JOURNAL OF SCHOOL HEALTH

American School Health Association

RESEARCH ARTICLE

HEALTHY Study School Food Service Revenue and Expense Report

ROBERTO P. TREVIÑO, MD[a] TRANG PHAM, MS, MPH[b] CONNIE MOBLEY, PhD, RD[c] JILL HARTSTEIN, MS, RD[d] LAURE EL GHORMLI, MS[e] THOMAS SONGER, PhD[f]

ABSTRACT

BACKGROUND: Food service directors have a concern that federal reimbursement is not meeting the demands of increasing costs of healthier meals. The purpose of this article is to report the food option changes and the annual revenues and expenses of the school food service environment.

METHODS: The HEALTHY study was a 3-year (2006 to 2009) randomized, cluster-designed trial conducted in 42 middle schools at 7 field centers. The schools selected had at least 50% of students who were eligible for free or reduced-price lunch or who belonged to a minority group. A randomly assigned half of the HEALTHY schools received a school health intervention program consisting of 4 integrated components: nutrition, physical activity, behavioral knowledge and skills, and social marketing. The nutrition component consisted of changing the meal plans to meet 5 nutrition goals. Revenue and expense data were collected from income statements, federal meal records, à la carte sale sheets, school store sale sheets, donated money/food records, and vending machines.

RESULTS: Although more intervention schools reached the nutritional goals than control schools, revenues and expenses were not significantly different between groups.

CONCLUSION: The HEALTHY study showed no adverse effect of school food policies on food service finances.

Keywords: child and adolescent health; chronic diseases; school food services.

Citation: Treviño RP, Pham T, Mobley C, Hartstein J, El ghormli L, Songer T. HEALTHY study school food service revenue and expense report. J Sch Health. 2012; 82: 417-423.

Received on June 27, 2011
Accepted on January 8, 2012

Fifty million K-12 students were enrolled in US schools in 2009.[1] Of these, 32 million (64%) were served National School Lunch Program (NSLP) meals and 12 million (24%) were served School Breakfast Program (SBP) meals. The US Department of Agriculture (USDA) gives schools cash and commodities to help cover the cost of the NSLP and SBP. In 2008, the USDA spent $14.7 billion and in 2009 it spent $15.4 billion on cash and commodities for the NSLP and SBP.[2] For 2010, the USDA's estimated cost is $17 billion.

The USDA's Food and Nutrition Service (FNS) administers the NSLP and SBP.[3,4] According to the School Lunch and Breakfast Cost Study-II, USDA cash and commodities accounted for 51% of school food service total revenues.[5] Student payments accounted for 24%, à la carte for 16%, and state reimbursements for 9%. The FNS reimburses schools for meals according to children's household poverty level. The reimbursement is 26¢ per lunch for children living at >185% of poverty level (full price); $2.32 per lunch for children living between 130% and 185% of poverty

[a]Director (rtrevino@sahrc.org), Social and Health Research Center, 1302 South Saint Mary's Street, San Antonio, TX 78210.

[b]Senior Research Associate, (tpham@bsc.gwu.edu), Biostatistics Center, The George Washington University, 6110 Executive Blvd, Suite 750, Rockville, MD 20852.

[c]Associate Dean of Research and Professor of Nutrition, (connie.mobley@unlv.edu), University of Nevada Las Vegas, School of Dental Medicine, M/S 7425, 1001 Shadow Lane, Las Vegas, NV 89106.

[d]Director of Nutrition Services, (jhartste@iusd.org), Irvine Unified School District,5050 Barranca Parkway,Irvine, CA 92616.

[e]Research Scientist, (elghorml@bsc.gwu.edu), Biostatistics Center, The George Washington University, 6110 Executive Blvd, Suite 750, Rockville, MD 20852.

[f]Assistant Professor, (tjs@pitt.edu), Department of Epidemiology, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, PA 15261.

Address correspondence to: Roberto P. Treviño, Director (rtrevino@sahrc.org), Social and Health Research Center, 1302 South Saint Mary's Street, San Antonio, TX 78210.

We wish to thank the administration, faculty, staff, students, and their families at the middle schools and school districts that participated in the HEALTHY study. This work was completed with funding from NIDDK/NIH grant numbers U01-DK61230, U01-DK61249, U01-DK61231, and U01-DK61223 to the STOPP-T2D collaborative group. HEALTHY intervention materials are available at http://www.healthystudy.org/.

level (reduced price); and $2.72 per lunch for children living at ≤130% of poverty level (free price). For breakfast, the FNS reimburses schools 26¢, $1.18, and $1.48 for the same poverty levels, respectively.

With increasing demand for schools to provide healthier food options, food service directors have a concern that federal reimbursement is not meeting the demands of increasing costs of healthier meals. The School Nutrition Association surveyed 1,200 school food service directors in 2009.[6] About 77% of the respondents stated that federal funding and costs of meals were the most pressing issue. The report showed that from 2007 to 2009, school nutrition programs had increased vegetable offerings by 12.4% and low-fat food offerings by 11.5%. The report also showed that federal reimbursement was not keeping up with the costs of providing healthier food. In 2009, federal reimbursement for a free priced NSLP meal was $2.57 and the cost to produce it was $2.92.

The HEALTHY study was conducted to examine the effects of an integrated school health intervention program on risk factors for type 2 diabetes among high-risk children. One component of the intervention was to improve the nutritional quality of the food and beverages being offered in the school food service environment. This article reports the food option changes and the annual revenues and expenses of the school food service environment.

METHODS

The HEALTHY Study

The HEALTHY study was a 3-year randomized, cluster-designed, primary prevention trial in 42 middle schools at 7 field centers from 5 states (Baylor College of Medicine, Houston, TX; Oregon Health & Science University, Portland, OR; University of California at Irvine, Irvine, CA; Temple University, Philadelphia, PA; University of North Carolina at Chapel Hill, Chapel Hill, NC; University of Pittsburgh, Pittsburgh, PA; and University of Texas Health Science Center at San Antonio, San Antonio, TX). Children were followed from start of 6th grade in fall 2006 to the end of 8th grade in spring 2009. Criteria for school participation included: (1) at least 50% of students eligible for free or reduced-price lunch or who belonged to a minority group, (2) annual school student attrition rates from all causes of ≤25%, and (3) school authorities to guarantee at least 225 minutes of physical education every 10 days in the school calendar year if assigned to the intervention group.

Methods and results for the HEALTHY study have been described elsewhere.[7] Briefly, half of the HEALTHY schools received an intervention program that consisted of 4 integrated components: nutrition, physical activity, behavioral knowledge, and social marketing. The nutrition component consisted of changing the meal plans to meet 5 nutrition goals set by HEALTHY study investigators.[8] Specifically, these goals were: (1) lower fat content of food for SBP, NSLP, and à la carte; (2) offer at least 2 servings of fruit and vegetables for NSLP and 1 serving for SBP; (3) offer dessert and snacks with no more than 200 calories per serving for NSLP and à la carte; (4) eliminate milk greater than 1% fat and all other added sugar beverages for SBP, NSLP, and à la carte; and (5) offer at least 2 servings of grain-based foods and/or legumes with at least 2 g of fiber per serving for NSLP and 1 serving for SBP. Detailed food service changes were presented elsewhere.[8] At baseline, food options available per student in food services of both school groups were similar. At the end of the study, more intervention than control schools had reached the nutritional goals set by the HEALTHY study.

Data Collection

Data on school characteristics, nutritional goals, and food service finances were collected in 42 schools—21 intervention and 21 control. Research staff and nutrition professionals collected data from intervention and control schools. The study was not blinded but program staff did not collect data and data collection staff did not implement programs.

Revenue and expense data were collected from a variety of sources, including income statements, federal meal records, à la carte sale sheets, school store sale sheets, donated money/food records, and vending machines. The financial data were collected monthly. When monthly data were not available, revenues and expenses were aggregated into semesters or school year. Values were recorded to the nearest dollar.

Revenue data were placed in 10 categories: breakfast, lunch, snacks, supper, commodities, à la carte, school store sales, donated money/food, vending machine, and ''other'' categories. Revenues were placed in breakfast, lunch, snacks, and supper categories if they were federal and state reimbursements and paid monies for meals. Commodities are those foods purchased by the government for schools. The commodities provided to schools were in the hundreds, grouped into meats, poultry, fruits and vegetables, grains, dairy, and oils. Because à la carte food items are nonreimbursable by federal and state, only paid monies were considered revenues for this category. Revenues received from school stores for food items were categorized as school store sales. Monies and/or the fair market value of foods donated to food service for the breakfast, lunch, or supper program were considered revenues. Profits from vending machines throughout all the school campus were considered revenues. The ''other'' revenues were not predetermined and these were recorded as they were collected.

Expense data were separated by food costs, labor, supplies, central kitchen costs, and ''other'' categories.

Food costs associated with serving breakfast, lunch, à la carte, snacks, and supper at the school site were considered expenses. Also included in food costs were commodity storage, process and delivery fees. Labor cost was considered if it were food service staff salaries, benefits, overtime hours, and substitute worker hours. Supplies were paper goods and cleaning expenses. Central kitchen expenses were considered if these included any costs from the central kitchen such as food costs or labor that were assigned to the site. For ''other'' expense category, a note was recorded regarding from where the monies came.

Data Analysis

Because of differences across schools in student enrollment and meal participation numbers, revenues and expenses were standardized to the student level. A school's breakfast and lunch annual revenues were divided by the average number of respective meals served daily and by the number of days in the school year. The average number of meals served daily was estimated from the records collected during the 20 consecutive days, and the number of days in a school year was obtained from the school calendar. Because served items were not available for the other revenue and expense categories, annual amounts were divided by total number of students enrolled in the school and by the number of days in the school year.

Differences in school characteristics between the two groups were determined by an independent *t*-test. One-way ANOVA was used to examine differences in mean revenues and expenses between the intervention and control schools for each school year. Analyses were conducted using SAS version 9.2 (SAS Institute Inc., Cary, NC). Probability values of $<.05$ were considered statistically significant.

RESULTS

School Demographics

The baseline characteristics of both school groups are presented in Table 1. The 2 school groups were similar with respect to student gender, race/ethnicity, student enrollment, obesity rates, percent students served breakfast and lunch, and percent students with federal eligibility to participate in the NSLP and SBP.

Revenues and Expenses by School Year

Over the 3-year study, none of the revenue and expense values were statistically significant between study groups. During school year 2006-2007, the mean total revenues per student for control and intervention schools were \$2.45 and \$2.30, respectively; and the mean total expenses were \$2.07 and \$1.86, respectively (Table 2). The net excess revenue over expense per student was 5¢ higher in intervention than in control schools (44¢ and 39¢, respectively).

Table 1. **School Characteristics by Treatment Group**

	Control (N = 21) Mean (SD)	Intervention (N = 21) Mean (SD)	p-value
Gender (% male)	46.8 (5.9)	47.5 (4.3)	.6479
Ethnic/racial group (%)			
Hispanic	43.5 (35.0)	45.6 (36.9)	.8547
Black	26.0 (24.9)	30.7 (30.1)	.5870
White	24.5 (22.6)	17.8 (16.8)	.2811
Other	6.0 (7.6)	6.0 (6.6)	1.0000
No. of students by school	863 (354)	892 (287)	.7730
No. of students by study grade	266 (119)	265 (96)	.9819
Obesity prevalence (≥ 95th percentile)	29.9 (5.0)	29.8 (6.4)	.9336
Breakfast served per school/day (% of students)	28.8 (17.8)	29.1 (12.5)	.9569
Lunches served per school/day (% of students)	71.3 (15.7)	73.8 (13.5)	.5817
Federal eligibility by NSLP payment type (%)			
Free/reduced	74.3 (18.2)	78.8 (14.2)	.3800

On the revenue-side, control schools had higher mean revenues per student from breakfast than intervention schools (\$1.86 and \$1.33, respectively), but intervention schools had higher mean revenues per student from lunch than control schools (\$2.05 and \$1.96, respectively). Control schools also had higher mean revenues from à la carte than intervention schools (21¢ and 15¢, respectively) and ''other'' (24¢ and 15¢, respectively). Mean revenues per student from snacks, supper, commodities, school store, donated money/food, and vending machine items were 1¢ or less different between the study groups.

On the expense side, control schools had higher mean cost per student than intervention schools in food (84¢ and 79¢, respectively), labor (94¢ and 83¢, respectively), and ''other'' (17¢ and 14¢, respectively) categories. Supplies and central kitchen expenses represented a 1¢ or less difference between groups.

During the school year 2007-2008, the mean total revenue per student for control and intervention schools was similar (\$2.40); and the mean total expenses were \$2.24 and \$2.11, respectively (Table 3). The net excess revenue over expense per student was 13¢ higher in intervention than in control schools (29¢ and 16¢, respectively).

Control schools had higher mean revenues per student than intervention schools from breakfast (\$1.69 and \$1.22, respectively), lunch (\$2.24 and \$2.07, respectively), and à la carte (19¢ and 14¢, respectively). Mean revenues per student from commodities, on the other hand, were higher in intervention than control schools (24¢ and 9¢, respectively). Mean revenues per student from snacks, supper, school store,

Table 2. **Total Revenues and Expenses by Treatment Group (2006-2007)**

	2006 to 2007				
	Control		Intervention		
	Total	Mean (SD)	Total	Mean (SD)	p-Value*
Revenue					
Breakfast†	$1,419,159	$1.86 ($1.78)	$1,189,887	$1.33 ($0.37)	.1899
Lunch†	$4,520,933	$1.96 ($0.72)	$5,024,872	$2.05 ($0.45)	.6270
Snacks‡	$47,647	$0.02 ($0.02)	$55,380	$0.02 ($0.02)	.9237
Supper‡	$6,012	$0.00 ($0.01)	$20,377	$0.00 ($0.02)	.5882
Commodities‡	$309,896	$0.10 ($0.07)	$277,135	$0.09 ($0.06)	.4630
A la carte‡	$703,772	$0.21 ($0.22)	$457,540	$0.15 ($0.13)	.2789
School store sales‡	$33,896	$0.01 ($0.04)	$85,835	$0.02 ($0.06)	.3400
Donated money/food‡	$0	$0.00 ($0.00)	$7,105	$0.00 ($0.01)	NA§
Vending machine‡	$12,876	$0.00 ($0.01)	$46,010	$0.01 ($0.02)	.0518
Other‡	$856,275	$0.24 ($0.57)	$488,059	$0.15 ($0.37)	.5752
Total revenue‡	$7,910,465	$2.45 ($0.52)	$7,652,198	$2.30 ($0.36)	.2792
Expenses					
Food costs‡	$2,719,977	$0.84 ($0.38)	$2,538,274	$0.79 ($0.38)	.6230
Supplies‡	$307,044	$0.10 ($0.11)	$298,688	$0.10 ($0.08)	.8748
Labor‡	$2,879,633	$0.94 ($0.37)	$2,739,508	$0.83 ($0.31)	.2805
Central kitchen‡	$0	$0.00 ($0.00)	$15,390	$0.01 ($0.02)	NA
Other‡	$703,130	$0.17 ($0.23)	$557,609	$0.14 ($0.23)	.5995
Total expenses‡	$6,609,784	$2.07 ($0.67)	$6,149,468	$1.86 ($0.55)	.2758
Excess revenue over expenses‡	$1,300,681	$0.39 ($0.58)	$1,502,730	$0.44 ($0.61)	.7600

*Based on standardized means.
†Mean (SD) standardized by dividing annual revenue by number of meals served daily by number of days in school year.
‡Mean (SD) standardized by the number of students in the school by the number of days in the school year.
§Not applicable.

Table 3. **Total Revenues and Expenses by Treatment Group (2007-2008)**

	2007 to 2008				
	Control		Intervention		
	Total	Mean (SD)	Total	Mean (SD)	p-Value*
Revenue					
Breakfast†	$1,195,086	$1.69 ($1.86)	$1,079,813	$1.22 ($0.51)	.2684
Lunch†	$4,965,845	$2.24 ($0.65)	$5,015,593	$2.07 ($0.47)	.3412
Snacks‡	$45,012	$0.01 ($0.02)	$68,945	$0.02 ($0.04)	.2399
Supper‡	$26,794	$0.01 ($0.04)	$57,408	$0.02 ($0.07)	.7494
Commodities‡	$250,380	$0.09 ($0.07)	$629,544	$0.24 ($0.53)	.2175
A la carte‡	$634,992	$0.19 ($0.21)	$425,603	$0.14 ($0.15)	.4455
School store sales‡	$0	$0.00 ($0.00)	$9,024	$0.01 ($0.03)	NA§
Donated money/food‡	$0	$0.00 ($0.00)	$0	$0.00 ($0.00)	NA
Vending machine‡	$11,128	$0.00 ($0.01)	$29,117	$0.01 ($0.01)	.1910
Other‡	$81,393	$0.02 ($0.04)	$59,121	$0.02 ($0.04)	.9753
Total revenue‡	$7,210,630	$2.40 ($0.45)	$7,374,166	$2.40 ($0.53)	.9713
Expenses					
Food costs‡	$2,882,067	$0.95 ($0.25)	$2,844,765	$0.95 ($0.34)	.9678
Supplies‡	$275,520	$0.09 ($0.11)	$252,303	$0.09 ($0.07)	.8604
Labor‡	$3,112,946	$1.07 ($0.47)	$2,876,086	$0.92 ($0.41)	.2659
Central kitchen‡	$0	$0.00 ($0.00)	$28,738	$0.01 ($0.05)	NA
Other‡	$564,633	$0.13 ($0.23)	$512,891	$0.14 ($0.24)	.9189
Total expenses‡	$6,835,166	$2.24 ($0.61)	$6,514,782	$2.11 ($0.58)	.4752
Excess revenue over expenses‡	$375,464	$0.16 ($0.52)	$859,384	$0.29 ($0.53)	.4379

*Based on standardized means.
†Mean (SD) standardized by dividing annual revenue by number of meals served daily by number of days in school year.
‡Mean (SD) standardized by the number of students in the school by the number of days in the school year.
§Not applicable.

Table 4. **Total Revenue and Expenses by Treatment Group (2008-2009)**

	2008 to 2009				
	Control		Intervention		
	Total	Mean (SD)	Total	Mean (SD)	p-Value*
Revenue					
Breakfast†	$1,083,285	$1.34 ($0.74)	$1,163,942	$1.37 ($0.74)	.8885
Lunch†	$5,094,947	$2.42 ($0.50)	$5,482,294	$2.31 ($0.35)	.4283
Snacks‡	$40,167	$0.01 ($0.02)	$74,370	$0.02 ($0.03)	.1295
Supper‡	$36,762	$0.02 ($0.06)	$57,721	$0.02 ($0.07)	.9146
Commodities‡	$267,808	$0.11 ($0.08)	$294,087	$0.11 ($0.07)	.9350
A la carte‡	$733,372	$0.21 ($0.24)	$417,237	$0.14 ($0.16)	.2586
School store sales‡	$0	$0.00 ($0.00)	$6,284	$0.00 ($0.02)	NA§
Donated money/food‡	$1,000	$0.00 ($0.00)	$14,280	$0.01 ($0.01)	NA
Vending machine‡	$8,402	$0.00 ($0.01)	$20,702	$0.01($0.01)	.2603
Other‡	$172,063	$0.06 ($0.09)	$202,653	$0.06 ($0.09)	.9720
Total revenue‡	$7,437,804	$2.67 ($0.46)	$7,733,569	$2.52 ($0.44)	.3085
Expenses					
Food costs‡	$2,656,943	$0.95 ($0.31)	$2,704,803	$0.89 ($0.25)	.4584
Supplies‡	$224,414	$0.08 ($0.11)	$210,251	$0.07 ($0.07)	.7737
Labor‡	$3,037,489	$1.12 ($0.54)	$2,894,794	$0.93 ($0.43)	.2054
Central kitchen‡	$0	$0.00 ($0.00)	$18,113	$0.01 ($0.02)	NA
Other‡	$796,495	$0.24 ($0.33)	$744,793	$0.21 ($0.33)	.7791
Total expenses‡	$6,715,340	$2.40 ($0.75)	$6,572,753	$2.12 ($0.60)	.1788
Excess revenue over expenses‡	$722,464	$0.26 ($0.58)	$1,160,816	$0.41 ($0.62)	.4427

*Based on standardized means.
†Mean (SD) standardized by dividing annual revenue by number of meals served daily by number of days in school year.
‡Mean (SD) standardized by the number of students in the school by the number of days in the school year.
§Not applicable.

donated money/food, vending machine, and ''other'' items were 1¢ or less difference between groups. Other than labor costs, mean expense per student was higher in control than in intervention ($1.07 and 92¢, respectively) schools; all other expenses were 1¢ or less difference between groups.

During the school year 2008-2009, the mean total revenues per student for control and intervention schools were $2.67 and $2.52, respectively, and the mean total expenses were $2.40 and $1.12, respectively (Table 4). The net excess revenue over expense per student was 15¢ higher in intervention than in control schools (41¢ and 26¢, respectively).

Intervention schools had higher mean revenues per student from breakfast than control schools ($1.37 and $1.34, respectively), but control schools had higher mean revenues per student than intervention schools from lunch ($2.42 and $2.31, respectively) and à la carte (21¢ and 14¢, respectively). Mean revenues per student from snacks, supper, school store, donated money/food, vending machine, and ''other'' items were 1¢ or less difference between groups. Food cost, labor, and ''other'' expenses were higher in control than in intervention schools (95¢ and 89¢, $1.12 and 93¢, and 24¢ and 21¢, respectively). Supplies and central kitchen expenses were 1¢ or less difference between groups.

The most common ''other'' revenues recorded were interest earned, purchase discounts, catering services, sales of equipment, and grants. The most common ''other'' expenses were contract services, accounting, data processing, storage, transportation, utilities, and capital expenditures.

DISCUSSION

The HEALTHY study was designed and implemented to moderate the risk factors for type 2 diabetes. The purpose of this article was to report the food option changes and the annual revenues and expenses of the school food service environment. Although the intervention schools showed healthier changes in food options than control schools, there were no significant revenue and expense differences between study groups. There was a trend, however, for intervention schools to have higher excess revenue over expense than control schools over the 3-year study ($3.5 and $2.4 million, respectively).

The composition of revenues and expenses were similar for both groups. Lunch accounted for an average of 66% of total revenue, breakfast for 15%, à la carte for 7%, commodities for 4%, and snacks, supper, school store, donated money, vending machine, and ''other'' for 8%. Of total expenses, labor accounted for an average of 44%, food for 40%, supplies for 4%, central kitchen for 2%, and ''other'' for 10%.

Studies to determine the impact of school food policies on food service finances are few and

have shown mixed results. Three statewide studies were conducted in California to assess the impact of legislation to improve nutritional standards of school food service.[9] The studies examined level of compliance with state laws and food and beverage sales. The studies involved 99 schools, kindergarten to 12th grade. School food service compliance with the nutritional standards increased by up to 60% points after the legislation went into effect. Total food service revenue also increased by 27¢ per student per day. Increases in revenue were outpaced by increases in expenses. In an interview with food service directors, a decrease in profit of 18¢ per student per day was reported.

A systematic review of the literature, on the other hand, concluded that school food service policies aimed at improving nutritional standards showed no adverse effect on school food service revenue.[10] The investigators assessed 4 peer-reviewed papers and 3 state reports. Among the peer-reviewed papers, 2 assessed à la carte revenue, 1 assessed vending machine revenue, and 1 assessed overall revenue. None of the peer-reviewed studies showed an adverse effect of food policies on food service revenue. Among the state reports, 2 showed no adverse effect, and the one that did was the same report presented above.

Both sets of studies that showed adverse and no adverse effect of school food policies on food service revenue were based on incomplete financial information. These studies collected detailed revenue but incomplete expense information. The studies showing the adverse effect collected detailed monthly breakdowns of food and beverage sales, but expenses were self-reported by food service directors. The studies showing no adverse effect collected revenue data only. The HEALTHY study collected both detailed revenue and expense data from school financial statements and federal school meal records.

Limitations

The HEALTHY study was not without limitations. Financial documents were obtained from different sources and record keeping varied. The sources were individual school, school district, and contracted administrative staffs. On some occasions, the source was assistant administrative staff because of key management position turnover. Regardless of the source, financial information was examined closely to search for the items in the 10 revenue and 5 expense categories preset by study economists. These items were located and entered into their respective categories.

A second limitation was the type of financial information collected. The present study does not present income statements because the financial information was collected from different sources and the ''other'' categories were broad and included interest, depreciation, taxes, and other items. A national study showed that the specific categories listed in the HEALTHY study make up most of the revenues and expenses of a food service financial statement.[5] The School Lunch and Breakfast Cost Study-II financial report of 120 school districts showed that school food service revenues came mostly from breakfast and lunch (69%), à la carte (16%), and commodities (5%); and expenses were mostly due to food cost (37%) and labor (48%). Because of this limitation, the term ''excess revenue over expense'' rather than ''profit'' was used.

A third limitation was the method used to standardize the revenue and expense values to the student level. School districts take revenue and expense and divide them by the number of students who were served meals on a daily basis. In the HEALTHY study, number of students who were served meals was not collected daily. Instead daily meals served was estimated from a sample of 20 consecutive days collected at start of 6th grade, end of 7th grade, and end of 8th grade. Steps were taken to select days that were representative of normal school operations. The 20 day period occurred 5 weeks after the semester began. In general, the first 4 weeks of school are atypical because of student enrollment changes and food service product delivery delays. Also, days related to holidays, school celebrations, or breaks were skipped to the following day or next typical school day.

Lastly, these findings may not be generalizable to other US school food services. Because school selection criteria included at least 50% of students be eligible for the NSLP, the HEALTHY study schools had a higher eligibility rate of students in the NSLP than that reported for US schools (77% and 64%, respectively). This may have skewed revenue in favor of HEALTHY schools because of the higher reimbursement of meals due to more students participating in the SBP and NSLP. Nonetheless, because this was a controlled study, these limitations do not diminish study findings.

CONCLUSION

In conclusion, many state and federal food policies are being implemented in the school food service environment to curtail the increasing rates of childhood obesity. A concern reported by food service directors is that the increase in number of food policies is producing a negative impact on finances. This study examined changes in revenue and expenses after providing healthier food options in the intervention schools. The HEALTHY study showed that providing healthier food options is affordable and does not compromise school food service finances. More studies, however, are needed to determine the impact of food policies on school food service net profit.

IMPLICATIONS FOR SCHOOL HEALTH

Food service management faces many challenges resulting from increasing labor and food cost, and additional program requirements such as stricter nutritional standards. Food service management needs to be more creative to increase revenues and improve labor efficiency. An initiative to increase revenues is to improve the nutritional value and presentation of their meals, and market these to their customers. An initiative to improve labor efficiency is to measure meals per labor hour (MPLH).[11] MPLH is calculated by dividing the number of meals or meal equivalents by the number of paid labor hours. An appropriate standard for school food service is 16 to 20 MPLH.

Human Subjects Approval Statement

The study protocol was approved by the institutional review boards at each of the 7 centers, and informed parental consent and minor child assent were obtained.

REFERENCES

1. US Department of Agriculture. *Fiscal Year 2010. Performance and Accountability Report*. Washington, DC: US Department of Agriculture; 2010.
2. Congressional Research Service. *The Federal Response to Calls for Increased Aid From USDA's Food Assistance Programs*, by Joe Richardson. Washington, DC; 2010.
3. US Department of Agriculture. National School Lunch Program Fact Sheet. Available at: http://www.fns.usda.gov/cnd/lunch/aboutlunch/NSLPFactSheet.pdf. Accessed May 2, 2011.
4. US Department of Agriculture. The School Breakfast Program Fact Sheet. Available at: http://www.fns.usda.gov/cnd/breakfast/AboutBFast/SBPFactSheet.pdf. Accessed May 2, 2011.
5. US Department of Agriculture, Food and Nutrition Service, Office of Research, Nutrition and Analysis. *School Lunch and Breakfast Cost Study-II, Final Report, by Susan Bartlett et al.* Alexandria, VA: US Department of Agriculture; 2008. Report No. CN-08-MCII.
6. School Nutrition Association. *School Nutrition Operations Report: The State of School Nutrition*. National Harbor, MD: School Nutrition Association; 2009.
7. Foster GD, Linder B, Baranowski T, et al. A school-based intervention for diabetes risk reduction. *N Engl J Med*. 2010;11(5):703-713.
8. HEALTHY Study Group, Mobley CC, Stadler DD, et al. Effect of nutrition changes on foods selected by students in a middle school-based diabetes prevention intervention program: The HEALTHY experience. *J Sch Health*. 2012;82(2):82-90.
9. Woodward-Lopez G, Gosliner W, Samuels SE, Craypo L, Kao J, Crawford PB. Lessons learned from evaluations of California's statewide school nutrition standards. *Am J Public Health*. 2010;100:2137-2145.
10. Wharton CM, Long M, Schwartz MB. Changing nutrition standards in schools: the emerging impact on school revenues. *J Sch Health*. 2008;78:245-251.
11. Martin J, Oakley, C.B. *Managing Child Nutrition Programs: Leadership for Excellence*. *2nd ed*. Sudberry, MA: Jones and Bartlett Publishers; 2008.