

RESEARCH ARTICLE

The Impact of Local Food Expenditure on School Foodservice Revenues

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ABSTRACT

BACKGROUND: Locally grown foods, through farm-to-school (FTS) activities, may be a key component to balancing foodservice budgets and alleviating financial constraints in school districts. Therefore, the purpose of this study is to examine the impact of local food expenditures on school foodservice revenues and earnings. We anticipated a positive impact of local food expenditures on foodservice revenues and earnings.

METHODS: Ordinary Least Squares (OLS) regression analysis was conducted using data from the 2013 US Department of Agriculture Farm to School Census. The questionnaire primarily asked all US public school districts about their FTS operations during 2011-2012 school year.

RESULTS: Although our results initially showed a negative impact of local milk and nonmilk expenditures on foodservice revenues from food sales, when combined with revenues from the federal government, the impact is positive. The positive effect seems to hold when adding foodservice revenues from both food sales and federal funds. Our study found a similar pattern for foodservice earnings.

CONCLUSIONS: This may indicate that competitive foods are still widely preferred in school districts. Revenue from the federal government is critical to maintain FTS activities viable to students and community members although federal funds and food sales may not cover total foodservice expenditures.

Keywords: farm-to-school program; school foodservice revenues; local food expenditure.

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Farm-to-school (FTS) programs are among the several efforts dedicated to improve the quality of school meals in US public schools. These programs include a variety of activities design to connect students with local agriculture, such as field trips to farms and taste tests, as an effort to integrate locally grown food into school meals, attempting to connect schools and farms in a mutually beneficial relationship. FTS programs also have the potential of enhancing local economic development as well as building capacity for creating infrastructure, sustainability, citizen involvement, and providing access to employment and quality public goods such as freedom from crime and greater access to education.¹

Another major component of these efforts is to improve the quality of school meals in US public schools as they have long been identified as a key setting for promoting childhood health due to their unique positioning to foster healthful eating through

meal programs.² The National School Lunch Program and the School Breakfast Program, authorized by the US Department of Agriculture (USDA) Food and Nutrition Services, provide affordable meals for over 32 million children each day in the United States. Students who participate in the school breakfast and lunch programs are found to consume more than half of their caloric intake in school environment.³ The Healthy, Hunger-Free Kids Act of 2010 required school districts participating in both lunch and breakfast programs to make significant changes to meals served to students. These new guidelines provided the number of required servings in each food group, limiting the amount of sodium, fat and calories for each meal.⁴

However, school foodservice directors face several financial obstacles to purchasing locally grown foods. Among them, the main perceived financial issues were related to budget constraints that led to the

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low prioritizing of health initiatives, making it more difficult to integrate healthier food components into school meals due to both reductions in foodservice staff and added food costs.⁵ In addition, the purchasing of local foods may be associated with higher levels of economic transaction costs incurred by school districts.⁶ Another pressing financial challenge reflects the greater availability of competitive foods, broadly defined as foods and beverages sold in foodservice areas in addition to, or at the same time as the reimbursable meals of the federal school meals programs, such as the National School Lunch Program.^{7,8}

The severe budget constraint of school foodservice operations have led many school districts to serve popular but nutritionally inferior food items that are appealing to students' preferences to maximize revenue levels. Among them, competitive foods, such as *a la carte* offerings and vending machine food items, may cover the existing revenue gap.⁹ Therefore, schools may remain reluctant to modify their competitive food offerings because of the potential impact nutritional changes could have on school foodservice revenues.⁸ The availability of competitive foods may also affect participation rates and school meal revenues. For instance, Fox et al.,⁷ investigating the financial contribution of competitive foods, have reported that competitive foods generate substantial revenue for schools. Similar results were also found by the US General Accounting Office.^{10,11}

However, recent evidence indicates that revenue losses due to decreases in the sales of competitive food may be unfounded, at least for the long-term. For instance, contrary to foodservice directors' belief that increase in number of food policies produce a negative effect on school finances, providing healthier food options is affordable and does not compromise school foodservice finances.¹² In addition, Cohen et al.¹³ suggest that schools may experience short-term losses due to the combined implementation of healthier school meals and competitive food policies, but potentially minimal impacts on longer-term overall revenues. Schools struggling with school meal revenues or participation rates from school meal standards may benefit from the new guideline standards. The study found that school districts with higher school meal revenues had the lowest competitive food revenues, and similarly, school districts with higher competitive food revenues had the lowest school meal revenues. This finding supports the growing evidence indicating the substitution effect between school meal and competitive food revenues.^{14,15}

In addition, there is a lack of evidence demonstrating improvements in both school revenues and profitability caused by increased in competitive foods revenues. Peterson¹⁴ provides evidence that competitive

foods revenues are associated with a negative effect on school foodservice finances. The findings suggest that reducing the availability of unhealthy competitive foods in schools results in either positive or neutral effects on foodservice finance, in part by increasing revenue from the school meal programs. The results indicate that school officials should examine competitive food profits, not revenue, to assess the financial contribution of competitive foods.

Locally grown foods may be a key component to balancing foodservice budgets and alleviating financial constraints in school districts. Therefore, the purpose of this study is to examine the impact of local food expenditures on school foodservice revenues and earnings. In this specific case, earnings are equal to foodservice revenue minus foodservice costs. Although public school districts are nonprofit, any annual surplus in earnings remain in foodservice budgets to be used in following years, or may be also used for foodservice improvements, such as equipment and the hiring of additional staff.¹⁶

As a result, the contribution of this study is twofold. First, locally grown foods may be a key component to balancing foodservice budgets and alleviating financial constraints in school districts. According to the latest USDA Farm to School Census, FTS operations currently reach nearly 23 million students in the United States, and purchase nearly \$800 million in local foods from farmers, potentially leading to over a billion dollars in local economic activity. Several studies estimate that buying local foods has a multiplier effect of 1.4-2.6 throughout the local economy.¹⁷⁻²⁰ In other words, for every dollar spent locally, another 40 cents to \$1.60 of economic activity is generated.

As a second contribution, there is a lack of evidence demonstrating the impact of purchasing local foods on financial outcomes in foodservice operations of school districts. Schools with balanced budgets are more likely to innovate and create value for students, having positive effects in academic outcomes.⁵ In addition, the potential positive effect on locally grown foods on school district finances is likely to have positive nonfinancial outcomes, such as preventing obesity, achieving higher educational outcomes and integrating students, other school members and farmers in the community.

METHODS

Participants and Instruments

The US Department of Agriculture conducted FTS census among public and private schools in 2013 and 2015. The census questionnaire primarily asked all US public school districts about their FTS activities during both 2011-2012 and 2013-2014 school years, respectively. The census prioritized

obtaining procurement data related to local sourcing, and included the types and frequency of local products purchased, the percentage of overall food budget spent on local foods and the degree to which the purchasing of locally grown foods is expected to increase, stay the same, or decrease.

The dataset used school districts as the unit of analysis. It consisted of identifying whether school districts participated in farm to school activities, main benefits and problems in procuring local products, number of schools in school district participating in FTS activities, as well as having school gardens and salad bars. In addition, direct and intermediary distributors, types of products purchased from local producers, frequency of purchase and local food costs, including and excluding locally purchased milk, were also part of the questionnaire.

The dataset also contained information from the National Center for Education Statistics' Common Core Data of public schools. Among others, the percentage of students eligible for free and reduced price meals, proportion of minority students and a set of financial variables, including foodservice revenue food sales and the federal government, foodservice benefits and salary expenditures as well as nonlabor foodservice expenditures (food and supplies) and total school system expenditure were part of the questionnaire. Because financial data was only available for FTS census 2013, we investigate the impact of local foods on school district finances from a cross-sectional rather than panel data perspective.

Procedure and Data Analysis

From a total of 13,133 public school districts in the target list frame, 9896 school districts completed usable responses for a total response rate of over 75%. Of these, 8719 usable responses were collected from March to July 2013 and another 1177 usable responses from October to November 2013. From the sample of 9896 school districts in the United States, nearly 40% of school districts have started FTS activities in the fiscal year 2011-2012. Using only the 3891 schools participating in FTS programs, we performed OLS regression analysis with robust SEs in order to minimize the potential impact of heteroscedasticity on the explanatory variables.

We specified the general regression equation by:

revenue = $\beta_1 + \beta_2$ (local food expenditure) + β_2 (School District Characteristics) + ε , where local food costs are segmented into local milk and local nonmilk products, and school district characteristics is a vector comprising school racial composition, number of students, number of schools in the district, and the percentage of students who are eligible for free and reduced-price meals. Next, we describe the variables used in the study.

Outcome variables: Foodservice sales and earnings.

As a measure of revenue, we have included the foodservice revenue from food sales, foodservice revenue from federal funds, and the summation of both. Due to the nonnormality of data, these 3 variables were transformed using the natural logarithm transformation. In addition, we also calculated earnings by simply measuring the difference between revenues and total food expenditure. Because the distribution of the earnings presented high leptokurtic kurtosis, including very large negative and positive values, we applied a symmetric transformation that pulls in extreme values. As a result, we have used the following cubic root transformation, $\text{sign}(\square) \times \text{abs}(\square)^{\frac{1}{3}}$, where the argument is given by the difference of earnings and the median value of earnings. Previous research indicates this as an appropriate transformation in case of leptokurtosis.²¹⁻²³

Explanatory variables: Local milk and local nonmilk expenditures.

The main explanatory variables are the dollar estimates spent on locally grown foods, including and excluding local fluid milk. Both variables were log transformed due to data skewness. The differences between local milk and local nonmilk foods are important since aggregate local food expenditures for the 2013-2014 year were equal to \$789 million, comprising 11% of the value of total food expenditure, among which fluid milk accounted for 61% of the value of local school food expenditures.²⁴

Control variables: School district characteristics.

The estimated econometric model considers a number of control variables to take into account school district characteristics, such as the number of students in the school district and the percentage of students eligible for both free and reduced meal prices. Finally, we control for school racial profile as taking into account the percentage of minority (non-white) students, such as Hispanic, Asian, Native American, Pacific Islander, and black students. In addition, we control for school location using a dummy variable for rural area. Previous research indicates these control variables as important determinants of local school food expenditures.²⁵⁻²⁷

RESULTS

Overall, the average foodservice revenue from both food sales and federal government funding was \$553,687.10 and \$960,260.00, respectively, while the mean summation of both revenues was \$1,513,947. On average, school districts incurred negative foodservice profits taking into account the revenues from food sales, federal money, and a summation of both minus the total foodservice expenditure (including salary, benefits, and nonlabor expenditures). The mean negative values were minus (\$1,017,615), (\$611,000.40), and (\$57,355.29) respectively. The average total food

Table 1. Ordinary Least Squares (OLS) Models—School Foodservice Revenues

	Revenue From Food Sales		Revenue From Federal Funds		Total Foodservice Revenue	
	Column 1a	Column 1b	Column 2a	Column 2b	Column 3a	Column 3b
Local expenditure (including milk)	-0.00631*(0.00333)		0.00468 (0.00358)		0.00515*(0.00277)	
Local expenditure (excluding milk)	-0.00367 (0.00360)		0.0114*** (0.00412)		0.00849*** (0.00308)	
# Students	1.034*** (0.0118)	1.031*** (0.0121)	0.956*** (0.0116)	0.951*** (0.0122)	0.973*** (0.00768)	0.972*** (0.00822)
Reduced meal	-0.00882*** (0.000731)	-0.00844*** (0.000735)	0.0227*** (0.000907)	0.0225*** (0.000897)	0.00637*** (0.000542)	0.00620*** (0.000552)
Minority	-0.00985*** (0.000840)	-0.0102*** (0.000822)	0.00243*** (0.000795)	0.00251*** (0.000807)	0.00000289 (0.000528)	-0.0000421 (0.000531)
Rural area	0.0625*** (0.0227)	0.0507** (0.0228)	0.0574** (0.0234)	0.0585** (0.0233)	0.0438*** (0.0167)	0.0433*** (0.0168)
_cons	5.450*** (0.0887)	5.444*** (0.0890)	4.491*** (0.102)	4.482*** (0.102)	5.828*** (0.0638)	5.818*** (0.0651)
N	2291	2328	2298	2334	2322	2360
r ²	0.888	0.888	0.886	0.881	0.939	0.935

*p < .10,
 **p < .05,
 ***p < .01.
 Robust SEs in parentheses.

Table 2. Ordinary Least Squares (OLS) Models—School Foodservice Earnings

	Earnings From Food Sales		Earnings From Federal Funds	
	Column 1a	Column 1b	Column 2a	Column 2b
Local expenditure (including milk)	-0.328 (0.205)		0.289 (0.201)	
Local expenditure (excluding milk)			0.267 (0.208)	
# Students	-29.76*** (0.791)	-29.50*** (0.797)	-26.99*** (0.809)	-26.49*** (0.791)
Reduced meal	-0.604*** (0.0360)	-0.611*** (0.0371)	0.179*** (0.0499)	0.161*** (0.0502)
Minority	-0.229*** (0.0310)	-0.233*** (0.0314)	0.282*** (0.0534)	0.275*** (0.0540)
Rural area	-8.711*** (1.035)	-8.759*** (1.130)	-7.584*** (1.346)	-7.382*** (1.304)
_cons	180.1*** (6.436)	180.5*** (6.415)	114.4*** (6.537)	111.7*** (6.445)
N	2329	2367	2329	2367
r ²	0.758	0.748	0.560	0.553

*p < .10,
 **p < .05,
 ***p < .01.
 Robust SEs in parentheses.

expenditure was \$1,571,302, whereas the mean values for local food expenditures were \$135,886.80 including local milk and \$67,440.85 excluding local milk, respectively. The total local food expenditure amounted, on average, to \$ 882,426 per school district.

In addition, school districts have, on average, 3892 students (mean of 27% of students belonging to minority ethnic groups), and are comprised of an average of 7 schools (including elementary, middle, and high schools). Nearly 50% of the students, on average, qualify for both free and reduced meal prices.

Table 1 lists the OLS results to measure the impact of local milk and nonmilk expenditures on foodservice revenues. We found a negative impact between local milk expenditures (column 1a) and local nonmilk expenditures (column 1b) on foodservice revenue. Local milk expenditures were statistically significant at the 1% level, whereas the negative relationship between nonmilk expenditures and foodservice revenue from food sales was not statistically significant. Both the percentage of students

eligible for free and reduced meal prices and non-white student proportion had a statistical negative relationship with foodservice revenue from food sales, whereas the number of students and the rural location of school districts showed a positive and statistically significant relationship with foodservice revenue.

Unlike revenues from food sales, local milk and local nonmilk expenditures were found to have a positive impact in the foodservice revenue from the federal government (columns 2a and 2b). However, only the local nonmilk expenditure was statistically significant. In addition, all the control variables were found to have a statistically significant positive effect on foodservice revenues from the federal government. Like the previous result, in addition, we found significant results indicating that both local milk and local nonmilk expenditures had a positive impact in the total foodservice revenue (columns 3a and 3b). The number of students, percentage of free and reduced-price meals and the rural location of school districts also had a significant positive relationship with total foodservice revenues.

Table 2 lists the OLS results in order to measure the impact of both local milk and local nonmilk expenditures on foodservice earnings. When investigating the impact of both local milk and nonmilk expenditures on foodservice earnings from food sales, our results show a negative relationship between local food expenditures and food sales profits for both local milk and nonmilk (columns 1a and 1b). The results are statistically significant only for local nonmilk. The percentage of students eligible for free and reduced-price meals, the percentage of non-white students and schools located in rural settings were also found to have a significant negative relationship with foodservice profits from food sales.

By only taking into account foodservice earnings from the federal government, our results suggest a positive relationship between local milk and nonmilk expenditures and revenue from revenue funds (columns 2a and 2b). However, our results are not statistically significant. Our findings yield similar significant results regarding the negative relationship of the impact of the number of students and rural settings on the foodservice profitability from federal funds. However, contrary to the results found in the first 2 columns of Table 2, the percentage of eligible students for free and reduced-price meal and the proportion of non-white students were found to have positive effects on foodservice profitability from the federal government.

DISCUSSION

The purpose of this study was to examine the impact of purchasing locally grown foods on school foodservice revenues and profits. We anticipated positive impact of local food expenditures on both foodservice revenues and earnings. Although our results initially showed a negative impact of local milk and nonmilk expenditures on foodservice revenues from food sales, when combined with revenues from the federal government, the impact is positive. Since local and competitive foods are substitute goods, a higher proportion of local food availability may imply lower accessibility to competitive food items.⁷ As a result, schools with higher levels of local food expenditure may have lower foodservice revenues from food sales as students may choose not to participate in school lunch. The negative impact of local food expenditures on food sales may also be partially explained by students' preferences. Although public schools have been raising awareness about the various benefits of local foods, competitive foods may be a major source of revenue for school districts as students may strictly prefer competitive foods over healthier options due to its wider availability.²⁸⁻³⁰

As a result, financial incentives from the federal government for schools to purchase locally grown

food items are critical to increasing foodservice revenue in school districts. Our results confirm the importance of foodservice revenue from federal funds by showing a positive impact of both local milk and local nonmilk expenditures on federal fund revenues. These findings indicate that school districts with higher local food expenditures may have access to higher foodservice revenues from the federal government, and consequently, increase the multiplier effect in the local economy.²⁰

In addition, the positive effect of local milk and nonmilk items seem to hold when adding foodservice revenues from both food sales and federal funds. In agreement with previous evidence indicating a negative relationship between competitive foods and revenues,^{14,15,30} our findings suggest that there is a positive association between local food expenditures and total foodservice revenue, highlighting the importance of federal funds to public school districts as a means to purchase locally grown food items. Confirming previous evidence,³¹⁻³³ our study also sheds light in the impact of certain school characteristics, such as the percentage of eligible students for free and reduced meal, rural location, and school composition in terms of proportion of non-white students in foodservice revenues from food sales and the federal government.

Our study found a similar pattern for foodservice earnings. Whereas we found a negative impact of both local milk and local nonmilk expenditure on the foodservice profits from food sales only, a positive relationship was found when considering foodservice profits from federal government funds. It is important to note that mean and median values of foodservice profits from food sales, the federal government and total foodservice profits are negative, implying that both federal funds and food sales may not be sufficient to cover the foodservice costs, such as labor costs (benefits, salaries, overhead, etc.), food costs, and expenditures in fixed assets.

Limitations

There is a clear and urgent need to understand the impact of local food expenditures on schools' foodservice financial management. A second FTS census was released in 2015, and there are plans for a third census in 2019. However, unlike the 2013 census, the 2015 census did not contain relevant financial data from the National Center for Education Statistics, such as labor and nonlabor foodservice expenditures and foodservice revenues from food sales and the federal government, due to the unavailability of data after fiscal year 2011-2012. Financial data for further years are critical not only to detect changes in school foodservice finances, but it may also assist key stakeholders involved with FTS programs to both enhance the reach of local food-related activities to a

higher number of school districts and understand the local foods nonparticipation of school districts.

As a natural segue for this study, future research could examine the impact of local food expenditures on key foodservice operating financial ratios, such as both food and labor cost percentage as separate proportions of total revenue, as well as per meal costs, meals per paid labor hour and other productivity measures. In addition, other studies could investigate the relationship between school foodservice financial operations and supply chain issues, such as local food transactions through intermediary sources or directly through local farmers and producers, farmers' markets, community supported agriculture, and cooperatives.

Conclusions

Farm-to-school programs are among the several efforts dedicated to improve the quality of school meals in US public schools. According to the latest USDA FTS census, these FTS-related activities reach nearly 23 million US students, and purchase nearly \$800 million in local foods from farmers, potentially leading to over \$1 billion in local economic activity. Several studies estimate that buying local foods has a multiplier effect of 1.4-2.6 throughout the local economy.¹⁷⁻²⁰

The purpose of this study was to examine the impact of purchasing locally grown foods on school foodservice revenues and earnings. We hypothesized a positive effect of local food expenditures on both foodservice revenues and profits. In agreement with our expectation, our overall results indicate a positive impact of expenditures in local foods and foodservice revenues from food sales and federal funds. However, revenues from both food sales and the federal government seem not to sufficiently cover all the costs incurred by foodservice operations in school districts.

In addition, contrary to our anticipation, we found a negative relationship between local food expenditures and overall profits. This may indicate that competitive foods are still widely preferred in school districts, and as a result, FTS-related activities and educating students and parents are an ongoing effort in order to increase participation in local food consumption. Revenue from the federal government is pivotal to maintain these efforts viable to students and community members although, on average, the federal funds combined with food sales may not cover total foodservice expenditures.

IMPLICATIONS FOR SCHOOL HEALTH

Our findings have implications for the expansion of FTS operations. First, they shed light to the importance of foodservice revenues from federal funds as one of the main sources of revenue to maintain these activities and balance school foodservice budgets by complementing foodservice revenues. Financial

support is important for the expansion of these programs. States may assist schools by providing funding through grants and income-tax credits for schools that implement FTS programs.

Therefore, school districts that have either established their operations or plan to start FTS activities in the future may apply for USDA grants, designed to both assist schools in starting operations or expanding their efforts and increase the availability of local foods served in schools, as a strategy to increase federal funding. These grants, ranging from \$14,500 to \$100,000 per grantee, support the training of foodservice staff, planning and partnership development to create new menu using locally grown food items. In addition, they also may assist in the purchase of fixed assets (ie, foodservice kitchen equipment) to support the additional food processing and storage needed to handle local and regional foods, educational services, and other FTS activities. The USDA estimates that over 18,000 school districts and 10 million students have been reached in fiscal years 2013-2016 through activities funded by the USDA FTS grants.³⁴

Second, school foodservice revenues from food sales are critical to the adequate maintenance of foodservice operations. The findings of this study may direct policymaking to potential changes in behavioral practices that may encourage students to substitute competitive foods to locally grown food items. Farm-to-school activities, such as conducting edible gardens and taste-tests, having farmers visit the school, hosting-related community events and conducting student field trips to farms, among several other activities, not only may encourage students to change their eating habits, but they also may allow students to become familiar with local foods.^{32,35-37} Student familiarity with local foods may alter food preferences and increase consumption levels of locally grown food items, and as a result, increase foodservice revenues from food sales to an optimal level.

On the cost side, strategies to control local versus nonlocal food costs and labor costs, including salaries/wages and foodservice employee benefits, need to be examined to increase profit levels and create opportunities for future investments in school foodservice operations. As an example, strategies to decrease local food costs may include the following:

- Decreasing transaction costs by negotiating prices with small-scale food producers.
- Purchasing locally grown food items in greater amounts from food cooperative arrangements at lower prices.
- Reducing transportation costs by creating school food hubs that cater one or more school districts.

In addition, strategies to contain labor costs include investments in either the purchase or leasing of

fixed assets, such as innovative kitchen equipment, to decrease both the time required to prep food and the number of foodservice staff allocated to food prepping. As an alternative strategy, school foodservice directors could increase the number of part-time employment positions while reducing the number of full-time employment, and as a result, decrease the number of staff hours as well as salary and benefit expenses.

For these strategies to be effective tools for food revenue maximization and cost minimization, school foodservice directors need to peruse the financial management of foodservice operations that includes examining:

- Per meal costs, including total costs and costs by category (food, labor, overhead)
- Measures of foodservice profitability (statement of revenues and expenditures, balance sheet, budget variances)
- Measures of foodservice productivity (meals per labor hour, meals per staff, percentage of labor to revenue, average daily lunch participation)
- Foodservice operating financial ratios, such as expenditures by category (food, labor) as a percentage of total revenue.

Finally, studies indicate that reducing the availability of unhealthy competitive foods in schools result in either positive or neutral effects in foodservice revenues, partially due to increasing revenue levels from school meal programs.^{8,14} There is an urgent need to consider both the regulation of unhealthy competitive foods and the strengthening of FTS-related state legislation in public schools to include specific healthy competitive food policies. For instance, competitive food policy may set rigorous nutrition guidelines to improve dietary outcomes. Evidence suggests that locally grown food items expenditures is greater for public schools in states where the legal framework regulates unhealthy foods in public schools, and encourage the creation of FTS laws that facilitate the purchase of local foods.^{15,27,38}

Including appropriate legal language regarding training opportunities for food staff, procurement guidelines to facilitate the purchasing and distribution of locally grown food items as well as the provision of technical assistance to school districts may also contribute to the strengthening of FTS-related laws. Both federal and state legislative actions may contribute to the main objective of promoting increased consumption of locally grown food items and increase the standards with competitive foods with greater nutritious value.

Human Subjects Approval Statement

This study was deemed exempt from human subjects review.

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