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Implementing a Farm to School Nutrition Education Program in a Large Urban School

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Abstract

School-based interventions to promote healthy eating and prevent obesity are a natural fit, and have demonstrated short-term success in behavior change related to healthy food choices. This project evaluated a collaborative model for implementation of a Farm to School (FTS) nutrition education program in a large urban school district. Secondary analysis of existing data was conducted. Data collection occurred over a two-year period at selected middle-schools (N=10) within a large urban school district in western New York. Two nutrition lessons, developed by community partners, were presented by dietetic interns from a local university. Nutrition lessons focused on farm to school program promotion, benefits of consuming locally grown fruits and vegetables and the food system. Students in grades 4, 5 and 6 completed paper and pencil surveys at baseline and post-intervention. Chi-squared tests of independence were performed to examine differences between the baseline and post-intervention responses. Results from Year 1 (N= 785) and Year 2 (N=545) indicated significant differences ($p \leq .05$) in awareness of FTS program, and benefits of consuming locally grown produce. A comparison of Year 1 and Year 2 was significant ($p \leq .05$) for knowledge of benefits of the FTS program and increased consumption of selected FTS produce. Classroom -based nutrition interventions involving contributions from community agencies, can positively impact knowledge and awareness of healthy food choices among middle-school students.

Fruits and vegetables are essential components of a healthy diet for children [1, 2]. Diets rich in fruits and vegetables lower the risk of chronic diseases such as heart disease, stroke, some cancers, and weight gain [3]. The 2015-2020 Dietary Guidelines for Americans recommend individuals eating a 2,000 calorie diet should be consuming two and a half cups of vegetables and two cups of fruits per day [3]. Research has documented children are not meeting the recommendations of fruits and vegetables [4, 5]. Diets poor in fruit and vegetables have been shown to be a contributing risk factor in childhood obesity, [6] though research has demonstrated multiple compounding factors such as physical activity, sedentary lifestyle, environmental factors, familial influences, social norms and health disparities [7-9].

School-based interventions to promote healthy eating and prevent obesity are a natural fit, and have demonstrated short-term success in behavior change related to healthy food choices [10, 11] Targeting healthy diet behaviors within the school environment is the focus of Farm to School (FTS) programs. FTS programs link schools and local farms in three distinct methods; 1) by incorporating locally grown produce into school meals, 2) providing nutrition education and, 3) supporting opportunities for school-based gardens and field trips to local farms [12]. Support for FTS initiatives has grown since its inception in the mid-1990's as evidenced by the US Department of Agriculture's (USDA) level of support and reports by the National Farm to Schools Network [13, 14]

Evaluation of FTS components can aid program administrators in identifying the impact on students (knowledge, behavior and anthropometrics), teachers, school policy, food service staff, farmers, parents and community [15]. A core element of the FTS program is nutrition education that focuses on agriculture, food, health and nutrition. While there is limited recent research specific to the efficacy of the nutrition education component of FTS programs, previous results have demonstrated programs have increased access and consumption of fruits and vegetables, as well as children's' willingness to try new foods [16-18]. This current research utilized a collaborative model, guided by the Whole School, Whole Child, Whole Community framework [19], and documented best-practices [20] to implement the FTS nutrition education program. Farm to School community partners included Cornell Cooperative Extension of Erie County, and dietetic interns and faculty from D'Youville College in Buffalo, New York among others (Figure 1).

Methods

Participants

This project utilized a purposive sample of 4th, 5th and 6th

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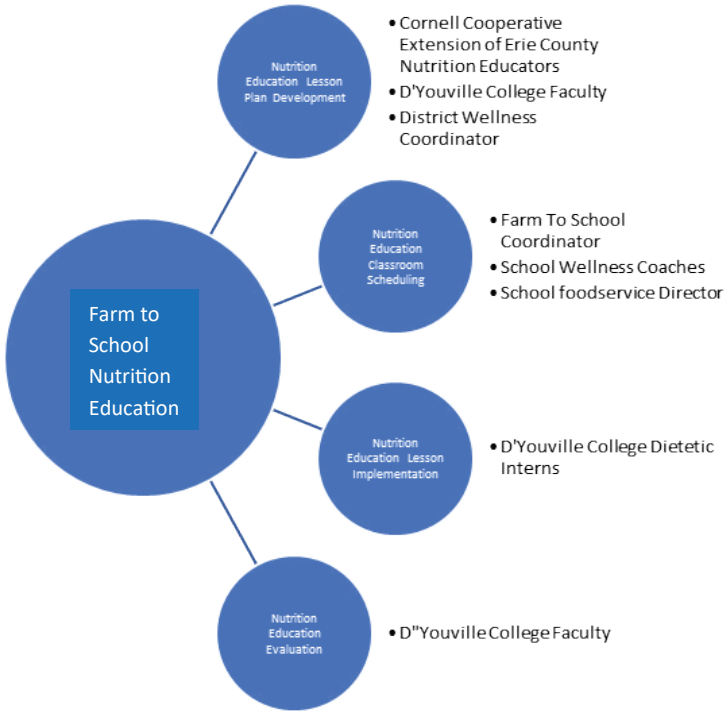

Figure 1: Farm to School community partners

grade classroom students in ten schools within a large urban school district. All ten schools were currently participating in the district FTS program. All participating schools had FTS produce items offered in their school meals, school cafeterias displayed FTS posters and informative table tents promoted the harvest of the month item. Additionally, newsletters, created by Cornell Cooperative Extension (CCE) educators were available for students, faculty and staff at participating schools. No previous FTS nutrition education had been conducted in a classroom setting prior to this study. Members of the FTS team promoted the classroom nutrition education opportunity at school meetings prior to the start of the school year. Classroom teachers indicated their interest in participating in the FTS nutrition education lessons by contacting the FTS Coordinator, who scheduled classroom lessons based on teacher requests and availability.

Instrumentation

A team of CCE nutrition educators developed nutrition lessons. Two nutrition lessons were created with FTS themes (food, agriculture and nutrition) in mind and using existing resources for development [21]. It was essential that the lessons considered; 1) content appropriate for the grade level of students, 2) a time limit of 30 minutes or less, 3) utilize a basic set of materials to implement the lesson and, 4) actively engage the participants. CCE educators used a dialogue-based, learner-centered approach to education by incorporating the concepts of Anchor, Add, Apply, and Away from Norris [22], In order to assure the pedagogy was appropriate for the intended participants, the lessons were reviewed using the Center for Research on Education, Diversity, and Excellence (CREDE) Standards for Pedagogy [23].

A pre-post survey was developed with the assistance of the School Foodservice Director as part of the department FTS evaluation, and reviewed by the FTS team prior to implementation. The survey included questions to identify locally grown fruits and vegetables, determine awareness of the existing FTS program and, indicate benefits of consuming locally grown fruits and vegetables. The paper and pencil survey was tested for face, content and construct validity.

Procedure

Members of the FTS Committee created a plan to implement the nutrition education component of the FTS program. Timelines were created to allow time for lesson plan and evaluation tool development, scheduling dietetic interns to conduct the lessons as part of their community nutrition rotation, promotion of the classroom nutrition education opportunity to school teachers, training dietetic interns on lesson plan implementation and finally, implementing the lessons at assigned schools. Designated days, two weeks apart, were planned to implement the nutrition lessons, as well as one training day for the dietetic interns. Dietetic interns presented both lessons on the assigned day and time and collected pre and post survey information. Surveys were kept in a secure location until data analysis. This procedure was completed during fall of 2016 (Year 1), and repeated in the same classrooms, based on teacher requests during fall of 2017 (Year 2). Data analysis occurred in 2018.

Data analysis

This research utilized a review of secondary data. All surveys were initially reviewed for completeness. Surveys which were incomplete (> 75% of questions left blank) were not included in data analysis. The effect of intervention on change

in knowledge, awareness and consumption of FTS menu items was examined using Chi square analysis to determine if significant differences existed between pre and post surveys. All analysis was performed using Statistical Package for the Social Sciences (IBM Corp. Released 2015. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.). A p-value of < .05 was considered statistically significant.

Results

Characteristics of the participants can be found in Tables 1 and 2. In Year 1, there were 1,553 completed pre and post surveys and 957 in Year 2. The school district participates in the Community Eligibility Provision (CEP) enabling all enrolled students in the school district, regardless of income level, are eligible to receive school meals at no charge. The CEP is an alternative to the traditional meal application process associated with the United States Department of Agriculture (USDA) National School Breakfast and Lunch Programs. In view of time restrictions, students were not asked to report their race or sex.

Results of pre and post surveys from Year 1 can be found in Table 1. Participants indicated increased knowledge of the FTS program ($p<.05$) but no differences in consumption were reported. Participants also indicated increased awareness of the benefits of consuming locally grown produce with significant differences noted for environmental benefits, benefits to farmers and taste. Most all students indicated that consuming fruits and vegetables was a healthy behavior, both pre (98.8%) and post (85.8%) intervention.

Results of pre and post surveys of Year 2 can be found in Table 2. Again, participants indicated increased knowledge of the FTS program within their school ($p<.05$). This time, significant difference in the consumption of squash was noted in the pre-post intervention period. While all participants had an increased awareness of the benefits of consuming locally grown produce, only benefit to farmers was significant ($p<.05$).

Table 1: Year 1 FTS Nutrition Lessons Comparison of Outcomes

	Pre-Intervention (N= 768)	Post-Intervention (N= 785)	P Value
Characteristics			
4th grade	298	290	
5th grade	214	223	
6th grade	256	272	
Awareness of Farm to School Program	358 (46.6)	577 (73.5)	<.05
Benefits of Farm to School Program			
Healthy	682 (88.8)	674 (85.8)	
Good for environment	263 (34.1)	349 (44.4)	< .05
Taste	254 (33.0)	305 (38.0)	< .05
Support local farms	254 (33.0)	301 (38.0)	< .05
Not important	24 (0 .03)	38 (0.05)	
Consumed FTS Produce			
Corn	703 (91.5)	723 (92.1)	
Broccoli/Cauliflower	587 (76.4)	634 (80.7)	
Apples/Pears	690 (89.9)	726 (92.4)	
Squash	302 (39.3)	322 (41.0)	

Table 2: Year 2 FTS Nutrition Lessons Comparison of Outcomes

	Pre-Intervention (N= 412)	Post-Intervention (N=545)	P Value
Characteristics			
3rd grade	54	52	
4th grade	83	200	
5th grade	148	191	
6th grade	127	102	
Awareness of Farm to School Program	163 (40.0)	375 (70.0)	<.05
Benefits of Farm to School Program			
Healthy	350 (84.9)	375 (70.0)	
Good for the environment	158 (38.3)	250 (45.8)	
Taste	185 (44.9)	263 (48.2)	<.05
Support local farms	243 (58.9)	313 (57.4)	
Not important	42 (10.1)	51 (0.09)	
Consumed FTS Produce			
Corn	377 (96.6)	502 (95.8)	
Broccoli/Cauliflower	336 (86.2)	459 (88.4)	
Apples/Pears	379 (91.9)	498 (91.3)	<.05
Squash	152 (41.8)	209 (43.1)	

Table 3: FTS Nutrition Lessons Comparison of Outcomes Year 1 and Year 2

	Year 1 (N= 785)	Year 2 (N= 545)	P Value
Awareness of Farm to School Program	577 (73.5)	375 (70.0)	<.05
Benefits of Farm to School Program			
Healthy	674 (85.8)	502 (92.1)	
Good for environment	349 (44.4)	250 (45.8)	
Taste	305 (38.0)	263 (48.2)	
Support local farms	301 (38.0)	313 (57.4)	
Not important	38 (0.05)	51 (0.09)	
Consumed FTS Produce			
Corn	723 (92.1)	502 (95.8)	
Broccoli/Cauliflower	634 (80.7)	459 (88.4)	<.05
Apples/Pears	726 (92.4)	498 (91.3)	<.05
Squash	322 (41.0)	209 (43.1)	

Comparison of outcomes of Year 1 and Year 2 found in Table 3 illustrated significant differences existed regarding knowledge of the FTS program within their school, and consumption of selected FTS produce items; corn and broccoli/cauliflower. Results indicated increased awareness of the benefits of consuming locally grown produce, but none of the differences were significant.

Discussion

Farm to school is a strategy to create a healthy school food environment by actively supporting healthy eating habits for school children [24]. This study assessed knowledge, awareness and consumption of selected FTS fruits and vegetables among 4th, 5th and 6th grade students in a large urban school district. This study was unique because it employed a collaborative model in implementation of a FTS nutrition education program and it compared results over a two-year period. Findings from this study revealed that a collaborative model to implement FTS nutrition education increased participants' knowledge of the FTS program, increased awareness of the benefits of consuming locally grown produce and had an impact on the consumption of selected FTS produce items.

Program promotion is important to ensure student, school and community engagement and support. This study found that students became significantly ($p<.05$) more aware of the FTS program after exposure to the FTS classroom lessons. This study did not control for other school-based promotional activities such as cafeteria promotional materials, menu taste testing, or morning announcements which may highlight featured FTS menu items. Interestingly, results from Year 2 indicated a significant change in awareness, which implies that students were not aware about the FTS program even after exposure the previous school year.

FTS programs have resulted in an increase in consumption of fruits and vegetables [16, 17, 25, 26]. These reported outcomes were demonstrated at schools with single or multiple exposures to FTS programming. This study found that students' increased consumption of selected FTS produce (specifically squash, broccoli and cauliflower) in Year 1 and Year 2. More time is necessary to determine the impact of FTS programming on overall fruit and vegetable consumption. Habits take time to cultivate and FTS programs can continue to support these efforts.

Students gained knowledge on the benefits of FTS to health, the environment and farmers in this research. Previous studies students respond positively to farm tours, school gardens and participating in preparing school recipes [27- 29]. This study utilized a lesson plan focusing on the food system and actively engaged the students in identifying each step in the food system from farmer to consumer to compost. Students gained an appreciation on how the FTS program can use resources efficiently by bringing locally grown foods to their school meals.

A collaborative approach to FTS nutrition education was applied in this research. With the support of the school administration (School Wellness Coordinator and Director of School Foodservice), members of the FTS committee worked closely together over a period of months to create an implementation timeline, develop lessons and an evaluation tool, secure resources, promote the nutrition education opportunity, train dietetic interns in lesson plan presentation and schedule lesson plans in classrooms. Farm to school programming can involve multiple stakeholders to improve the health status and performance levels of students, nutritional wellness of families, and overall development of communities. Previous projects have compiled resources for school communities to use in their efforts to carry out a FTS program [12], but no reports have been found which detail a collaborative method for nutrition education implementation.

All studies have limitations; many are inherent due to time, funding and available resources. Limitations for this study include utilizing an instrument which had undergone limited testing for validity and reliability. Additionally, the sample size was limited only by the number of community partners available to conduct the nutrition lessons. This research was conducted in an urban school district, so results cannot be generalized to schools in rural or suburban areas. The timeframe for this study was two weeks between pre and post intervention surveys. More time between lessons may impact results. Future research should consider increasing the number of classes exposed to the nutrition lessons, including a control group and use a validated instrument.

Conclusions

Classroom -based nutrition interventions involving contributions from community agencies, can positively impact knowledge and awareness of healthy food choices among middle-school students. Future studies should examine long term consumption patterns and impact of FTS programs on nutrition status of school children. Creating collaborative teams to accomplish school wellness goals can result in increasing program reach and impact.

Implications for School Health

Community partnerships can strengthen and support school-based wellness initiatives. Creating diverse program advisory boards can lead to successful implementation of programs, enhance evaluation efforts and enrich community support for school wellness.

Human Subjects Approval Statement

This research was reviewed and approved by the Institutional Review Board at D'Youville College.

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