

Process Evaluation of the Fresh Fruit and Vegetable Program Implementation in a New Jersey Elementary School

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Please note that this study was published before the implementation of Healthy, Hunger-Free Kids Act of 2010, which went into effect during the 2012-13 school year, and its provision for Smart Snacks Nutrition Standards for Competitive Food in Schools, implemented during the 2014-15 school year. As such, certain research may not be relevant today.

ABSTRACT

Purpose/Objectives

The U.S. Department of Agriculture provides funding to elementary schools for the Fresh Fruit and Vegetable Program (FFVP) to encourage healthy eating. The purpose of this study was to examine factors facilitating or challenging the program's successful implementation in one New Jersey school.

Methods

Researchers conducted an observational study in a New Jersey public elementary school to evaluate implementation of the FFVP. We observed FFVP snack preparation, delivery, consumption by children, and nutrition education sessions. Program stakeholders, such as the FFVP coordinator, principals, teachers, school nutrition staff, and parents participated in the study. We used surveys and interviews to explore facilitators and challenges of FFVP implementation. Interview responses were transcribed and coded to extract common concepts using thematic content analysis. Descriptive analyses were conducted on the participant demography and survey responses.

Results

Individual interviews of 37 stakeholders were conducted, and 19 teachers and 134 parents completed the survey. Participants generally perceived the FFVP to be successful. Facilitators of the program's implementation included morning snack time, role-modeling by teachers, and discussion of the snack served. The study determined that insufficient numbers of volunteers, funding, coordination of nutrition education among FFVP partners, and ineffective communication between families and school staff were challenges to FFVP implementation.

Applications to Child Nutrition Professionals

Children's healthy eating habits learned in school at an early age could have a positive impact on their personal health and on the healthfulness of the environment in their homes and communities. Creative, colorful presentations of a variety of food items as part of the FFVP, in addition to curriculum coordination among program stakeholders, may encourage fruit and vegetable consumption. Engaging children in a successful FFVP may encourage and sustain healthy eating.

INTRODUCTION

Currently, an estimated 17% of children and adolescents ages 2 to 19 years are at or above the 95th percentile of the body mass index (BMI) for age, and 31.7% of them are at or above the 85th percentile (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010). Numerous studies have shown that increased consumption of a wide variety of vegetables (e.g., dark-green leafy, cruciferous, and deep yellow-orange vegetables) and fruits (e.g., citrus and deep yellow-orange fruits) improves health,

prevents overweight and obesity, and provides protection against chronic diseases such as diabetes (Lin & Morrison, 2002; Van Duyn & Pivonka, 2000).

Despite the health benefits of increased fruit and vegetable consumption, the current intake for children is low. For children 6 to 11 years of age, intake of fruits and vegetables is far below the U.S. Department of Agriculture (USDA) MyPyramid recommendations of 1.5 cups of fruit and 2.5 cups of vegetables per day (Lorson, Melgar-Quinonez, & Taylor, 2009; U.S. Department of Agriculture [USDA], 2010a). For this age group, the proportion of children not meeting fruit and vegetable intake recommendations ranges from 74.1% to 83.8% (Guenther, Dodd, Reedy, Krebs-Smith, 2006). Children from households falling below 130% of the poverty-income ratio are 1.6 to 1.7 times more likely not to meet fruit intake recommendations (Guenther et al., 2006). Furthermore, children are not meeting the daily dietary recommendation for dark green and leafy vegetables and fruits (Guenther et al., 2006). Instead, 46% of total vegetable intake was attributed to fried potatoes and only 8% of vegetables consumed by children and adolescents aged 2 to 19 years were dark green or orange (Lorson et al., 2009).

Studies of children and adolescent dietary intake report that availability and accessibility, along with individual taste preferences for fruits and vegetables, are positively associated with consumption of these foods (Blanchette & Brug, 2005; Cullen et al., 2003; Dave, Evans, Pfeiffer, Watkins, & Saunders, 2010; Neumark-Sztainer, Wall, Perry, & Story, 2003). School-based interventions that combine classroom curriculum, parent involvement, and support of school nutrition programs are effective in increasing student's fruit and vegetable intake. (Neumark-Sztainer et al., 2003).

The USDA administers the Fresh Fruit and Vegetable Program (FFVP) to create a healthier school environment by expanding the opportunities for children to sample varieties of fruits and vegetables (Food, Conservation, and Energy Act of 2008). Elementary schools participating in the FFVP receive \$50.00 to \$75.00 per student for the school year. The exact funding amount is determined by the state agency administering the program, and is based on total funds allocated to the state and the enrollment of the applicant school. The funds are used by the schools to purchase fresh fruits and vegetables, which are then distributed free of charge to students at varying times during the school day. The fruits and vegetables offered may not be served at the same time as the federally-funded school lunch or breakfast programs.

In order to maintain and maximize the positive impact of the FFVP, appropriate evaluation of the program in funded schools is needed (USDA, 2010b). Therefore, the purpose of this study was to evaluate logistics involved in the FFVP implementation, and to determine factors challenging or facilitating the implementation process.

METHODOLOGY

Sample

The state of New Jersey funded 60 FFVP elementary schools in 2009-2010. One of these elementary schools, conveniently located near Montclair State University, agreed to participate in this study. The researchers obtained permission to recruit parents ($n = 134$) and stakeholders ($n = 37$) for interviews and surveys (Table 1). Stakeholders included the FFVP coordinator, teachers, school nutrition director, and school administrators. The Montclair State University Institutional Review Board (IRB) approved the study protocols.

Table 1. *Demography of Study Participants*

Characteristics	Stakeholders ^a (n=37) Number (%)	Teachers (n=19) Number (%)	Parents (n=134) Number (%)
Race			
Asian	2(5)	1(5)	4(3)

Characteristics	Stakeholders ^a (n=37) Number (%)	Teachers (n=19) Number (%)	Parents (n=134) Number (%)
Non-Hispanic Black	0(0)	0(0)	5(4)
Latino	3(8)	5(26)	86(64)
Non-Hispanic White	31(84)	12(63)	23(17)
Others	1(3)	1(5)	14(10)
No response	0(0)	0(0)	2(2)
Education			
Below high school	0(0)	0(0)	27(20)
High school	3(8)	0(0)	54(40)
Some college	0(0)	0(0)	14(10)
College graduate	22(60)	17(90)	29(22)
Post college		2(11)	0(0)
No response		0(0)	10(7)
Home Room	N/A		N/A
K		3(16)	
1st		1(5)	
2nd		3(16)	
3rd		4(21)	
4th		5(26)	
5th		1(5)	
Special Education		2(11)	
Age (Mean±SD), years	40±9	42 ±12	35 ± 7

^aStakeholders include school administrators, the Fresh Fruit and Vegetable Program coordinator, school nutrition staff, teachers, and parent volunteers.

FFVP Implementation Procedure

During the period of the study, the FFVP was offered three times per week at the selected school. Volunteers came in to prepare the snacks in the cafeteria prior to each serving period. The serving

size of the fruit or vegetable varied by the type (e. g., one medium banana, four to five bite-sized cantaloupe chunks in a 4 oz cup, and one medium apple).

Volunteers filled the snack bins for each class with enough fruits and vegetables, and wet wipes, for each child. An announcement was then made over the loud speaker that the snacks were ready for pick up. At that time, student representatives of each class came down to the cafeteria to pick up a bin to bring back to class.

A nutritionist outside of the school district, from the local nutrition service, provided the education to each class once a week for a continuous eight-week period. Lessons were tailored to the age of the students and employed workbooks and coloring activities. Topics included general nutrition and healthy eating issues such as MyPyramid, hand-washing, sugars, fats, and specific fruits and vegetables.

Data Collection for Process Evaluation

The researchers observed the snack preparation (e.g., cutting and packaging the fresh fruit or vegetable), delivery and consumption of the snack in the classroom, and the weekly nutrition education sessions during regular visits in spring, 2010. They recorded the program process in observation logs. The logs were standardized to minimize subjective variations in the observers' notes.

Semi-structured interview questions were developed to target stakeholder opinions about: the FFVP mechanism; timing of the food delivery; challenges to program implementation, and facilitators of the program. Teacher and parent surveys were designed to measure perceptions of the program efficiency and students' attitudes regarding the program.

Teacher and Parent Survey Questionnaires

Research tools were adopted from existing instruments and modified to be specific to the current study (He et al., 2007; Heim, Stang, & Ireland, 2009). They were calibrated to measure perception of the program efficiency, guided by the school's proposed program implementation procedure. A panel of four experts validated the instrument face and content validity. The experts consisted of specialists in nutrition, food service, scale development, and survey instrument development. Reliabilities were tested using Cronbach's index of internal consistency, $\alpha = 0.75$ for the teacher questionnaire and $\alpha = 0.72$ for parent questionnaire.

Teachers were asked to rate the implementation of the FFVP on a scale of 1 to 4 (4: *very good*); their rating of the incorporation of nutrition education in their regular class sessions on a scale of 1 to 7 (7: *fully implemented*); and their opinions regarding students' enjoyment of the program on a scale of 1 to 7 (7: *high*). Teachers' opinions/perceptions regarding FFVP procedures and their strategies to promote fruit and vegetable consumption were queried in open-ended questions.

The degree of parents' awareness of the FFVP was determined by asking them to rate their familiarity of the program on a scale of 1 to 5 (5: *very familiar*). The rest of the questionnaire inquired about their observation of their child's behavior during the implementation period and about whether or not they actively followed the program implementation. Responses were on a scale of 1 to 4, with 4 being the most positive opinion or action. An open-ended question was also included to explore parents' current and future plan to encourage their child's fruit and vegetable consumption at home.

Data Analyses

Qualitative data from interviews and free response questions were transcribed and coded to extract common concepts. Thematic content analyses were then performed to find salient beliefs held by the program stakeholders regarding implementation of the FFVP. The analyses identified potential challenges to and facilitators of the program.

Descriptive analyses were conducted on the demography of participants and survey responses. Mean values of the questionnaire responses were calculated to summarize trends. Chi-square analyses ($\alpha = 0.05$) were used to compare response patterns on the implementation of the FFVP between demographic characteristics of the participants.

RESULTS

The study school is set in an urban environment. At the time of the study, 580 children were enrolled in grades K-5. The demography of enrolled students was as follows: 10% White, 80% Hispanic/Latino, and 10% African American. The proportion of students who received free- and reduced-priced meals at school was 56% and 14%, respectively. Demography of study participants is shown in Table 1.

The FFVP coordinator was responsible for organizing the program and ordering the food. Fresh fruits and vegetables were ordered from a national food distributor in whole or pre-cut forms. The purchase selections were dependent on seasonal availability. The coordinator attempted to purchase a variety of fruits and vegetables, though fruits (67%) were more frequently ordered than vegetables (33%). The most frequently ordered food items among fruits were apples and oranges, which constituted 14% of the purchase orders. The least purchased items were cauliflower, pepper, green beans, pears, broccoli and cantaloupe. Snacks were prepared by the coordinator and volunteers, shortly after the vendor delivery, and distributed to students.

Researchers observed the delivery of the snacks in all grades (K-5). In 92% of the observations conducted, no specific student nutrition education, or healthy eating discussion regarding the snacks that were served, was provided by the teachers during the snack time. From the observation of weekly nutrition education sessions, researchers noted that topics discussed in the session were not aligned with the fruit or vegetable served that week.

Interviews with stakeholders

A total of 37 stakeholders were interviewed: 31 teachers, 3 staff members (the principal, vice principal, and program coordinator), and 3 volunteers. Stakeholders perceived that program implementation was successful, which they described as “running smoothly,” “good,” or “well-coordinated and effective.”

Some stakeholders (60%) expressed concern regarding the school’s ability to deliver the FFVP (see Figure 1). Most of the stakeholders indicated that the timing (morning vs. afternoon) of the snack delivery was important for the success of the program. When the snacks were delivered in the afternoon, the children rushed to eat the snack or would take it home with them.

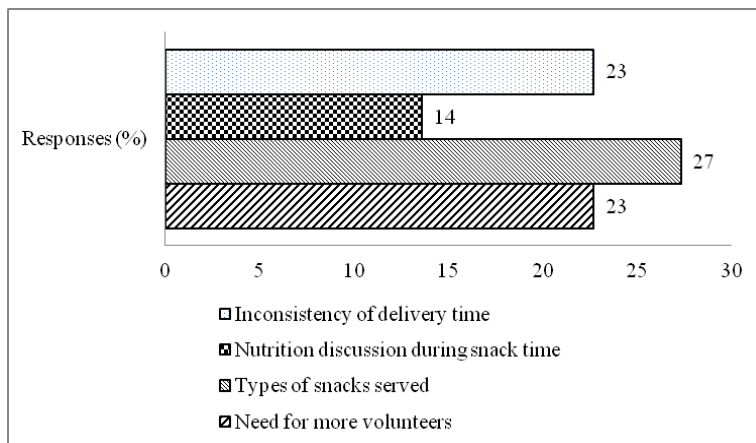


Figure 1. Frequently mentioned challenges faced during the program implementation. Graph shown is the percent representation of common responses by stakeholder interviewees. Some challenges were mentioned by 60% of interviewees; the remaining stated they were satisfied with the implementation procedure.

The USDA requires that FFVP snacks are served only during the school day, and not before or after school (USDA, 2010c). Teachers commented that teacher’s supervision would assist in ensuring that

children consume foods offered, supporting a morning snack delivery time. Comments regarding the leftover snacks indicated that consumption was dependent on the popularity of the fruit or vegetable served. Examples of statements during interviews are as follows: “the amount leftover depends on what was being served” (29%), “kids didn’t enjoy celery” (6%), or “children disliked grapefruit, broccoli, and cauliflower” (17%). Comments indicated that the less popular the fruit or vegetable, the more food was leftover.

Teacher and Parent Surveys

Modal responses of teachers to question items are shown in Table 2. A majority of the teachers (82%) rated the implementation of the FFVP as *very good*. Student’s enjoyment of the program was also rated *high* by 71% of teachers.

Table 2. *Teacher Survey Responses*

Questionnaire Items	Modal responses	Percent responses
How do you rate the FFVP implementation?	Very good	82
Educational sessions to teach about FFVP were...	Fully implemented	53
In your opinion, the level of students’ enjoyment of the FFVP was...	High	71
In your opinion, how many newsletters were handed to students to take home?	Some	24
In your opinion, how many newsletters were read by parents?	Some	30
In your opinion, FFVP promotion during Home and School Association monthly meeting happened...	All	71
In your opinion, the snack information was included in monthly menu calendar	None	31
In your opinion, posters were made in art class...	None	56
In your opinion, posters were displayed throughout the school...	None visible	47

Note. FFVP = Fresh Fruit and Vegetable Program

However, specific promotional activities were somewhat less recognized by the teachers; more than 50% of them responded *never made* or *none visible* when asked about promotional posters. Responses were similar between homeroom teachers ($p>0.05$). The promotional activities to increase the awareness and create the excitement about the program were encouraged by the USDA, but not required. The school’s FFVP proposal stated that promotional posters would be made by students and displayed throughout the school during the program period.

Of those who responded to the open-ended question inquiring about strategies employed to encourage children’s fruit and vegetable consumption, 53% of the teachers indicated that they discussed “benefits of eating fruits and vegetables,” “nutritional values of fruits and vegetables,” or “healthy food choices throughout the year.” Teachers also stated that they provided encouragement during snack distribution time; 20% of teachers reported they reinforced the importance of fruit and vegetable consumption (e.g., discussing the specific fruit or vegetable being served), and 13.3% of teachers responded that they served as a role model by tasting the snacks with students.

Although the program was ongoing throughout the school year, 16% of parents still indicated that they were “not at all familiar” with the program. Parent observations of children’s enjoyment of the FFVP were highly positive. For example, parents reported that their child “liked the snacks a lot,” and that the “perception of FFVP was very good.” Responses were similar regardless of parent’s race and education levels ($p>0.05$).

The parent surveys indicated that 47% of parents teach nutrition and health in order to encourage their child to eat more fruits and vegetables (e.g., “fruits and vegetables make you strong and healthy”, “explain how it helps them grow”, or “good for your mind and body”). Some parents used food preparation demonstrations at home to entice children to make healthy food selections (39%). Several served as a role model by eating fruits and vegetables themselves (8%). Others set rules and provided rewards for fruits and vegetable consumption (7%).

DISCUSSION

A positive feature of the FFVP implementation was that it offered the students varieties of fruits and vegetables as much as possible. The children were offered 17 different choices (9 different fruits and 8 different vegetables) throughout the year. The program benefited students who possibly had limited exposure to fruit and vegetables due to economic challenges and the lack of nutrition knowledge. However, exotic or culturally salient fruit and vegetable selections were limited. In addition, in response to student demand, fruits were purchased twice as often as vegetables (67% vs. 33%). Favoritism toward fruits has been observed in other studies (Centers for Disease Control and Prevention (CDC), 2006; Davis, Cullen, Watson, Konarik, & Radcliffe, 2009; Dixon, Mullins, Wakefield, & Hill, 2004; Heim et al., 2009). A challenge to promoting vegetable intake is the participants’ perceived association of vegetables with evening meals, but not with snacks (Buzby, Guthrie, & Kantor, 2003). Other studies relating to similar programs reveal the need for better implementation strategies to promote vegetable over fruit consumption (CDC, 2006; Davis et al., 2009). The study school used low- fat dips to encourage the children to eat vegetables. However, the vegetables were not selected enough to justify more frequent purchases.

In addition, particular fruits such as apples, oranges, and bananas were offered more frequently because of the ease of in preparation and distribution. Other contributing factors that may have influenced the type of fruits and vegetables purchased were the limited budget and the availability of personnel for preparation.

During the program implementation, students received fruits and vegetables on 93 occasions with a total cost of \$56.68 per student. This equals \$1.64 per week per student, or \$0.55 per student, per day, per serving. This amount sufficiently covers the purchase value and low labor costs of providing a whole banana, apple, or orange, which according to the school’s food vendor cost approximately \$0.26, \$0.35 and \$0.33, respectively. However, use of only these three fruits would be insufficient for exposing the children to a variety of fruits and vegetables. In addition, the program funds do not cover the cost of the extra help needed for offerings requiring more preparation than whole fruits. The small cadre of staff and volunteers are already stretched in time available to implement the FFVP. The existing funding ostensibly covers the purchase of fruits and vegetables, limited labor for preparation, serving and distribution, complementary service items such as low-fat dressings, paper supplies, and distribution bags. Administrative costs are also a consideration, and are limited to 10% of the total funds.

The promotional activities used by the current school were limited and inconsistent. Contrary to school’s initial plan for FFVP implementation, recipe cards or art class activities in some cases never existed, or were interrupted due to lack of assistance or coordination. The FFVP promotion section in the monthly newsletter was only active during the beginning of the year. As a result, the promotions were not well recognized by the school community and parents. Better coordination between the snack and education components may have encouraged greater fruit and vegetable consumption among students.

CONCLUSIONS AND APPLICATIONS

These findings suggest that the operation of the FFVP in this school was generally perceived to be successful by program staff, teachers, and parents. The level of students' satisfaction was highly positive, as noted by parents. The excitement observed by the researchers during the snack time supported the level of students' satisfaction as measured by the questionnaire. Better coordination with nutrition education could enhance the program operation, thus having a stronger impact on the students. Strategic promotional activities need to be employed to increase parents' interest and engagement in the program.

Eating behavior is a function of the varied food environments that are composed of individual food preference, cultural and familial influences, and home, school and community environments (Haire-Joshu & Nanney, 2002). The FFVP has a great potential to impact the eating behavior of school age children by shaping each child's food preference via healthy food offerings at school. Children's healthy eating habits learned from school at an early age could have a dynamic impact on their homes and communities and most importantly, on their health. This process evaluation study allowed researchers to assess the implementation of the FFVP, identify concerns of the operation, suggest solutions to improve the program, and suggest alternate methods of snack delivery, such as fruit and vegetable vending machines or mobile carts. The findings are valuable in increasing success rates for subsequent programs.

Finally, continuous funding support is necessary to nurture this important program so that schools may sustain and enhance an environment conducive to healthy eating, and ultimately improve children's and the nation's health.

Limitations

This study was conducted in one school conveniently selected from a list of 60 schools that received the FFVP funding in 2009-2010. Accounting for the fact that the implementation procedure was specific to each school, findings of this study regarding the components of the unique implementation operation may not be generalized to all FFVP schools.

Another limitation is that the school under study was in the first year of implementation. Some of the challenges faced by this school may not be an issue in other schools more experienced with the program. Low participation rates of parents in this study could be due to low program awareness. Future quantitative studies with a larger number of program schools could strengthen and validate the findings of this study.

Solutions for the School Nutrition Directors

An innovative implementation of the FFVP program is necessary to increase children's awareness and consumption of fruits and vegetables. Snacks could be served as a combination of fruits and vegetables with different colors (e. g. rainbow) instead of a single-type of fruit or vegetable. Schools could arrange produce trays that have popular items as well as new items. Creative ways of preparing new items and colorful presentations could also make fruit and vegetable consumption fun for children (e.g., eat your colors). Activities such as fruit and vegetable of the day, creative snack display tables, show and tell, bingo, crossword puzzles, trivia games, and cultural fruit/vegetable events could be implemented to encourage healthy dietary habits.

The significance of diverse cultural eating preferences can be incorporated in schools with a diverse student population. Though oranges, apples, and bananas have now become globalized food commodities, other less broadly recognized fruits and vegetables are staples of many ethnic diets, including papayas, mangos, jicama, ugli fruit, blood oranges, daikon radish, star fruit, or cherimoya. These foods may be more costly, but may be affordably purchased if they are distributed in smaller portions to inspire taste experiences.

In addition, the FFVP may be enhanced by support and coordination with the National School Breakfast and Lunch Programs. For example, snacks served could be featured later in the month on the breakfast and lunch menus, signage could be posted in the cafeteria, Harvest of the Month materials could be utilized, recipe books developed, and school nutrition program staff involved to help with education (Knai, Pomerleau, Lock, & Mckee, 2006).

Solutions for Students

More student involvement in the program's process may further enrich their experience with various fruit and vegetable snacks. In the study school, snacks were served in a ready-to-eat form, and students were not engaged in the assembly of the snacks. Students' involvement in snack preparation may raise awareness and provide ownership in the healthy snacks. This ownership may foster a sense of responsibility to taste new fruit or vegetables before these foods are served to the rest of the school. Hands-on snack assembly may require more staff to facilitate the food preparation, and possibly increased funding.

A recent intervention study utilizing garden-based nutrition education demonstrated that the intervention led to an increase in preferences and consumption of fruits and vegetables for students in grade 4 and 6 (Heim et al., 2009). This study used a "seed to table" approach, which encouraged children's fruit and vegetable consumption through gardening, snack preparation, and taste-testing. While gardening may not be possible in some schools, children may be inspired to eat more fruits and vegetables if they become involved in selection, such as visit to a local farm or grocery store, and preparation. Therefore, nutrition education should include concepts connecting foods to nutrition and health.

Solutions for FFVP Coordinators

Future FFVPs in schools may also employ a theory-based approach to structure the implementation process. Behavioral theories such as the theory of reasoned action, theory of planned behavior, or the transtheoretical model may be used to strategically modify students' eating behavior during intervention (Ajzen, 1991; Ajzen & Fishbein, 1980; Horwath, 1999). For example, the intention or willingness to try a fruit or vegetable precedes the action of fruit and vegetable consumption according to the theory of reasoned action and the theory of planned behavior. Providing a school environment incorporating nutrition education, and promotion through school displays and teachers' role-modeling, may positively influence the child's intention to try new fruit and vegetable. Following the transtheoretical model framework, various stepwise intervention strategies tailored to the child's readiness to try new fruit and vegetable may be used.

Program coordinators are responsible for coordinating the FFVP consistent with the program plan, and for determining the program's effectiveness. Impact evaluation studies to examine the dynamic effect of the FFVP on the home environment assist in evaluating long-term effectiveness of the program.

Solutions for Teachers and Nutrition Educators

Integration of FFVP implementation with nutrition education, and the school curricula is needed to maintain a successful program. Repeated exposure to new fruit and vegetables, and students' engagement in the process, enhance the positive impact of the program. For that reason, weekly nutrition education should be aligned with the fruit and vegetables served in the same week.

Nutrition education themes may also be incorporated into the regular curricula throughout the year. For example, science classes could use a "seed to table" project, in which students grow a variety of vegetables in the class garden and then present them to the class for tasting. Art classes could reinforce fruit and vegetable themes in student art activities.

Solutions for Parents

Parental involvement is important for the successful implementation of the FFVP. Examples of promotional activities to promote parent involvement include more frequent information sessions to increase parents' awareness and participation in the FFVP.

To encourage parents' to model fruit and vegetable consumption at home, training on appealing ways to serve new fruits and vegetables to children at home, and hosting cultural events to introduce ethnic fruit and vegetable recipes and cooking techniques, are possible parent involvement activities. Education efforts should include take-home materials, including the snack menu, with appropriate translations; also, school-hosted parent events should have translators present as needed.

Solutions for School Administrators

School administrators may facilitate better communication among the program coordinator, teachers, and other FFVP stakeholders by using monthly newsletters and display boards promoting the vegetable or fruit featured during the specific week and/or month. Recipe cards may be sent home, reinforcing the consumption of featured fruits and vegetables. A suggestion box, which may be an electronic communication system, may be used to survey stakeholders about their opinions and feelings regarding the FFVP, responding to suggestions in a timely manner.

These participatory activities may create a positive environment for fruit and vegetable consumption, promoting the daily fruit and vegetable snack as part of a daily routine and norm in the school community.

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