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FARM TO SCHOOL PROGRAM ACTIVITIES: FOOD SERVICE RESPONSE TO THE SCHOOL HEALTH POLICIES AND PRACTICES SURVEY 2016

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ABSTRACT

PURPOSE/OBJECTIVES

Farm to School (FTS) is a growing program that incorporates food system education, local procurement, and hands on gardening into school systems nationwide. FTS activities have been associated with improved youth health behaviors, yet limited information is available regarding the impact of district and foodservice director characteristics on FTS participation. This study examined how district location, self-operated versus contract managed nutrition services, and education background of foodservice directors may play a role in FTS program engagement in school districts.

METHODS

Survey responses of district foodservice personnel to FTS-related questions in the 2016 School Health Practices and Policies Study were compared by district location, self-operated versus contract managed nutrition services, and director degree type. Publicly available, de-identified survey data were analyzed using Chi Square tests of independence with SAS statistical software.

RESULTS

Responses from 599 districts were used in the analysis. The majority of district nutrition services (78%) were self-operated by the school district. About half of respondents were from rural districts. Having contract managed compared to self-operated nutrition services was related to greater purchasing and procurement contracts for locally produced foods. District locations including rural and town locations were associated with lower participation in FTS related activities than city and suburban district locations. Districts where directors had food and nutrition related degrees had higher participation in FTS activities than those where directors had business or none of the degrees listed.

APPLICATION TO CHILD NUTRITION PROFESSIONALS

Information about district and district foodservice director characteristics that may influence FTS participation can be used in decision making about qualifications for hiring, professional development training content, and resource allocation to better promote FTS program participation. As a result, the potential to increase the number of programs nationwide, the quality of each program, and overall program participation may be increased.

KEYWORDS: Farm to School, Foodservice, Purchasing, Collaboration, Food Systems

INTRODUCTION

The Farm to School (FTS) Program is a federally recognized program that works through a community food systems perspective to provide local produce and a variety of food system education activities to school-aged youth (Vallianatos et al., 2004). By connecting children to their local food systems, the program is intended to improve knowledge and familiarity that inspires a positive change in the health of today's youth (Feenstra & Ohmart, 2012). FTS consists of three core elements including education, school gardens and procurement. The interactive approach taken by FTS programs is consistent with research that shows children learn better through experience (Murimi et al., 2018). A review of the literature from 2010-2019 (Bobronnikov et al., 2021) identified studies indicating that participation in FTS can lead to an increase in fruit and vegetable consumption, a decrease in food waste, and an increase in knowledge about vegetables (Gold et al., 2017; Izumi et al., 2010; Jones et al., 2015; Namenek Brouwer & Benjamin Neelon, 2013; Sharma et al., 2015). In addition, local farmers have found the program appealing because of social and financial benefits including an increase in direct buying, grant opportunities, and collaboration with local school systems (Christensen et al., 2018; Conner et al., 2012). With community collaboration being a main focus of FTS, the connections between school foodservice directors and all other contributing partners are an essential component for program success (Durairaj & Cureton, 2017; Janssen, 2015; Lee et al., 2019). As program success and policy supporting FTS have increased, the program has seen recent growth in overall participation (Colasanti et al., 2012; Schneider et al., 2012). With about 65% of all U.S. school food authorities reporting participation in one or more FTS activities during the 2018-2019 school year (USDA, FNS, 2021), greater opportunities exist to learn how to improve the quality of FTS participation nationwide.

School foodservice directors take on obligations beyond the lunchroom, making them leaders in food purchasing and implementation of policy and nutrition education in their districts (Askelson et al., 2015). Foodservice directors are typically involved in FTS research because of the integral role they play in the implementation of FTS-related activities and procurement (Cirillo & Morra, 2018; Conner et al., 2011; Janssen, 2015). Research exploring the motivations of directors showed that they participate in FTS activities such as procurement because of student preference, price, and to support local farmers (Izumi et al., 2010). In addition to procurement, many directors also play an active role in gardening, recipe creation, and other food education promotion activities that they see appropriate for their district (Izumi et al., 2010; Laurie et al., 2014). As a result, individual districts that participate in FTS may have programs that vary greatly in type and amount of participation. Variety across individual programs has allowed foodservice directors to create FTS programs that best serve the needs of its youth based on the background and experiences of staff, school culture, and resources available to each district (Cirillo & Morra, 2018).

Foodservice directors face barriers when participating in FTS programs as documented in a review of the literature by Bobronnikov et al. (2021). Studies to identify barriers to FTS program implementation have shown that the physical inaccessibility of local food, lack of knowledge and lack of overall resources including storage, funding, and planning time have all presented challenges for foodservice directors (Colorado Farm to School Task Force, 2010; Institute for Agriculture and Trade Policy, 2012; Kohala Center, 2015; Landry et al., 2015). One of the most

difficult hurdles for many programs is simply starting a FTS program. Without background knowledge, farm connections, or adequate resources and support, many districts and schools find starting procurement and other FTS activities difficult (Carbone et al., 2016; Pinard et al., 2013).

Success of FTS programs may require that foodservice directors create capacity among staff to work with seasonal and fresh produce and develop partnerships with organizations such as state agriculture departments and growers/producers (Feenstra & Ohmart, 2012). Because education about FTS procedures is not required for school foodservice directors and overall education requirements can vary, FTS program participation may rely on previous background knowledge surrounding childhood nutrition programs (School Nutrition Association, 2021). Although previous research has shown associations between foodservice directors holding a degree and the effectiveness of their foodservice programs (Thornton, 2007), exploration into FTS engagement by degree type has been limited. Examination of the degree type of foodservice directors in relation to FTS engagement may explain how previously held knowledge is related to participation.

Studies have also shown that variation in characteristics such as district location and the type of management may influence the type of barriers that districts face regarding FTS activities (Burt et al., 2019; Kang et al., 2016; Pinard et al., 2013). For example, rural areas tend to have smaller school foodservice operations. As a result, they may have limited external communication and may not be in proximity to farms that grow non-commodity crops (Askelson et al., 2015; Cirillo & Morra, 2018). Studies have supported the perception that foodservice directors within rural areas and in small districts found reforms burdensome and were less willing to adapt to changes as a result (Askelson et al., 2015; Smith et al., 2013). As for management, district nutrition services can be contract managed or self-operated, leading to a variety of different obstacles surrounding finances and decision making related to FTS participation (Kang et al., 2016). Additional knowledge can be gained about how to improve resource and funding allocation for FTS-related activities by exploring district characteristics such as location and whether nutrition services are self-operated or contract managed.

The purpose of this study was to examine district participation in FTS activities involving food ordering, collaboration and staff development by district and director characteristics including whether nutrition services were self-operated or contract managed, district location, and director degree type, using results from the 2016 School Health Policies and Program Study. The overall objective was to improve the understanding of how district and director characteristics were related to FTS participation to inform future decisions regarding planning and development of FTS resources that would further efforts to expand FTS programs.

METHODS

Instrument

The School Health Policies and Program Study (SHPPS) is a nationwide survey regularly conducted by the U.S. Department of Health and Human Services (US DHHS), Centers for Disease Control and Prevention (CDC) (US DHHS, CDC, 2019a). The 2016 SHPPS was conducted at the district level in 2016 using five questionnaires that separately examined health education, health services, healthy and safe school environment, nutrition services, and physical education and activity (US DHHS, CDC, 2017a). The overall goal was to gain a broad

understanding of how to utilize school programs to produce healthy behaviors among youth that would last a lifetime.

Development of the 2016 SHPPS questionnaires began with subject matter experts meeting and discussing each of the earlier survey questions to remove or revise questions based on current relevance and data needs (US DHHS, CDC, 2017b). The questions that remained were examined with cognitive testing procedures involving personnel from eight school districts (not included in the population for the data set). In addition, questions were also sent to reviewers nationwide representing federal agencies, nongovernmental organizations, foundations, universities, and businesses, including some who had experience with school meal programs, policies, and FTS. Finally, an electronic survey was created for ease of completion by respondents.

The nutrition services questionnaire included questions regarding the following categories: general information, food ordering, food preparation, collaboration and promotion, evaluation, district wellness policy, staffing and professional development, nutrition services and child nutrition requirements and recommendations, and district foodservice director (US DHHS, CDC 2017a). Among the food ordering, collaboration and promotion, and staffing and professional development categories, eight questions either directly addressed FTS activities or those related to FTS. In the food ordering section, participants were first asked if their district nutrition services program has primary responsibility for deciding which foods to order for their district (yes/no). If yes, they were also asked if their district purchases foods from local or regional growers or producers and if their district's food procurement contracts specifically address preference for locally or regionally grown foods (both yes/no). In the collaboration and promotion section of the questionnaire, participants were asked if their district participates in any FTS activities (yes/no). In this section, they were also asked if in the past 12 months, district-level nutrition services staff worked on school nutrition services or nutrition activities with staff from 1) the state agriculture department, 2) a food commodity organization, such as the Dairy Council or produce growers associations, and 3) a non-governmental organization promoting FTS activities (all yes/no response options). In the staffing and professional development section, participants were asked if during the past 2 years, their district provided funding for professional development or offered professional development to nutrition services staff on 1) sourcing foods locally or regionally, and 2) using produce from school gardens (both yes/no). Responses to these eight FTS-related questions were examined by characteristics of the district (having self-operated or contract managed nutrition services), director (degree type) and location (city, suburban, town, or rural). The general information section asked whether the district nutrition services were operated by the school district (i.e. self-operated) or a foodservice management company (contract managed). The district foodservice director section asked about director degree type. District location (i.e. city, suburban, town or rural) was determined as part of the sampling design (US DHHS, CDC, 2017b).

Sample

The SHPPS used a stratified random sampling design to create a study population that was representative of United States public school districts. The sampling frame included an initial 13,320 districts prior to exclusion of districts that contained sub-units, sub-districts, or special education districts to ensure that each unit was included only once in the frame (US DHHS, CDC, 2017b). As for the sampling selection, districts were divided into 12 strata based on urban status. These included city and suburb, each divided into large, medium, and small, and town and rural, each divided into fringe, distant and remote. The sample was allocated proportionally

across these 12 strata to create a self-weighting sample of districts. A total of 972 districts were initially sampled, but 29 were deemed ineligible due to serving less than 30 students. Of these 29 districts, 14 were replaced with similar districts in the same stratum with the final total sample including 957 districts.

In June 2015, recruitment for the study began by sending SHPPS information packets to designated contacts who worked in state education agencies and state departments of health from each state (US DHHS, CDC, 2017b). These contacts were asked to obtain a letter of support for the study from the head of their agency. After the letter was obtained, study invitation packets were sent to the superintendents of the selected districts within that state. The packet sought agreement from each district to participate in the study. Participating districts identified questionnaires not applicable to their district and the most knowledgeable respondent for each questionnaire. District school food authority directors were considered the most knowledgeable respondents for the nutrition services questionnaire. The respondents who were identified were contacted by email and overnight mail and provided instructions to access the data collection Web site. Data collection was completed between October 2015 and August 2016. The response rate for the nutrition services questionnaire was 62.6% (599 responses from 957 districts).

Data Analyses

Publicly available, de-identified 2016 survey data were downloaded from the SHPPS website (US DHHS, CDC, 2019b) and analyzed using SAS statistical software. The percentages of yes/no responses to the 8 FTS-related questions were calculated and compared using Pearson's Chi Square test of independence to determine if associations existed between responses and district and director characteristics including who operated the nutrition services (self-operated versus contract managed), district location reported as a stratum variable by CDC in the sampling procedure (e.g. city, suburb, town, rural) and respondent's degree type (e.g. food/nutrition, foodservice, business, none of those listed). The statistical significance threshold was set at 0.05 indicating the probability of a Type 1 error at 5%.

RESULTS AND DISCUSSION

District and director characteristics

Questionnaire responses were obtained from 599 district personnel, each from a different district. Most participants indicated they were in a director role (80%) in charge of oversight and coordination of nutrition services with 20% indicating they were not the district director (Table 1). Of those indicating they were in a director role, 87% reported working for the school district. Most of the district nutrition services were self-operated (78%), with 19% contract managed by a foodservice management company. The majority of respondents were from districts in rural (57%) and suburban areas (19%). Another 16% and 8% were from town and city areas, respectively. About one-fourth of participants had a degree (associate's degree, undergraduate major or minor, or graduate degree) in business/administration, and about 16% had degrees in either foodservice or foods/nutrition. Almost half (44%), indicated that they did not have a degree in any of the categories provided and chose the response "none of those listed", which could indicate that the participant either held a degree that was not provided as an option or did not have a degree. The majority of participants had ServSafe® or other food safety certification. About 10% were dietitians, 31% had School Nutrition Association certification and 20% had a state foodservice certificate.

Table 1. *Characteristics of School Districts and Survey Participants*

District characteristics	n (%)[a]
District location (n = 599)	
City	47 (7.9)
Suburb	113 (18.9)
Town	95 (15.9)
Rural	344 (57.4)
Who operates nutrition services (n = 592)	
Self-operated (school district)	461 (77.9)
Contract managed (foodservice management company)	113 (19.1)
Other	18 (3.0)
Survey participant characteristics	
Are you the district foodservice director (n = 535)	
Yes	429 (80.2)
No	106 (19.8)
Who participant works for[bc] (n = 433)	
School district	377 (87.1)
Foodservice management company	57 (13.2)
Other	5 (1.2)
Degree type[cd] (n = 430)	439
Food/nutrition	70 (16.3)
Foodservice	67 (15.6)
Business	106 (24.7)
None of those listed	187 (43.5)
Credentials held[bc] (n = 427)	
Licensed nutritionist or dietitian	31 (7.3)
Registered dietitian or registered dietitian nutritionist (Commission on Dietetic Registration)	41 (9.6)
School Nutrition Association certification	133 (31.2)
School Nutrition Specialist (School Nutrition Association)	44 (10.3)
State foodservice certificate	80 (19.5)
ServSafe® or other food safety certification	330 (77.3)
Health department certification	61 (14.3)
Certified dietary manager	20 (4.5)
Dietetic Technician Registered	6 (1.4)

[a]Total percentages may ≠ 100 due to rounding or because participants could mark all that applied.

[b]Participants marked all that applied

[c]Responses only from participants who indicated they were the district foodservice director

[d]Foods/Nutrition = Foods and nutrition, Family consumer science, Nutrition education; Foodservice = Foodservice management, Culinary arts; Business = Business, Public/school administration; None of those listed

Farm to School participation based on who operates nutrition services

Based on Chi-square results, associations were observed between whether nutrition services were self-operated or contract managed and whether districts purchased foods from local/regional growers/producers ($p = 0.0001$) with 83% of directors from districts with contract managed nutrition services indicating they purchased foods from local/regional growers/producers versus 63% from districts with self-operated nutrition services (Table 2). Associations were also observed between whether nutrition services were self-operated versus contract managed and whether districts had procurement contracts with locally and regionally grown food producers ($p = 0.001$) with 74% of directors with contract managed nutrition services indicating they had procurement contracts versus 56% of directors with self-operated nutrition services (Table 2). These results may indicate that contract managed nutrition services have additional resources for purchasing and training than district-operated nutrition services. Unlike self-operated nutrition services, contract managed nutrition services have the advantage of extensive buying power (Sackin, 2006). Having contract managed nutrition services may provide district nutrition services with formalized structures and more procurement opportunities. However, an association was also observed between contract managed nutrition services and having no professional development offered about using produce from school gardens ($p = 0.001$). A higher percentage of directors (91%) from districts with contract managed nutrition services indicated that professional development was not offered versus 77% from districts with self-operated nutrition services.

Chi-square test results showed that no associations were observed between district nutrition services being contract managed or self-operated and participation in FTS activities ($p = 0.258$) (Table 2). In addition, no associations were observed between self-operated versus contract management of nutrition services and collaboration with non-governmental organizations promoting FTS ($p = 0.225$), the state agriculture department ($p = 0.119$), or a food commodity organization ($p = 0.641$) (Table 2). The lack of associations may indicate that FTS collaboration and participation occurs with any entity that operates the nutrition services, regardless of their administrative structure. The lack of associations between collaboration with organizations that can promote FTS activities and whether district nutrition services were self-operated (38%) or contract managed (44%) was unexpected. These results were contrary to expectations because associations were observed between purchasing foods locally and having preferences for local/regional procurement contracts and whether district nutrition services were self-operated or contract managed. These findings may indicate that FTS participation is more than just procurement and can involve education and gardening aspects. Using questionnaires administered to school nutrition employees from twelve schools in each of eight states, Kang et al. (2016) found that self-operated nutrition services participated in one more FTS activity than those that were contract managed. A suggested reason for this outcome was that self-operated services have more flexibility to implement new activities compared to contract managed operations (Kang et al., 2016). While contract managed nutrition services may have an advantage in purchasing and procurement, their lack of flexibility to adapt to school specific nutrition programs may act as a barrier to participating in more specialized education and gardening related FTS activities.

Table 2. *Farm To School Activities Reported by Whether the School Nutrition Services Were Self-Operated or a Contract Managed*[a]

Question Category	Questions	Response	Self-operated - School District n (%)	Contract managed - Foodservice Company n (%)	p-value[b]
Food Ordering	Purchase foods from local/regional growers/producers?[c]	Yes	274 (63.0)	83 (83.0)	0.0001
		No	161 (37.0)	17 (17.0)	
	Procurement contracts address preferences for locally/regionally grown food? [c]	Yes	237 (55.8)	72 (73.5)	0.001
		No	188 (44.2)	26 (26.5)	
	Participate in any Farm to School Activities? [c]	Yes	175 (38.3)	49 (44.1)	0.258
		No	282 (61.7)	62 (55.9)	
Collaboration and Promotion	Work on school nutrition services or nutrition activities with staff from:				
	A non-governmental organization promoting Farm to School activities? [c]	Yes	107 (23.7)	30 (29.4)	0.225
		No	345 (76.3)	72 (70.6)	
	A food commodity organization, such as the Dairy Council or produce growers association?	Yes	202 (44.6)	49 (47.1)	0.641
		No	251 (55.4)	55 (52.9)	
	The state agriculture department?	Yes	150 (33.3)	43 (41.4)	0.119
		No	301 (66.7)	61 (58.7)	
Staffing and Professional Development	Sourcing foods locally or regionally?	Yes	217 (49.8)	61 (59.8)	0.068
		No	219 (50.2)	41 (40.2)	
	Using produce from school gardens?	Yes	102 (22.9)	9 (8.7)	0.001
		No	343 (77.1)	94 (91.3)	

[a]Total percentages may ≠ 100 due to rounding.

[b]p-value based on chi square tests.

[c]These questions were only answered by individuals who responded Yes to whether their district nutrition services has primary responsibility for deciding which foods to order for any schools in the district.

Farm to School participation based on district location

Chi-square test results showed that associations existed between the district location and involvement in local and regional purchasing and procurement ($p = 0.001$ and $p = 0.001$, respectively) and participation in FTS activities ($p < 0.0001$) (Table 3). Slightly more than half (52%) of the participants from the city location indicated local and regional purchasing compared to 29% from rural and 34% from town locations. More than half (57%) of the participants from the city location indicated participation in FTS activities compared to 21% from rural and 23% from town locations. Although districts in large cities may be located farther away from farms, they have access to more resources that allow them to incorporate more local and regional produce into their school lunches. Accessibility to resources may account for the differences in local purchasing, such as when and how often local produce is purchased (Burt et al., 2019; Pinard et al., 2013). One study examined purchasing frequency and determined that smaller schools, such as in many rural school districts, were less likely than large schools to purchase daily and more likely to purchase weekly in comparison to medium and large schools (Stokes & Arendt, 2018). The need to purchase weekly versus daily may indicate that foods such as fruits and vegetables may not be as readily accessible to smaller schools, and that these schools may require the storage capacity to hold food for a week at a time. A study examining disparities between resources available to urban and rural schools showed that rural schools overall have fewer resources to improve the wellbeing of their students in comparison to city school districts (Truscott & Truscott, 2005). Rural districts often have smaller student enrollment and additional food procurement costs due to increased transportation and limited supply within the proximity of the district. Another study examined characteristics of school districts that participated in the Community Eligibility Provision of the National School Lunch Program (Rogus et al., 2018), with results applicable to resource availability for participation in the FTS program. Rogus et al. (2018) suggested that because government funding is based on enrollment, smaller schools may not receive as much funding in comparison to large urban schools, and that rural areas may tend to have fewer staff, making new policies and change more difficult to implement compared to larger districts.

Based on results from Chi-square tests, associations were also observed between district location in the current study and collaboration with outside organizations that may be involved in FTS programming such as the state agriculture department ($p = 0.001$), non-governmental organizations ($p < 0.0001$) and food commodity organizations such as produce growers associations ($p = 0.002$) (Table 3). For example, 57% of participants from city districts indicated they collaborated with non-governmental organizations compared to 21% of those from rural and 23% of those from town locations. About half (52%) from city districts indicated they collaborated with the state agriculture department compared to 29% of those from rural districts. Physical proximity may enhance collaboration between foodservice personnel in city districts and staff in organizations located in cities by supporting collaborative interactions and facilitating relationships. Physical distances from food centers, equipment, and organizations were also suggested by Rogus et al. (2018) as challenges to rural districts in implementing change to their school meal programs. Larger school districts may receive more resources than smaller districts in the form of money and collaboration, based on large student enrollment. This type of collaboration is important because community partnerships can assist with school staff education, implementation of FTS curriculum, and aid in exploration and innovation to further improve the program. FTS programming is based on collaboration with many external organizations to make the program a community effort (Cirillo & Morra, 2018).

Table 3. *Farm to School Activities Reported by District Location*[a]

Question Category	Questions	Response	City n (%)	Suburb n (%)	Town n (%)	Rural n (%)	p-value[b]
Food Ordering	Purchase foods from local/regional growers/producers?[c]	Yes	24 (52.2)	49 (45.4)	31 (33.7)	95 (28.6)	0.001
		No	22 (47.8)	59 (54.6)	61 (66.3)	22 (71.4)	
	Procurement contracts address preferences for locally/regionally grown food? [c]	Yes	31 (66.0)	53 (49.1)	46 (50.6)	131 (39.2)	0.002
		No	16 (34.0)	55 (50.9)	45 (49.4)	203 (60.8)	
	Participate in any Farm to School Activities? [c]	Yes	26 (56.5)	29 (26.7)	21 (23.1)	68 (20.5)	<0.0001
		No	20 (43.5)	80 (73.4)	70 (76.9)	263 (79.5)	
Collaboration and Promotion	Work on school nutrition services or nutrition activities with staff from: A non-governmental organization promoting Farm to School activities? [c]	Yes	26 (56.5)	29 (26.7)	21 (23.1)	68 (20.5)	<0.0001
		No	20 (43.5)	80 (73.4)	70 (76.9)	263 (79.5)	
	A food commodity organization, such as the Dairy Council or produce growers association?	Yes	31 (66.0)	53 (49.1)	46 (50.6)	131 (39.2)	0.002
		No	16 (34.0)	55 (50.9)	45 (49.4)	203 (60.8)	
	The state agriculture department?	Yes	24 (52.2)	49 (45.4)	31 (33.7)	95 (28.6)	0.001
		No	22 (47.8)	59 (54.6)	61 (66.3)	22 (71.4)	
Staffing and Professional Development	Sourcing foods locally or regionally?	Yes	30 (65.2)	62 (57.9)	48 (55.2)	147 (46.4)	0.029
		No	16 (34.8)	45 (42.1)	39 (44.8)	170 (53.6)	
	Using produce from school gardens?	Yes	14 (30.4)	23 (21.1)	22 (24.7)	56 (17.4)	0.126
		No	32 (69.6)	86 (78.9)	67 (75.3)	266 (82.6)	

[a]Total percentages may ≠ 100 due to rounding.

[b]p-value based on chi square tests.

[c]These questions were only answered by individuals who responded Yes to whether their district nutrition services has primary responsibility for deciding which foods to order for any schools in the district.

Table 4. *Farm to School Activities Reported by Director Degree*[a]

Question Category	Questions	Response	Food/ Nutrition n (%)	Foodservice n (%)	Business n (%)	None of those listed n (%)	p-value[b]
Food Ordering	Purchase foods from local/regional growers/producers?[c]	Yes	54 (78.3)	49 (80.3)	79 (78.2)	101 (55.2)	<0.0001
		No	15 (21.7)	12 (19.7)	22 (21.8)	82 (44.8)	
	Procurement contracts address preferences for locally/regionally grown food? [c]	Yes	49 (72.1)	42 (67.7)	65 (65.0)	83 (46.9)	<0.0001
		No	19 (27.9)	20 (32.3)	35 (35.0)	94 (53.1)	
Collaboration and Promotion	Participate in any Farm to School Activities? [c]	Yes	41 (58.6)	36 (54.6)	42 (39.6)	51 (27.6)	<0.0001
		No	29 (41.5)	30 (45.5)	64 (60.4)	134 (72.4)	
	Work on school nutrition services or nutrition activities with staff from:						
	A non-governmental organization promoting Farm to School activities? [c]	Yes	20 (29.9)	27 (40.9)	31 (29.5)	27 (15.0)	0.001
		No	47 (70.2)	39 (59.1)	74 (70.5)	153 (85.0)	
	A food commodity organization, such as the Dairy Council or produce growers association?	Yes	42 (60.9)	39 (59.1)	55 (52.9)	62 (34.1)	<0.0001
		No	27 (39.1)	27 (40.9)	49 (47.1)	120 (65.9)	
	The state agriculture department?	Yes	33 (47.8)	28 (42.4)	39 (37.1)	47 (26.3)	0.005
		No	36 (52.2)	38 (57.6)	66 (62.9)	132 (73.7)	
Staffing and Professional Development	Sourcing foods locally or regionally?	Yes	41 (58.6)	38 (60.3)	54 (52.9)	82 (46.3)	0.153
		No	29 (41.4)	25 (39.7)	48 (47.1)	95 (53.7)	
	Using produce from school gardens?	Yes	17 (24.6)	21 (32.8)	22 (20.8)	32 (17.7)	0.081
		No	52 (75.4)	43 (67.2)	84 (79.2)	149 (82.3)	

[a]Total percentages may ≠ 100 due to rounding.

[b]p-value based on chi square tests.

[c]These questions were only answered by individuals who responded Yes to whether their district nutrition services has primary responsibility for deciding which foods to order for any schools in the district.

Farm to School participation based on director degree type

Associations were observed in the current study between participation in FTS-related activities and district director degree type (Table 4). A higher percentage of those with food and nutrition-related degrees compared to those with none of the listed degrees reported purchasing foods from local or regional growers/producers (78% vs. 55%), having procurement contracts for locally- and regionally-produced foods (72% vs. 47%) and participating in FTS activities (59% vs. 28%). In many food and nutrition-related higher education programs, information about FTS practices is shared through community nutrition courses as part of the curriculum. Associations were also observed between district director degree type and collaboration with organizations that may be involved in FTS programs. For example, 61% of directors with food/nutrition degrees indicated they collaborated with food commodity organizations compared to 34% of those with none of the degrees listed. These findings may reflect how education background is related to participation in various areas of FTS programming based on desirable skills and abilities of foodservice directors described by Feenstra and Ohmart (2012).

CONCLUSIONS AND APPLICATIONS

The FTS program may have the potential to help children develop healthy eating habits at an early age, which would represent an important investment in the health of future generations (Moss et al., 2013). Exploring factors that contribute to school district participation is an important way to expand FTS program participation from the current approximately 65% of school food authorities nationwide (USDA, FSN, 2021) to a higher percentage, thus potentially benefitting more children. The results from this study showed that participation in FTS-related activities such as collaboration, purchasing and procurement may be related to who operates nutrition services, district location, and director degree type.

Having nutrition services self-operated by the school district was related to lower participation in local purchasing and local procurement contracts in comparison to those that were contract managed. However, no significant relationship was observed in FTS participation and collaboration with non-governmental organizations involved in FTS by whether district nutrition services were self-operated vs. contract managed. This may indicate that while contract managed districts have more local procurement contracts and purchasing, they contribute less to education and garden-related FTS activities. Results also showed that districts in rural areas had overall lower participation than all other location categories, which could indicate a disparity worth further study to understand how to reduce barriers facing these districts. Results by director degree type showed that directors with food/nutrition and foodservice degrees were more likely to participate in FTS related activities than those with other degree types or none of the degrees listed. This presents another area where schools can work toward improving staff knowledge to increase overall FTS participation. The results from this survey may act as a foundation for future research related to expanding FTS participation.

Districts who self-operate their nutrition services and those that are contract managed may require different resources to increase FTS participation. As results showed, although procurement varied between the two, overall participation was not different. Through multiple studies, evidence has shown that procurement by itself may not be as effective as other forms of FTS programming in improving health-related habits (Gold et al., 2017; Murimi et al., 2018). Considering that districts with contract managed nutrition services have the same amount of participation despite possibly having more procurement capacity suggests that they may be

falling short on other types of FTS activities. Areas to further investigate could include the types of FTS activities that districts with contract managed nutrition services are participating in and how often they collaborate with schools and students to create programs that fit the needs of the district population. The answers to these questions could inform ways to incorporate more education and increased collaboration with school staff. On the other hand, self-operated nutrition services indicated lower participation in local purchasing and procurement than contract managed nutrition services. This may represent the disadvantage self-operated schools face by not having the same amount of buying power that contract managed schools have access to through their contractor (Sackin, 2006). Finding ways to connect these districts with local and regional farmers may be the next step in improving involvement in procurement. Creating solutions specific to who operates nutrition services may provide schools with a better idea of the changes needed to make their unique programs successful.

Respondents from rural districts indicated lower participation in FTS programs and related activities across all survey questions in comparison to other district locations. Rural districts and schools that participate in FTS face unique barriers such as physical distance that prevents collaboration with local farmers (Askelson et al., 2015; Cirillo & Morra, 2018.; Smith et al., 2013). In addition, Landry et al. (2015) reported that a perceived lack of local food availability and variety among this population. Results from interviews and surveys with foodservice directors from rural school districts about changes required by the Healthy, Hunger Free Kids Act of 2010 indicated that many perceived an additional financial burden of having to supply more fresh produce, and lack of support in the form of staff, collaboration and technology to adapt to change (Cornish et at., 2016). Therefore, investing in rural districts may be an important step in decreasing the disparity in FTS program participation by district location and improving the health outcomes of children living in rural communities. As demonstrated in the literature, collaboration is a key component in improving FTS curriculum and overall staff knowledge (Janssen, 2015; Stokes & Arendt, 2018). Beyond increasing funding to implement change, improving support in rural programs may include increasing communication and collaboration with organizations that are not within a reasonable proximity. With an increase in video communication technologies, rural districts could create a partnership with food and nutrition-related organizations or other school districts to share knowledge that could advance each individual program's ability to participate. The next steps to improve FTS programming within rural areas may include creating collaboration networks for rural school districts, increasing technology access, and providing financial support to ease the implementation of change.

Directors with food/nutrition and foodservice degrees were more likely to indicate that they participate in FTS programs and related activities than those with other degrees or none of those listed. Hiring individuals with food/nutrition and foodservice degrees may be one way to increase FTS program participation, however many states do not currently have these degree types as a requirement for the position. The current director hiring standards for most districts are a bachelor's degree within a related field, or a bachelor's degree of any kind accompanied by a state recognized school foodservice certification (School Nutrition Association, 2021). These requirements become more flexible as the size of the school decreases, making it more likely for small districts, typically located in rural areas, to have foodservice directors with less education about nutrition (School Nutrition Association, 2021). To make up for the inconsistency in a director's education background, another way of creating a knowledge standard may be through standardized training to fill any knowledge gaps for foodservice directors with degree types other than a food/nutrition degree type (Flure et al., 2020). In a review examining the effectiveness of

nutrition interventions, highly trained foodservice professionals or those in collaboration with nutrition professionals were more likely to see success after implementation of curriculum than those with more lenient training standards (Murimi et al., 2018). By creating an education standard, foodservice personnel would have standardized knowledge and skills to create a successful and effective FTS program within their district. In the current study, the provision of FTS-related professional development was not related to director degree type, but could be tailored to meet individual needs by degree type in the future.

The use of data from a nationally representative sample of public school districts may have reduced sampling bias. However, the use of secondary data limited the ability to control data collection procedures or influence the type of data collected. In addition, responses to close-ended questions limited the ability to explore perspectives relevant to the study objectives. Self-reported survey responses may have been influenced by social desirability bias or lack of understanding of the questions.

The results from this analysis of the SHHPS 2016 survey responses provide new areas of focus within school food systems that could be studied further to improve FTS participation. Characteristics such as whether a district nutrition services is self-operated versus contract managed, director degree type, and district location should be considered when evaluating specific FTS programs because these characteristics may have an impact on participation in FTS-related activities. By continuing research within these areas, leaders in FTS programming can gain a better understanding of how to improve programs based on their unique resources and environment.

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