E 2 times per day
 - F 3 times per day
 - G 4 or more times per day
6. During the past 7 days, how many times did you eat **other vegetables**? (Do **not** count green salad, potatoes, or carrots.)
- A I did not eat other vegetables during the past 7 days
 - B 1 to 3 times during the past 7 days
 - C 4 to 6 times during the past 7 days
 - D 1 time per day
 - E 2 times per day
 - F 3 times per day
 - G 4 or more times per day

Grade, Age, Gender, Ethnicity And Race

1. What grade are you in? (Fill in one answer)

- | | | |
|---|---|---|
| 4 <input type="radio"/> 4 th grade | 7 <input type="radio"/> 7 th grade | 10 <input type="radio"/> 10 th grade |
| 5 <input type="radio"/> 5 th grade | 8 <input type="radio"/> 8 th grade | 11 <input type="radio"/> 11 th grade |
| 6 <input type="radio"/> 6 th grade | 9 <input type="radio"/> 9 th grade | 12 <input type="radio"/> 12 th grade |

2. How old are you? (Fill in one answer)

- | | | |
|---------------------------------------|---------------------------------------|---------------------------------------|
| 8 <input type="radio"/> 8 years old | 12 <input type="radio"/> 12 years old | 16 <input type="radio"/> 16 years old |
| 9 <input type="radio"/> 9 years old | 13 <input type="radio"/> 13 years old | 17 <input type="radio"/> 17 years old |
| 10 <input type="radio"/> 10 years old | 14 <input type="radio"/> 14 years old | 18 <input type="radio"/> 18 years old |
| 11 <input type="radio"/> 11 years old | 15 <input type="radio"/> 15 years old | |

3. Are you a boy or a girl? (Fill in one answer)

- 1 Boy
- 2 Girl

4. Are you Hispanic or Latino?

- 1 Yes
- 0 No

5. How would you describe yourself? (Fill in all that apply to you)

- 1 American Indian or Alaska Native
- 2 Asian
- 3 Black or African American
- 4 Native Hawaiian or Other Pacific Islander
- 5 White/Caucasian
- 6 More than one

Physical Activity from the Nutrition Education Survey (NES) (range 0-14)

Physical activity is any activity that increases your heart rate and makes you get out of breath some of the time.

Physical activity can be done in sports, playing with friends, or walking to school.

Some examples of **physical activity** are running, brisk walking, and rollerblading.

1. Over the past 7 days, on how many days were you physically active for a total of at least 60 <u>minutes</u> per day?							
0 0 0 days	1 0 1 Day	2 0 2 Days	3 0 3 Days	4 0 4 Days	5 0 5 Days	6 0 6 Days	7 0 7 Days

2. Over a typical or usual week, on how many days are you physically active for a total of at least 60 minutes per day?							
0 0 0 days	1 0 1 Day	2 0 2 Days	3 0 3 Days	4 0 4 Days	5 0 5 Days	6 0 6 Days	7 0 7 Days

Preferences – sample items

The “I don’t know what this is” responses were dropped for the analysis of preferences assuming they don’t have a preference since they can’t identify it. Scores could range from 2 x the number of items to 4 x the number of items. In this example the range would be 2 x 10 =20 to 4 x 10 = 40.

How much do you like these fruits and vegetables?		I like this a lot 	I like this a little 	I do not like this 	I don’t know what this is 
Asparagus.....		4 0	3 0	2 0	1 0
Dried Plums		4 0	3 0	2 0	1 0
Green Beans.....		4 0	3 0	2 0	1 0
Kiwifruit.....		4 0	3 0	2 0	1 0
Mandarins		4 0	3 0	2 0	1 0
Melons		4 0	3 0	2 0	1 0
Persimmons.....		4 0	3 0	2 0	1 0
Salad Greens.....		4 0	3 0	2 0	1 0
Spinach.....		4 0	3 0	2 0	1 0
Sweet Potatoes...		4 0	3 0	2 0	1 0

Knowledge (range 0-5)

For all knowledge questions, enter a “1” for correct responses and a “0” for incorrect responses.

<p>1. Eating fruits and vegetables can help lower your chances of getting heart disease or cancer.</p> <p>1 <input type="radio"/> True 0 <input type="radio"/> False 0 <input type="radio"/> Don't know</p>
<p>2. Fruits and vegetables that are high in Vitamin A are _____ in color.</p> <p>0 <input type="radio"/> Red and white 0 <input type="radio"/> Blue and light brown 1 <input type="radio"/> Yellow-orange and dark green 0 <input type="radio"/> Brown and purple 0 <input type="radio"/> I don't know</p>
<p>3. Almost all fruits and vegetables contain a lot vitamins and _____.</p> <p>0 <input type="radio"/> Protein 1 <input type="radio"/> Fiber 0 <input type="radio"/> Cholesterol 0 <input type="radio"/> Fat 0 <input type="radio"/> Don't know</p>
<p>4. Which of the following fruits and vegetables are grown in California:</p> <p>0 <input type="radio"/> Spinach 0 <input type="radio"/> Apples 0 <input type="radio"/> Pears 1 <input type="radio"/> All of the above</p>
<p>5. Fruits and vegetables, like apples and pears, are best when eaten with the peel because that is where most of the fiber and antioxidants are.</p> <p>1 <input type="radio"/> True 0 <input type="radio"/> False 0 <input type="radio"/> Don't know</p>

Adult consumption:

Food Behavior Checklist

These questions are about the ways you plan and fix food.
Think about how you usually do things.

Name _____ Date _____ ID# _____ Entry
 Exit

Choose one answer for each question.

1.



Do you eat fruits or vegetables
as snacks?

- no yes,
sometimes yes,
often yes,
everyday

2.



Do you drink fruit drinks, sport drinks
or punch?

- no yes,
sometimes yes,
often yes,
everyday

3.



Did you have citrus fruit or citrus juice
during the past week?

- yes no

The full version of the Food Behavior Checklist and Fruit and Vegetable Checklist can be found online at: <http://townsendlab.ucdavis.edu/>

Appendix D: Checklist for School Nutrition Program Planning

(Response categories: Yes/ No)

1. What is the name of this school?
2. What is the name of the Network contractor supporting nutrition education in this school?
3. Does your school have a National School Lunch Program?
4. Does your school have a National School Breakfast Program?
5. Will this school participate in the Alliance for a Healthier Generation Healthy Schools Program this year (2008-09)?
6. Did this school participate in the Alliance for a Healthier Generation Healthy Schools Program last year (2007-08)?
7. Did the school participate in the Governor's Challenge Competition last year?
8. Does your school have a fruit and/or vegetable snack program?
9. Does your school have clean, free sources of tap water and/or working water fountains available and accessible to students at meals and throughout the day?
10. Does your school serve at least one fruit (fresh or canned in fruit juice) at breakfast in addition to 100% fruit juice?
11. Does your school have salad bars or other opportunities to offer fresh fruits and vegetables, e.g., crunch lunches, boxed salads and veggie meals?
12. Does your school offer at least four non-fried, no-added sugar fruit and/or vegetable options daily? (salad can count as one of the four)
13. Does your school market and promote fruit and vegetable consumption of the featured HOTM food in cafeterias, a la carte area of lunch area, and/or corridors as well as in classrooms at least once a month?
14. Does your school use cafeteria as 'nutrition education' learning laboratory on a weekly basis via programs, promotions, nutrition labeling, or special demonstrations?
15. Does your school prohibit commercial food and beverage branding in non-food environments such as recreational facilities, classrooms, and hallways?
16. Does your school offer evidence-based nutrition education (i.e., curriculum/lesson plans/programs) that are based on the National Health Education Standards or California Health Education Content Standards, e.g., Eat Smart/Play Hard, Harvest of the Month, Power Play!) in each grade for the level of school being evaluated (elementary, middle, high)?
17. Are fruit and vegetable-focused nutrition education integrated into academic learning using theory and skills-based lessons on an ongoing basis?
18. Do students participate in hands-on preparation, cooking, and tasting of fruits and/or vegetables in your school?
19. Do students in your school plant fruits and/or vegetables in a garden that is cultivated regularly during growing season and produce is used in nutrition education?
20. Does your school have a school health council or a student nutrition advisory committee where students have roles in making key decision in planning and implementing nutrition policies to improve nutrition in their schools, homes, and community?

21. Do low income parents and other community members that reflect the diversity of the district actively engage in planning, implementing and supporting school policies and programs that address healthy eating through participation in School Wellness Council, parent organizations, or other concrete examples.
22. Do parents in our school help plan, implement and participate in nutrition education programs and promotions that focus on fruit and vegetable consumption?
23. Do students, parents, and/or school staff work with community businesses, such as corner stores, grocery stores, fast food places, and restaurants, to promote fruit and vegetable consumption in a way that is integrated with school activities?
24. Have teacher and child nutrition program staff attended training sessions that promote fruit and vegetable consumption?
25. Does your school have administrative support and worksite healthy eating guidelines for staff training, employee events, meetings, and work environment?