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Impacts of School District Characteristics on Farm-to-School Program Participation: The Case for Oklahoma

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Abstract

Farm-to-School (FTS) programs exist in 50 states. However, many FTS efforts have failed due to operating costs, local food availability, and distribution logistics. There is almost no literature examining the factors impacting FTS program implementation and success, although such information could have value to policy makers, school administrators, and producers interested in FTS. More than half of Oklahoma's schools provided information on their child nutrition programs, their means of food procurement, and their experiences with FTS (or lack thereof). This information was used in a logit model to examine the correlations between certain school characteristics and participation in FTS programs.

Keywords: Farm-to-School, locally grown, program adoption, logit model

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Introduction

Farm-to-School (FTS) programs have gained national recognition and policy support since the original 1996-1997 pilot projects were implemented by schools in California and Florida (National FTS Network 2009). In 2000, USDA's Initiative for Future Agricultural and Food Systems supported the establishment of the National FTS Program, serving as a catalyst for program development, research, and policy (USDA-CSREES 2008). The following year, the USDA Agricultural Marketing Service organized numerous FTS workshops nationwide. The 2002 and 2008 Farm Bills each included a section promoting the purchase of locally produced food (USDA-ERS 2008). Institutions receiving funding under the Child Nutrition Act of 1966 are encouraged to purchase unprocessed agricultural products, both locally grown and locally raised, to the maximum extent practicable and appropriate (USDA-ERS 2008). In 2011, according to the National FTS Network (2011), FTS activities included 48 states, involving approximately 9,756 schools and 2,255 school districts.

In terms of policy, practice, and perception, FTS programs connect schools with local farms, allowing school food service directors to purchase produce from local farmers. The program aims to help farmers by promoting the consumption of local produce and expanding market opportunities. At the same time, FTS programs are expected to impact trends in childhood obesity and diabetes by increasing the number of fresh fruits and vegetables in school meals; thus improving child nutrition while decreasing caloric intake.

Challenges to FTS Program Implementation

Numerous issues pertain to FTS, including operation costs, food supply, program adoption, and distribution logistics. Although more than 9,000 schools nationwide participate in FTS programs of some sort (National FTS Network 2011), not all of the FTS programs designed and implemented have been successful. FTS literature exists on program costs and benefits for specific cases and suggestions for implementing FTS programs. However, there is virtually no literature examining the probability of school participation in a FTS program, nor is there literature identifying the characteristics that support successful program implementation at schools. Distribution issues are one of the main barriers to FTS adoption (Berkenkamp 2006; Vogt and Kaiser 2006; and Zajfen 2008), but they alone do not determine the probability of successful FTS implementation at a school.

Despite institutional budget constraints and economic uncertainties, FTS has been adopted nationwide and is continually gaining more recognition. Thus, information regarding program adoption may be useful to food and agricultural policy makers, school food service directors, and producers interested in FTS. The primary objective of this USDA-funded study was to gather information and develop reference materials for those considering implementation of FTS, but not to justify FTS programs or suggest policies for encouraging/supporting FTS programs.

Why FTS?

There are various reasons why producers (farmers) and non-producer stakeholders (school food service directors, communities, parents, children, and warehouses or distributors) participate in FTS. Unlike other school-based programs, FTS closely links food service directors, parents, gardeners, farmers, and community members, giving each group the opportunity to become actively involved in schoolchildren's health and creating a positive outlook towards school food programs. However, while some of the motivations behind FTS participation are shared among producers and non-producer stakeholders, the basic premise behind FTS participation for each group is inherently different.

Research shows that food service directors participate in FTS programs to: support the local economy (Izumi et al. 2006; Oklahoma Food Policy Council, 2003; Vogt and Kaiser 2006), have access to a fresher product (Izumi et al. 2006; Oklahoma Food Policy Council 2003; Vogt and Kaiser 2006), and increase fruit and vegetable consumption among children (Izumi, Wright, and Hamm 2009; Joshi and Azuma 2009). Communities are willing to support FTS programs because they provide fresh food from known sources to consumers (Bellows, Dufour, and Bachmann 2003; Sanger and Zenz 2004). There are also perceptions among consumers that local farms have produce with superior taste and quality when compared to distance-sourced produce (Bellows, Dufour, and Bachmann, 2003). The National FTS Network sprouted from the desire to support community-based food systems, strengthen family farms, and improve student health by reducing childhood obesity (Center for Food and Justice 2009).

For the producers, FTS is an additional market outlet where geographic proximity limits competition. Recent research and interviews with farmers who participate in FTS show that FTS accounts for only a small fraction of business for the farmers, in many cases averaging only 5-10% of sales volume (Joshi and Azuma 2009). However, many farmers express the desire to participate and feel FTS could become a more profitable program in the future. According to a study in Vermont, all farmers involved in the Burlington School Food Project enjoyed the opportunity to educate students about their farms and recognized the potential FTS provided for direct marketing opportunities (Schmidt and Kolodinsky 2006). A study of six California farmers reported profits and quantities related to FTS were too small to contribute to an overall profit margin; nevertheless, the farmers want to nurture the program for its potential direct-marketing benefits (Joshi and Azuma 2009). Like food service directors and communities, the farmers consider FTS a program that is in line with their own values and creates synergy among farmers, school personnel, children, and other community members (Ohmart 2002).

In most instances, small-sized local farms would not be able to competitively market their products directly or "almost directly" to schools without an established FTS program. Small-scale farms have historically been perceived as inefficient since they lack the ability to cut costs with economies of scale (Buitenhuys et al. 1983). In addition, school cafeterias traditionally operate with extremely tight time and budget constraints (Izumi, Wright, and Hamm 2009), with the "big three" items – meat-based entrees, milk, and bread – consuming a majority of the food dollars and fresh produce purchases constituting a small budget percentage. However, political influence from small farmers and advocates for both localism and fresher/healthier foods has penetrated the school food system and localism-related policy incentives provide both small farms and tight-budgeted schools the ability to participate in FTS. Coincidentally, this political activism is similar to the rent-seeking activities foreseen by Orden and Paarlberg (2001), who predicted that process-defined farmers and like-minded consumer activists would try to persuade government to regulate agricultural products according to production processes, which can include localism and efforts to promote minimally processed foods.

Farmers marketing locally-grown foods are able to pursue a formerly untapped market opportunity as a result of these consumer trends and rent-seeking efforts. With government and community support for programs such as FTS, small- and medium-sized farms are able to compete with larger farms despite their inability to take advantage of economies of size. It is imperative to acknowledge that FTS, like many government programs, is not solely based on market-clearing supply and demand and is therefore subject to certain inefficiencies. These inefficiencies reinforce the necessity of examining programs such as FTS and identifying means to become more efficient.

Examining Program Participation – Previous Studies

Although previous studies related to FTS program participation are practically non-existent, a review of existing literature shows that many efforts have been made to quantify both consumer interest in locally-grown foods and the efficiency of school lunch programs. Several of these previous studies have relevance for efforts aimed at successful FTS program induction. The following studies all serve as important guides to identifying the potential for FTS adoption by schools.

Govindasamy et al. (1998) used logistical models to evaluate consumer awareness and willingness to buy local produce. Produce origin was not a statistically significant descriptive variable in their models. Produce quality was considered the most important factor by both consumers who bought and/or who were willing to buy local produce. (Govindasamy et al. 1998).

Maurer (1984) used national data to estimate the effects of meal program characteristics on lunch and breakfast programs. The specific program characteristics were breakfast program availability, open campus policy, à la carte service availability, vending machine availability, number of meal choices, and offered verses served meals. Maurer found students from low-income families were more likely to participate in breakfast and lunch programs than those from high-income families. In addition, students tended to participate in the programs regularly (four or five days a week) or not at all. Results also showed students were slightly more likely to participate in lunch programs at schools with breakfast programs.

Ham, Hiemstra, and Yoon (2002) described an ordinary least squares approach to determine what factors affect school lunch participation. The authors determined that the following independent variables affected participation: lunch price, school enrollment, closed or open campus policies, on-site or satellite food production systems, offered versus served lunch, and percentage of students eligible for free or reduced lunch. Ham, Hiemstra, and Yoon found that price had a large impact on the change in paid-lunch participation.

Gleason (1995) used a probit model to estimate participation rates in the National School Lunch Program (NSLP) and the School Breakfast Program. Gleason found that free and reduced meal certification status of students was strongly related to NSLP participation. The author noted that "more than three-fourths of certified students eat a school lunch on a given day, compared with fewer than half who pay the full price" (Gleason 1995, 215).

Murray (2005) reported descriptive statistics on the characteristics of colleges participating in FTS and found the most frequently cited program barrier was coordinating purchases and delivery of commodities.

Data and Methods

To determine the characteristics that best impact a school's decision to participate in FTS, the Oklahoma Child Nutrition Survey was jointly conducted by the Robert M. Kerr Food and Agricultural Products Center at Oklahoma State University, the Oklahoma Department of Education (ODE), and the Oklahoma Department of Agriculture, Food, and Forestry (ODAFF). The sample frame consisted of food service directors, child nutritionists, superintendents, and other school personnel from Oklahoma school districts. The Oklahoma FTS program identified districts participating in FTS, henceforth referred to as FTS participants and distinguished from non-FTS participants.

The following information was obtained via the created Child Nutrition survey: school district size, current suppliers of fruits and vegetables to the schools, the portion of the schools' food budget allocated for fruits and vegetables, produce preferences, and even distributors utilized by the schools when placing food orders. The state requires school districts each year to pursue bids and enter into contracts with primary foodservice providers, even though auxiliary providers can be used for certain items. Because of the primary provider requirement, the ability of a school to participate in FTS may be impacted by the chosen provider.

A final response rate of 52% was achieved involving 276 school districts. Tables 1-8 provide frequency breakdowns of responses to questions deemed most relevant for the logistic model. Fifty-five percent of responding districts had less than 500 students, which is consistent with the number of small rural school districts in the state, and 36% had between 500 and 2,500 students. A breakdown of the district size and students served can be found in Table 1 (see Appendix A). Breakfast programs were prevalent in almost all responding FTS and non-FTS schools, although the presence of summer feeding programs varied more significantly between FTS (45%) and non-FTS (25%) schools (Table 2). Conversely, the non-FTS schools were more inclined to have closed campus lunch policies for high schools than the FTS schools, 72% to 55%, respectively.

As shown in Table 3, the prevalence of free/reduced meals as a percent of total provided meals was quite high. Seventy-six percent of all districts reported having more than 50% of their total provided meals as free/reduced meals. The percentages varied by school district size, with only the 5,000-10,000 student schools having a majority (67%) of schools with less than 25% free/reduced meals.

Table 2. Breakfast and summer feeding programs and campus policy according to FTS participation

Do your schools participate in breakfast programs? If so, how many students do you serve per day with the breakfast program?[a]

		No breakfast program	Breakfast program
Non-FTS participant	Number	13[b]	231
	Percent	5[b]	95
FTS participant	Number	0	29
	Percent	0	100

Do any of the schools within your district house a summer feeding program?[c]

		No summer feeding program	Summer feeding program
Non-FTS participant	Number	183	62
	Percent	75	25
FTS participant	Number	16	13
	Percent	55	45

Is your school district a closed or an open campus for high-school students during lunch hours?[d]

		Closed campus policy	Open campus policy
Non-FTS participant	Number	171	66
	Percent	72	28
FTS participant	Number	16	13
	Percent	55	45

[a]N=273. [b]Among non-FTS participants, 13 (5%) do not have a breakfast program. [c]N=274. [d]N=266.

Table 3. Free and reduced meals received according to district size

Free and reduced meals (%)	District size						
	< 500	500-1,000	1,000-2,500	2,500-5,000	5,000-10,000	> 10,000	All districts
< 25%	1%[b]	4%	9%	0%	67%	14%	4%[c]
25% to 50%	17%	22%	27%	38%	0%	14%	20%
51% to 75%	48%	54%	56%	46%	33%	43%	50%
> 75%	34%	20%	9%	15%	0%	29%	26%

[a]N=273. [b]One percent of the respondents with district size of 500 students or less reported less than 25% of the students receive free and reduced meals. [c]Across all district sizes, 4% reported less than 25% of the students receive free and reduced meals.

Table 4 provides information on the schools' experiences with FTS programs in the state. Sixteen (6%) had participated in a statewide pilot program several years ago, but did not pursue FTS efforts beyond the pilot program. Twenty-eight (10%) indicated they were active in the current state FTS program, while another 29 (11%) indicated they work with local farmers for at least some small portion of their produce requirements but not within the structure of the state's FTS program. Table 5 (see Appendix B) provides an overview of the more common distributor firms for schools' food items, including fresh produce and frozen/preserved produce items.

Table 4. Type of FTS program participation by responding school districts[a]

	Pilot program	Statewide program	Working with local farmers	None of these
Number	16[b]	28	29	218
Percent	6[b]	10	11	79

[a]N=276 [b]Of the 276 collected responses, 16 respondents (6%) participated in the FTS pilot program.

Weekly produce deliveries were most prevalent among responding school districts, with 77% of non-FTS schools and 82% of FTS school receiving fresh produce on a weekly basis (Table 6). The second most-used delivery schedule for produce was twice-per-week, at 14% and 18% for non-FTS and FTS schools, respectively. Regardless of the regularity of deliveries, fresh produce represented less than 15% of total food budgets for 89% of non-FTS schools and 79% of FTS schools, and most of those produce purchases were for precut and bagged items (Table 7).

Overall, the schools believed that FTS programs benefited a broad range of stakeholders (Table 8). A larger percentage of respondents felt that farmers benefited from the program (84%) compared to students (81%), schools (74%), or the community (62%). By far, the responding schools viewed delivery scheduling as the greatest barrier to FTS program success (54%), much more so than availability of produce (13%), seasonality of production (12%), or even costs (9%).

Table 6. Produce delivery frequency according to FTS participation[a]

		Once a month	Twice a month	Once a week	Twice a week
Non-FTS participant	Number	8[b]	12	178	33
	Percent	3[b]	5	77	14
FTS participant	Number	0	0	23	5
	Percent	0	0	82	18

[a]N=259 [b]Among non-FTS participants, 8 (3%) have produce delivered once a month.

Table 7. Fresh produce expenditure and percentage of fruits and vegetables precut and bagged

Percentage of food budget spent on fresh produce[a]

		Percentage				
		<5%	5% to 15%	16% to 25%	26% to 50%	>50%
Non-FTS participant	Number	85[b]	125	6	7	14
	Percent	36[b]	53	3	3	6
FTS participant	Number	7	15	0	2	4
	Percent	25	54	0	7	14

Percentage of precut and bagged fruits and vegetables received

		Percentage				
		10%	25%	50%	75%	100%
Non-FTS participant	Number	85	62	44	28	4
	Percent	38	28	20	13	2
FTS participant	Number	7	12	2	7	0
	Percent	25	43	7	25	0

[a]N=265
[b]Among non-FTS participants, 85 (36%) allocate less than 5% of their food budget to produce.
[c]N=251

Table 8. Perceived beneficiaries of and barriers to FTS

"In your opinion, who benefits from Farm-to-School? Please check all that apply."[a]

	Schools	Students	Farmers	Community	Other
Number	135[b]	148	152	112	5
Percent	74[b]	81	84	62	3

"What do you feel is the greatest barrier to a successful Farm-to-School program within your district?"[c]

	Costs	Delivery	Seasonality	Health concerns	Availability of products	Other
Number	18	107	24	13	25	12
Percent	9	54	12	7	13	6

[a]N=182 [b]135 respondents (74%) stated schools benefit from FTS. [c]N=199

Logistic and probit models are often used for estimating dichotomous variables; however, the logit is easier to compute and provides odds ratios useful for interpretation of coefficients. The utility function of the school districts when choosing whether or not to participate in FTS is

a random utility function, which is shown in equation 1,

$$(1) \qquad U_{ij} = V_{ij} + \varepsilon_{ij}$$

where j represents the districts and i is the choice option of participating (FTS) or not participating (NFTS) in the program. U_{ij} is the district's utility defined by a deterministic (V_{ij}) and a stochastic (ε_{ij}) component. Assuming V_{ij} is linear in parameters, the utility function may be expressed as equation 2,

$$(2) \qquad V_{ij} = \beta_0 + \sum_{k=1}^{6} \beta_k X_{kij}$$

X_{kij} represents characteristic k (k=1,…, 6) of the j^{th} district for the i^{th} choice option. β_k is the coefficient associated with X_{kij}. The district utility is not observable but the choice to participate or not to participate in FTS is observable. A district chooses to participate in the program when the utility of participating is greater than the utility of not participating; thus, the probability for a district to participate in FTS program can be described by equation 3, assuming the distribution of the error terms (stochastic component) is independent and identical:

$$(3) \qquad \text{Prob }(FTS) = P(U_{FTSj} > U_{NFTSj})$$

A binary logistic model could be used to fit the regression, as show in equations 4 and 5, with NFTS as the reference category where the parameter estimates are normalized to zero and P_j denoting the probability that the j^{th} district chooses to participate in FTS. The probability for a district to participate in FTS program can be expressed in equation 4:

$$(4) \qquad P_j(FTS) = \frac{exp(\beta_k X_{kj})}{1 + exp(\beta_k X_{kj})}$$

where X_{kj} is a particular explanatory variable for district characteristic k and β_k is the coefficient associated with X_{kj}. The empirical model used for the analysis is seen in equations 5:

$$(5) \qquad P_j(FTS) \quad = \beta_0 + \sum_{k=1}^{K} \beta_k X_{kij}$$

Detailed definitions of all independent variables are provided in Table 9 (see Appendix C). Equation 6 represents the deterministic portion of the utility function, which is expressed as the sum product of the parameters of the independent variables listed,

$$(6) \quad P_j(FTS) = \beta_0 + \beta_1 SIZE_j + \beta_2 SUMMERP_j + \beta_3 REDUCED_j + \beta_4 CMPSPOLICY_j + \beta_5 DELFREQ_j + \beta_6 PROCESSED_j + \beta_7 DISTRIBUTOR_j + \beta_8 BUDGET_j$$

The explanatory variables include district size (SIZE), the percentage of free and reduced meals received by the student population (REDUCED), district participation in summer feeding programs (SUMMERP), campus policy during lunch period (CMPSPOLICY), commonly used produce vendors (DISTRIBUTOR), delivery frequency of produce (DELFREQ), percentage of the school's fresh produce purchases that are pre-cut and bagged (PROCESSED), and the share of a school nutrition budget utilized for produce purchases (BUDGET). Descriptions and summary statistics for these explanatory variables are provided in Table 9 (see Appendix C).

Breakfast program participation and a class variable for the school's choice of primary food distributor were originally included in the model, but were removed to avoid multicollinearity. Breakfast program participation is a continuous variable closely correlated to district size, i.e. participation in breakfast programs increased as district size increased. Primary distributor choice closely correlates to chosen produce distributors because of an Oklahoma requirement for each school to contract with a primary distributor that provides a majority of the school's food items, so often the distributors that provided other food items also provided fresh produce.

Using SAS® and maximum likelihood estimation (Allison 1999), the logistic model predicted the probability of schools participating in FTS. Because interpretation of the coefficients in logistic models are not intuitive, alternative means of understanding coefficients are used. The marginal effect is estimated using equation 7,

$$(7) \qquad \frac{\partial P_j}{\partial X_{kj}} = \frac{exp(\beta_k X_{kj})}{[1 + exp(\beta_k X_{kj})]^2} \beta_k$$

Applying this equation, if the base or reference equation contains X_{kj} values equal to their means, then the change in probability can be observed for an incremental unit change or 1% increase in X_{kj}. Marginal effects are used to measure changes in probability of participation in the FTS program due to given changes in the independent or explanatory variables.

A restricted model using only SIZE, CMPSPOLICY, DELFREQ, DISTRIBUTOR, and BUDGET as explanatory variables was also developed. Log likelihood ratio tests indicated that the unrestricted model did not fit the data significantly better than the restricted model. However, results from both models are included.

Model Results and Implications

Table 10 lists the independent variables from the unrestricted model along with their marginal probabilities. Of the eight listed variables, only five were statistically significant at the 10% level or higher and therefore included in the restricted model. Marginal probabilities for the restricted model are shown in Table 11.

Table 10. Results of the unrestricted FTS participation logit model

Item	Estimate	Standard Error	Change in probability
Intercept	-3.0179	1.3123	--
SIZE***	0.0004	0.0001	0.0024%
REDUCED	-0.0181	0.0161	-0.1121%
SUMMERP	-0.0760	0.6148	-0.4706%
CMPSPOLICY*	0.9062	0.5243	5.6117%
DELFREQ*	0.2496	0.1430	1.5457%
PROCESSED	-0.0074	0.0113	-0.0459%
DISTRIBUTOR**	-1.7854	0.8083	-11.0561%
BUDGET***	3.5007	1.3849	21.6782%

***, **, and * indicates significance at the 1%, 5%, and 10% levels, respectively.

Table 11. Results of the restricted FTS participation logit model

Variables	Estimate	Standard Error	Change in probability
Intercept	-4.3583	0.8462	--
SIZE***	0.0004	0.0001	0.0029%
CMPSPOLICY*	0.9008	0.5073	5.9067%
DELFREQ *	0.2298	0.1389	1.5068%
DISTRIBUTOR**	-1.7478	0.8032	-11.4607%
BUDGET***	3.5140	1.3117	23.0421%

***, **, and * indicates significance at the 1%, 5%, and 10% levels, respectively.

According to the logistic model, district size, campus policy, delivery frequency of produce, produce distributor used, and the percentage of the budget allocated to produce purchases were all correlated to FTS participation. All variables, with the exception of the contracted produce distributor, had a positive association with FTS participation.

Statistics suggest a positive relationship between the probability of FTS participation and a district's student population, indicating that larger school districts may be more inclined to initiate a FTS purchasing regimen. This unearths a more dynamic aspect of FTS. The program can only exist if there are willing consumers and suppliers. Both the schools' and the farmers' needs must be met in order for a FTS program to be successful and sustainable. According to interviews with a few farmers participating in FTS, it is more convenient and profitable to supply higher volumes of produce to schools with large orders (i.e. larger school districts) as opposed to delivering smaller quantities to numerous schools. By doing so, the farmer minimizes transportation costs and time spent on coordinating orders.

The proportion of a district's cafeteria budget also significantly affected the probability of FTS adoption. With increasing amounts of a food budget allocated to purchasing produce, FTS participation became more likely among districts. Given the percentage of a budget was on a scale with equidistant values, the likelihood of FTS participation within a district increased by 23% when increasing the proportion of money allocated to fruits and vegetables by one level. Similarly, delivery frequency, a categorical variable, had a positive influence on FTS adoption.

The remaining variables in the restricted model were dichotomous. School districts with an open campus policy were six percent more likely to participate in FTS than districts with a closed campus policy. This can be explained by market competition. Cafeteria food must appeal to students to compete with other restaurants and food chains if a school has an open campus policy. Advertising locally grown, fresh fruits and vegetables on salad bars is one way some schools chose to market their cafeteria food.

Districts that use smaller, local/in-state distributors were more likely to foster FTS programs than those that contracted with larger regional/national distributors. Findings from a follow-up survey of food distributor representatives suggest that this may in part be due to the challenge of large distributors to economically justify reserving valuable warehouse space for small volumes of seasonally-limited local produce purchased by a small percentage of their clients. Many larger distributors expressed interest in participating in FTS programs, and some have worked with the state FTS program. However, coordinating procurement from several small, independent farmers with the ordering schedules of schools can be cumbersome. Representatives also stated that the verification and delivery of locally-grown FTS produce to schools was more costly to the distributor, unless the order was a large one for a district of substantial size. Conversely, smaller distributors may be more likely to work with local farmers to coordinate procurement and distribution of smaller produce quantities while using the “local” marketing angle to differentiate their products and services from those of their larger competitors.

Conclusions

States with strong local food initiatives may have the potential for adoption of FTS programs, if school district and state policies – as well as logistics – result in satisfactory farmer-school transactions. Identifying the school district characteristics associated with participation may help food service directors and farmers target their FTS programs towards school districts more likely to adopt and succeed with FTS programs.

Using a logit procedure, a binary choice model was specified to represent the dichotomous decision to participate in FTS. The probability of FTS participation by Oklahoma schools was significantly impacted by factors such as district size, frequency of produce deliveries, the type of food distributors used by the schools, and the share of school food budgets allocated to fruits and vegetables. Marginal effects were calculated to measure the effects of changes in the explanatory variables on the probability of FTS participation.

Overall, the results indicate that larger school districts with open campus policies, using smaller/dispersed food distributors (as opposed to large, regional distributors), and the preferences/ability for more frequent food deliveries by schools are indicative of schools inclined to participate in FTS programs. Schools with larger budget shares set aside for produce have more options for purchasing fresh fruits and vegetables and are more likely to participate in FTS.

Because food distributors play a large role in FTS participation, this information might be useful to farmers considering FTS participation, since local schools may prefer to have produce deliveries coordinated through third-party distributors so that all food deliveries occur at a specified time.

Future research might benefit from identifying factors other than characteristics of districts, such as the availability of FTS program information to the school's nutrition program director and the influence of stakeholders and/or the state FTS program organizer. For example, all of the school personnel from districts currently participating in Oklahoma's FTS program have had close contact with the very charismatic Oklahoma FTS coordinator. Furthermore, it might be useful to observe the opinions of food service and school personnel towards local food initiatives, or even determine willingness-to-pay for a FTS program.

This study provides a unique insight into a state FTS program and the willingness of schools to participate in the program. Viability of the program is not solely contingent on the willingness of schools, but that of the farmers and even distributors involved in the food marketing chain. Applying the methods of this study to FTS programs in other states may assist the National FTS Network in achieving more targeted and more successful FTS programs.

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Appendix A.

Table 1. District size and number of students served according to district size

	District size[a]					
	< 500	500-1,000	1,000-2,500	2,500-5,000	5,000-10,000	> 10,000
Number	153[b]	54	45	13	3	8
Percent	55[b]	20	16	5	1	3
	Range of number of students served[c]					
	< 500	500-1,000	1,000-2,500	2,500-5,000	5,000-10,000	> 10,000
Number	179	50	27	7	4	6
Percent	66	18	10	3	1	2

[a]N=276 [b]153 respondents (55%) reported a school district of 500 students or less. [c]N=273

Appendix B.

Table 5. Distributors for fresh produce and all items

From what distributor(s) does your school district receive food items including any form of fruits and vegetables?[a] *	
Small distributors	22%[b]
U.S. Foods*	15%
Sysco*	11%
Grocery Stores	11%
Tankersley Food Company	6%
Tom E. Boggs	6%
Mid-America*	5%
Performance Food Group*	5%
Ben E. Keith*	5%
Vinyards	3%
Buddy's Produce	3%
Tulsa Fruits & Produce	3%
Southwest Food Service*	2%
Thomas Brothers-Tulsa	1%
Okie Produce	1%
Frontier Produce	1%
Thomas Brothers-OKC	0%
Regarding the list below, which distributor(s) provide(s) fresh fruits and vegetables (i.e.: whole produce, cut, or bagged)?[c]	
Small distributors	18%
U.S. Foods*	13%
Sysco*	12%
Grocery Stores	11%
Tankersley Food Company	9%
Ben E. Keith*	6%
Tom E. Boggs	5%
Mid-America*	4%
Vinyards	4%
Performance Food Group*	4%
Buddy's Produce	4%
Tulsa Fruits & Produce	4%
Southwest Food Service*	2%
Thomas Brothers-Tulsa	2%
Okie Produce	1%
Frontier Produce	1%
Thomas Brothers-OKC	0%

[a]N=261
[b]N=Across all districts, 22% buy all food items from small distributors.
[c]N=257
*National or "large" regional (more than 4 states) distributor

Appendix C.

Table 9. Description of variables used in the FTS logit model

Variable	Description	Mean	Standard Deviation	Min	Max
SIZE	District size (continuous variable ranging from 0-40,000 students)	1396.6800	4184.1600	44.0000	41195.0000
REDUCED	Student population receiving free and reduced meals (continuous variable ranging from 0-100%)	63.1721	18.3875	9.8300	100.0000
SUMMERP	Existing summer feeding program (yes = 1, no = 0)	0.2737	0.4467	0.0000	1.0000
CMPSPOLICY	Campus policy during lunch hours (open = 1, closed = 0)	0.2970	0.4578	0.0000	1.0000
DELFREQ	Frequency of produce delivery (1 = once a month, 2 = twice a month, 4 = once a week, 8 = twice a week)	4.4015	1.6309	1.0000	8.0000
PROCESSED	Amount of produce received pre-cut and bagged (continuous variable ranging from 10-100%)	32.2510	24.1870	10.0000	100.0000
DISTIBUTOR	Distributor used for produce (less common, small distributor and grocery store = 0, commonly used, large distributor = 1)	0.2879	0.4537	0.0000	1.0000
BUDGET	Amount of cafeteria food budget allocated to fresh produce (continuous variable ranging from 0 to 70%)	0.1121	0.1438	0.0029	0.6667