

The Impact of the Texas Public School Nutrition Policy on Student Food Selection and Sales in Texas

Karen W. Cullen, DrPH, RD, and Kathleen B. Watson, MS

School food policies have become a component of public health efforts to reduce the increasing rates of childhood obesity.^{1,2} The focus on nutrition guidelines for foods is because there are no federal rules for competitive foods sold outside the National School Lunch Program meal, such as in snack bars and vending machines, except for foods of minimal nutritional value (e.g., soda).³ Although states, school districts, and individual schools have enacted policies regarding foods or beverages available in school food environments,⁴ such policies are controversial. Barriers to improving school food environments include the loss of revenue generated from vending machine, snack bar, and à la carte sales⁵ as well as school staff, student, and parent attitudes toward the types of foods expected in schools.⁶ There are also concerns that limiting access to these foods at school will not improve overall student dietary intake and that if these items are not available in schools, students will compensate by increasing consumption of desired foods in out-of-school environments.⁷

However, school wellness policies do affect the school food environment and dietary behavior. The Texas Public School Nutrition Policy, an unfunded mandate to promote a healthful school environment for Texas students, was implemented statewide in fall 2004. The Texas Department of Agriculture notified districts about the policy. Implementation is monitored during periodic school food service reviews. The guidelines apply to all school food environments, including vending.⁸ The Texas policy restricts the portion sizes of high-fat and sugar snacks to fewer than 200 kilocalories per serving package and sweetened beverages to 12 ounces or less, limits the fat content of milk offered to 1% or less, provides guidelines for the fat content of foods served, and sets limits on the frequency of serving high-fat vegetables such as french fries.⁸

A recent study found positive changes 2 years after the Texas Public School Nutrition Policy was implemented.⁹ During the 2005–2006 school year, middle-school student lunch consumption

Objectives. We assessed the statewide impact of the 2004 Texas Public School Nutrition Policy on foods and beverages served or sold in schools.

Methods. We collected lunch food production records from 47 schools in 11 Texas school districts for the school years before (2003–2004) and after (2004–2005) policy implementation. Cafeteria servings of fruit, vegetables (regular and fried), and milk served each day were calculated. Twenty-three schools from 5 districts provided records of à la carte sales of candy, chips, desserts, drinks, ice cream, and water. We examined aggregated school-level differences in total items served or sold per day per student between study years.

Results. School demographics were similar to state data. Regardless of district and school size, cafeterias served significantly fewer high-fat vegetable items per student postpolicy ($P < .001$). Postpolicy snack bar sales of large bags of chips were significantly reduced ($P = .006$), and baked chips sales significantly increased ($P = .048$).

Conclusions. School food policy changes have improved foods served or sold to students. It is not known whether improved lunch choices influence consumption for the whole day. (*Am J Public Health.* 2009;99:706–712. doi: 10.2105/AJPH.2007.129387)

of milk, fruit, and vegetables significantly increased, whereas consumption of sweetened beverages, candy, chips, and dessert foods decreased⁹ compared with consumption in 2001–2002.

During 2004–2005, we conducted a statewide evaluation of the Texas policy to assess food service–level policy adherence. We assessed whether there were changes in the foods served and sold to students in the first year after implementation. Although we did not directly evaluate changes in student consumption, we did evaluate changes in food availability, which influences student consumption.⁹ The primary hypotheses were that sales or selection of fruit, regular or nonfried vegetables, and milk would be higher and sales or selections of sweetened beverages and high-fat or sugar foods per student would be lower in 2004–2005 after the policy implementation than they were in 2003–2004 before policy implementation.

METHODS

We did not collect any individual student data. Texas has 20 regions with Educational Service Centers, which serve 1238 school

districts and 4.5 million students.¹⁰ About 56% of the students are economically disadvantaged.¹⁰ The overall prevalence of overweight in Texas schoolchildren was 38.7% for 4th-grade students, 37.1% for 8th-grade students, and 29.4% for 11th-grade students in 2000–2001.¹¹ Our goal was to recruit 1 large (>10 000 enrolled students) and 1 small (<10 000 enrolled students) school district in each of the 20 Educational Service Centers in Texas. Study staff contacted food service administrators in each region and explained the study requirements. We requested daily production records for the National School Lunch Program meals and point of sale data for snack bar items for the 2003–2004 (prepolicy) and 2004–2005 (postpolicy) school years from 2 elementary (primary) schools, 2 middle (secondary) schools, and 1 high (secondary) school in each district. Districts received reimbursement for participating to offset copying and shipping costs (\$300). We did not collect data on districts that declined to participate.

Cafeteria Meal Production Data

Schools provided daily food production records on which they recorded the number of

students served each meal and the number of servings of each food or beverage item served. The records were coded for the number of portions served or sold for the following food items: fruit, regular or nonfried vegetables, high-fat vegetables (e.g., french fries, tater tots), and milk. The type of milk served (e.g., skim, 2%, whole) was not recorded on many production records, so we used total milk in the analyses. Although most schools provided daily data for item-specific daily portions served, several schools provided monthly data. Therefore, daily portions served per student for all schools were aggregated over the month. For example, 1200 servings of fruit were served at lunch every day in August, and 2000 students were served during August. This translates to a daily average of 0.60 portions (1200 or 2000) served per student for August. The final data to be analyzed included the daily average food-specific portions served per student for all months. Because only 3% of the total number of people served were adults for most schools and the total number of specific food items served was not separated into student and adult categories, we counted adults as students when calculating the number of specific food items served per student.

Snack Bar or à la Carte Sales Data

Schools provided records regarding sales of food items (i.e., candy, small and large bags of chips, desserts, small and large drinks, ice cream, and water) from the snack bar or à la carte lines. Some schools provided daily sales, whereas others provided monthly and annual sales. Therefore, we aggregated the data annually by summing the total food-specific items sold and dividing that total by 180 school days.

Data Analyses

We used descriptive statistics to describe district-, school-, and state-level characteristics. Socioeconomic status was defined as low (percentage of students receiving free or reduced meals >50%) or high (percentage of students receiving free or reduced meals ≤50%). To examine differences in the meal production data (i.e., amounts of fruit, regular nonfried vegetables, high-fat vegetables, and milk served) in the study years (2003–2004 and 2004–2005), we conducted traditional repeated measures analyses of variance with 2 between-group

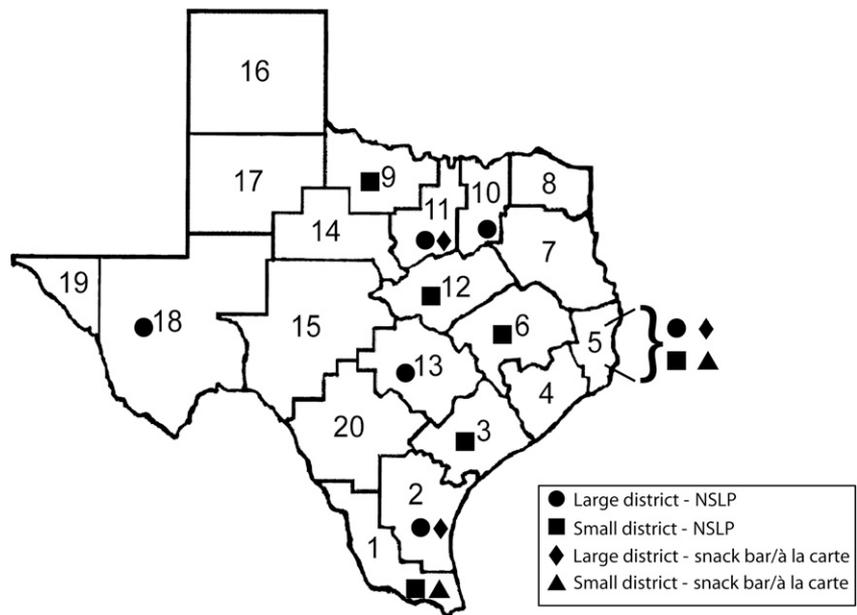
factors (school level: primary and secondary; district size: small and large). We examined main effects for year, school level, and district size, with interactions for year by school level and year by district size included. Follow-up testing for significant interactions was conducted by performing a paired *t* test of differences between years, stratified for each level of the between-groups factor.

With a final sample for analysis of 47 schools, $\alpha=.05$, and a correlation of 0.07 among the repeated measures, there was adequate power (80%) to detect small to moderate differences between years and moderate to large differences between factors. There was insufficient power to detect significant differences between the school level by district size interaction and the time by school level by district size interaction; thus we excluded these terms from the model. Because of the distributional properties of foods sold via the snack bar, we performed the Wilcoxon signed-rank test for related samples. We also conducted the χ^2 test of independence to determine if food sales in 2003–2004 were significantly associated with food sales in 2004–2005.

RESULTS

Although 29 districts initially agreed to participate, only 11 districts (with a total of 49 schools) sent adequate food production data. Two schools were excluded from analyses because 2004–2005 data were not provided. There were no significant differences in district size, ethnicity, or percentage of students eligible for free or reduced-price meals between the districts that sent data and those that did not. Ten of the 20 Educational Service Centers were represented, and there were 5 large and 6 small districts (Figure 1). The characteristics of the participating districts were somewhat like Texas schools in general, with 51% eligible for free or reduced-price meals and an average profile of 12% Black, 31% Hispanic, 56% White, and 1% other (Table 1).

Other school and district characteristics are shown in Table 1. Because of the recruitment strategy, there were more secondary (61.2%) than primary (38.8%) schools. We found no significant difference ($P=.52$) between study years in the average number of students



Note. NSLP=National School Lunch Program.

FIGURE 1—Participation in the assessment of food service-level adherence to the 2004 Texas Public School Nutrition Policy, by region and school district: 2003–2004 and 2004–2005 school years.

TABLE 1—District- and School-Level Characteristics in the Assessment of Food Service-Level Adherence to the 2004 Texas Public School Nutrition Policy: 2003–2004 and 2004–2005

	Study Sample		State of Texas
	Production Data	À la Carte Data	
School-level data^a			
Schools			
Total, no.	49	29	7662
Primary, no. (%)	19 (38.8)	10 (43.5)	4081 (53.3)
Secondary, no. (%)	30 (61.2)	13 (56.5)	3222 (40.7)
Primary and secondary, no. (%)			459 (6.0)
Average number of students enrolled during year, mean (SD)			
2003–2004	843 (517)	857 (594)	560 (479)
2004–2005	835 (512)	867 (576)	563 (483)
Difference between years	8 (85)	-11 (59)	-3 (64)
Test of difference	$t_{48} = 0.65$ ($P = .519$)	$t_{28} = -0.90$ ($P = .376$)	$t_{7661} = -3.63$ ($P < .001$)
No. of days of daily data provided, ^b mean (SD)			
2003–2004 (n = 44 schools)	163.9 (21.0)		NA
2004–2005 (n = 42 schools)	166.5 (20.5)		NA
Total (N = 86)	165.2 (20.7)		NA
District-level data			
Districts, no.	11	5	1238
Schools per district, mean (SD)	4.5 (0.7)	4.6 (0.5)	6.3 (14.9)
District size, ^c no. (%)			
Large	5 (45.5)	3 (60.0)	87 (7.1)
Small	6 (54.5)	2 (40.0)	1137 (92.9)
SES, ^d no. (%)			
Low	26 (53.1)	3 (60.0)	597 (50.6)
High	23 (46.9)	2 (40.0)	582 (49.4)
District race/ethnicity profile, mean % (SD)			
Black	16.2 (26.0)	15.7 (24.0)	12.1 (19.8)
Hispanic	32.5 (27.4)	30.2 (25.6)	30.9 (27.9)
White	50.1 (31.0)	52.8 (29.2)	56.0 (30.0)
Other	1.4 (1.8)	1.5 (1.7)	1.2 (2.4)

Note. SES = socioeconomic status.

^aTwo schools that were missing the 2004–2005 production data were excluded from the analyses, and 6 schools that were not selling the snack bar items under investigation were excluded from the à la carte analyses.

^bOne district (5 schools) provided the monthly summary data.

^cA large district was defined as more than 10 000 students; small was 10 000 or fewer.

^dSES was defined as low (free or reduced meals > 50% of the student population) or high (free or reduced meals ≤ 50% of the student population).

enrolled per school (839 ± 512). Among the schools providing daily production records, approximately 164 (SD=21) days of records were obtained. Five of those districts in 4 regions provided snack bar data for 29 schools; however, only 23 schools were included in the analyses. Six schools did not serve the items under investigation during the 2003–2004

and 2004–2005 academic years. Schools that provided snack bar data were similar in district- and school-level characteristics to schools that provided food production data.

Cafeteria Meal Production Data

Fruit. We found no significant improvement in fruit servings between school years, but we

did find a significant ($P = .001$) school-level main effect for average daily servings of fruit served per student (Table 2). Regardless of district size, primary schools reported serving more portions of fruit per student both school years (0.73 and 0.74 servings) than did secondary schools (0.40 and 0.45 servings).

Regular or nonfried vegetables. We found no significant differences for regular or nonfried vegetables for any analyses (Table 2). Between 0.56 and 0.74 portions were served per student per day.

Milk. There was a significant district size main effect for milk ($P = .030$; Table 2). Schools in the smaller districts served more milk (1.31 servings in both years) than did larger districts (0.83 and 1.02 serving).

High-fat vegetables. For high-fat vegetables, the analysis revealed a significant difference between school years ($P < .001$; Table 2). We also identified a significant main effect between school levels ($P = .003$) and a significant year by district size interaction ($P = .005$). Regardless of school and district size, fewer portions of high-fat vegetables per student were served during 2004–2005 (0.46 servings) than during 2003–2004 (0.68). Regardless of school year or district size, secondary schools reported serving more portions of high-fat vegetables per student (0.80 and 0.54 serving) than did primary schools (0.49 and 0.36 serving). The reduction was greater in schools located in the larger districts (0.71–0.38 servings; $P < .001$) than in schools in the smaller districts (0.65–0.55 serving; $P = .011$).

Although information from the daily cafeteria food production records was limited, we determined that 75% of the elementary schools offered french fries 3 or fewer times per week during 2003–2004; this increased to 89% in 2004–2005. Forty-two percent of the middle schools offered french fries 3 or fewer times per week during 2003–2004; this increased to 62% during 2004–2005. Although high schools were permitted to offer french fries daily at that time, 44% and 47% offered french fries 3 or fewer times per week during 2003–2004 and 2004–2005, respectively.

Snack Bar Data

Not all schools sold all snack bar items. Table 3 presents frequencies and percentages for schools that (1) never sold the item, (2) sold the

TABLE 2—Monthly Average of Foods Served, According to Food Production Records, With Repeated-Measures Analysis of Variance Results, by School Level and District Size, in the Assessment of Food Service–Level Adherence to the 2004 Texas Public School Nutrition Policy: Texas, 2003–2004 and 2004–2005 School Years

Variable and School Year	School Level		District Size ^a		Average for All Schools (n = 47), Mean (SD)
	Primary Schools (n = 19), Mean (SD)	Secondary Schools (n = 28), Mean (SD)	Schools in Small Districts (n = 23), Mean (SD)	Schools in Large Districts (n = 24), Mean (SD)	
Fruit^b					
2003–2004	0.73 (0.36)	0.40 (0.22)	0.51 (0.35)	0.56 (0.30)	0.54 (0.32)
2004–2005	0.74 (0.44)	0.45 (0.22)	0.54 (0.32)	0.60 (0.39)	0.57 (0.35)
Regular vegetables					
2003–2004	0.69 (0.32)	0.61 (0.33)	0.66 (0.29)	0.62 (0.36)	0.64 (0.32)
2004–2005	0.74 (0.46)	0.56 (0.22)	0.63 (0.27)	0.64 (0.41)	0.63 (0.35)
Milk^c					
2003–2004	1.09 (0.45)	1.05 (0.75)	1.31 (0.62)	0.83 (0.58)	1.07 (0.64)
2004–2005	1.23 (0.66)	1.12 (0.67)	1.31 (0.46)	1.02 (0.79)	1.16 (0.66)
High-fat vegetables^d					
2003–2004	0.49 (0.17)	0.80 (0.39)	0.65 (0.29)	0.71 (0.41)	0.68 (0.35)
2004–2005	0.36 (0.18)	0.54 (0.30)	0.55 (0.32)	0.38 (0.20)	0.46 (0.27)

^aA large district was defined as one having more than 10 000 students; a small district as one with 10 000 or fewer students.

^bSchool level main effect significant at $P = .001$.

^cSchool size main effect significant at $P = .030$.

^dSchool level main effect significant at $P = .003$. Year main effect significant at $P < .001$. Year by school size interaction significant at $P = .005$.

item in 2003–2004 only, (3) sold the item in 2004–2005 only, and (4) sold the item both years. Results from the χ^2 test of independence showed significant associations ($P < .01$) between both school years for baked chips, desserts, large drinks, ice cream, and water. These results indicate that if these items were sold (or not sold) in 2003–2004, they were significantly likely to be sold (or not sold) in 2004–2005.

There were significant main effects between school years for baked chips ($P = .048$) and regular large chips ($P = .006$) by the Wilcoxon signed-rank test of the median sales per day (Table 3). The sale of large bags of chips decreased postpolicy (2004–2005) from 9.6 to almost 0.0 servings, whereas the sale of baked chips increased from 15.3 to 23.6 servings per day postpolicy. We did not observe other significant differences. Although not significant, we found a 91% decrease in servings of candy sold postpolicy from 12.8 to 1.1 servings per day.

DISCUSSION

The Texas Public School Nutrition Policy affected the foods served and sold to students during the first year of implementation (school

year 2004–2005) compared with the previous school year. Fewer portions of high-fat vegetables (e.g., french fries) were served to students (from 0.68 to 0.46 servings; $P < .001$) from the National School Lunch Program line. The policy included a reduction in the number of times each week that french fries could be sold in elementary (once per week) and middle (3 times per week) schools. These results indicate adherence to this policy for secondary schools in frequency as well as greater reductions in the use of french fries by the larger districts (from 0.71 to 0.38 servings) than the smaller districts (from 0.65 to 0.55 servings). Implementation differences between large and small districts should be investigated. Perhaps small districts have more barriers associated with the bidding and food contract process and availability of alternative products. It may take more than 1 school year to achieve the policy goals, particularly for favorite food items such as french fries. Perhaps more frequent oversight from the state agency is needed to enforce policies. Barriers and facilitators to achieving food service–level changes should be investigated.

The effect of the Texas Public School Nutrition Policy on the menus offered to elementary school students in 38 Texas schools was

recently assessed.¹² There were significant reductions in grams of fat (13%; $P < .01$) and saturated fat (19%; $P < .001$) in the planned menus before and after the policy implementation. These results support our findings of significant reductions in the daily servings of high-fat vegetables.

For the 5 schools selling candy, there was a nonsignificant decrease in sales from 12.8 to 1.1 servings per day. There may not have been enough power in this small sample to detect significant differences. These results also indicate adherence to the restriction of candy sales to after the last class (elementary schools), last lunch period (middle schools), or not in the meal area (high schools). There were no significant changes in sales of dessert foods or ice cream. This is somewhat encouraging in that students did not purchase more of the smaller dessert items when candy was not available.

About 43% of secondary schools sold large bags of chips in 2003–2004, which was significantly reduced to 9% of schools (almost to zero sales per student) in 2004–2005. Sales of baked chips increased significantly ($P < .05$). Although 61% of the schools sold baked chips during both years, the sales per student increased postpolicy. These data show that districts did comply with

TABLE 3—Average Sales per Day of Snack Bar and À La Carte Food Items From 23 Schools: Texas, 2003–2004 (Year 1) and 2004–2005 (Year 2)

Food Item	Never Sold Item, No. (%)	Sold Item Year 1 Only, No. (%)	Sold Item Year 2 Only, No. (%)	Sold Item Both Years, No. (%)	Schools That Sold Item During at Least 1 Year	
					Mean (SD)	Median (Variability ^a)
Candy	18 (78.3)	3 (13.0)	2 (8.7)	0 (0.0)		
Year 2003–2004					12.8 (21.6)	0.0 (49.8)
Year 2004–2005					1.1 (1.5)	0.0 (2.8)
Change between years					-11.7 (22.4)	0.0 (52.5)
Baked chips (small bag), ^{b,c} ***	9 (39.1)	0 (0.0)	0 (0.0)	14 (60.9)		
Year 2003–2004					15.3 (8.8)	16.7 (27.7)
Year 2004–2005					23.6 (15.2)	21.5 (50.4)
Change between years					8.3 (15.4)	2.7 (51.0)
Regular chips (large bag) ^c **	12 (52.2)	9 (39.1)	1 (4.3)	1 (4.3)		
Year 2003–2004					9.6 (13.4)	3.4 (41.3)
Year 2004–2005					0.2 (0.5)	0.0 (1.3)
Change between years					-9.4 (13.3)	-3.4 (42.3)
Regular chips (small bag)	4 (17.4)	3 (13.0)	4 (17.4)	12 (52.2)		
Year 2003–2004					56.2 (81.5)	26.0 (315.6)
Year 2004–2005					67.7 (142.9)	26.7 (628.3)
Change between years					11.5 (77.9)	-0.8 (373.2)
Dessert ^b **	6 (26.1)	2 (8.7)	0 (0.0)	15 (65.2)		
Year 2003–2004					83.2 (129.6)	33.3 (396.1)
Year 2004–2005					61.2 (94.5)	25.7 (317.6)
Change between years					-22.0 (44.0)	-0.9 (140.5)
Drink (small)	1 (4.3)	4 (17.4)	0 (0.0)	18 (78.3)		
Year 2003–2004					97.8 (169.1)	47.1 (790.1)
Year 2004–2005					90.6 (158.8)	39.1 (703.7)
Change between years					-7.2 (27.2)	0.0 (145.4)
Drink (large) ^b **	17 (73.9)	1 (4.3)	1 (4.3)	4 (17.4)		
Year 2003–2004					14.1 (21.5)	6.3 (56.0)
Year 2004–2005					11.5 (22.1)	1.3 (56.0)
Change between years					-2.6 (6.6)	0.0 (16.6)
Ice cream ^b **	6 (26.1)	0 (0.0)	1 (4.3)	16 (69.6)		
Year 2003–2004					43.4 (57.6)	24.6 (245.0)
Year 2004–2005					48.9 (48.3)	26.3 (194.1)
Change between years					5.4 (29.1)	0.0 (149.8)
Water ^b **	17 (73.9)	0 (0.0)	0 (0.0)	6 (26.1)		
Year 2003–2004					15.8 (26.1)	7.1 (67.9)
Year 2004–2005					22.2 (35.4)	8.8 (93.3)
Change between years					6.3 (9.6)	3.5 (25.3)

^aDifference between minimum and maximum values.

^bDetermined using the χ^2 test of independence with continuity correction.

^cDetermined using the Wilcoxon signed-rank test.

* $P < .05$; ** $P < .01$.

the regulations limiting snack food portions to single serving packages with fewer than 200 kilocalories and encouraging sales of reduced fat or baked chips. Similar reductions in sales of large bags of chips and increases in baked or reduced-fat chip sales were found in another

study that manipulated the school food environment.¹³ In that pilot study, large bags of chips and sweetened beverages were eliminated from à la carte lines in 6 schools.¹³

Large drink sales did not decrease significantly during this first year, perhaps because of

the low number of schools selling large drinks. This may also reflect a problem with beverage company contracts and the need for schools to replace 20-ounce drink machines with 12-ounce drink machines. The Texas policy acknowledged that districts would have to honor

existing beverage contracts but required that subsequent contracts include the 12-ounce beverage restriction. However, only 26% of the secondary schools sold 16- and 20-ounce drinks before the implementation of the Texas policy. With the updated beverage contracts, sales of large drinks will be eliminated in Texas schools; further research should document this removal.

A previous study on the Texas Public School Nutrition Policy did document a significant decrease in mean sweetened beverage consumption during school lunch from 5.4 to 1.5 ounces for middle school students.⁹ Significant reductions in desserts, chips, and candy were also found. A national study found significant reductions in sweetened beverage sales along with significant increases in water sales after an environmental cafeteria intervention that restricted the size of sweetened beverages and increased water availability.¹³ During the recruitment phase of this study, school food service personnel remarked that they were improving their school food environment even before the Texas policy was implemented.

Unfortunately, there were no significant increases in the number of fruit and regular nonfried vegetables served to the students. We hypothesized that reductions in the availability of french fries would increase healthy selections of fruit and vegetable. During the 2003–2004 school year, elementary school students selected 1.42 servings of fruit and regular vegetables each day, along with 1 half serving of high-fat vegetables, for a total of almost 2 servings selected per student each day. Secondary school students selected 1.01 servings of fruit and regular vegetables each day and about three fourths of a serving of high-fat vegetables.

In the 2004–2005 school year, the fruit and regular vegetable selection remained the same, even with the reductions in high-fat vegetables served. Perhaps the average amounts of fruit and regular vegetables selected before the policy implementation (1.42 for elementary and 1.01 for middle school students) were the maximum levels for these students. The same methods were used in a previous study of middle school students and yielded similar results in that the average number of servings of fruit and regular vegetables served before an environmental cafeteria intervention was 1.1.¹³ After increasing the daily number of fresh fruits and vegetables

available, servings of fruit and regular vegetables served each day increased to 1.42.¹³ In that study, the 83% increase in fruit served was much greater than the 22% increase in vegetables served.¹³ An elementary school cafeteria intervention documented baseline student lunch consumption of 0.79 serving of fruit and 0.27 vegetable serving, without potatoes, but achieved only a significant increase in lunch fruit consumption, suggesting that vegetable consumption is harder to improve.¹⁴ This may be related to a lower vegetable preference among children.¹⁵

Exposure to fruit and vegetables has been shown to improve preferences and consumption among preschool and elementary school children.^{16–19} Whether techniques such as free samples of fruit and vegetables in the school cafeteria would improve preference and consumption is unknown. This is an important area deserving more research.

Other significant results included the grade-level differences in fruit and high-fat vegetable consumption. Overall, secondary school students selected significantly fewer servings of fruit and more servings of high-fat vegetables than did elementary school students. Previous studies have noted the decline in fruit consumption from third through eighth grades²⁰ and from elementary to middle school.²¹ Different methods may be needed to encourage healthful food choices by secondary school students. This is an important area for future research.

Limitations

There are several limitations that should be considered. The individual school districts copied and sent all the data. These districts might have been more amenable to making the policy changes and participating in the study compared with the districts that did not take part in the study. However, no data on actual implementation of the policy was obtained aside from the cafeteria meal production records and snack bar sales data. Although we did receive data from 10 different regions in the state, results may not be generalizable to all of Texas or other parts of the country. We did not keep any records on the districts that declined to participate. However, there were no differences in district size or student ethnicity or the percentage of students eligible for free or reduced-price meals among the districts that

provided data, those that agreed but did not send data, and state district averages.

Data on served or sold food items may not represent individual student lunch consumption. However, earlier studies have documented that the amount of fruit and vegetables taken on trays from the school lunch line was a valid proxy measure for consumption among children aged 6 to 13 years²² and those aged 8 to 10 years.²² In addition, because of budget limitations, we did not collect any data for any other years. Plus, only a small number of schools provided snack bar sales data, limiting our ability to detect significant differences.

Conclusions

Despite these limitations, our results document that school-level data can demonstrate individual-level behavior changes in response to altered environments (i.e., selecting foods from the cafeteria National School Lunch Program line and making purchases in school snack bars). These results document that the Texas Public School Nutrition Policy made a difference in students' selection and purchase of some food or beverage items, supporting the hypotheses. Whether improvements in the school food environment and food selections result in more-healthful daily food consumption patterns among youth is unknown and is an important issue to address. These results should provide motivation and justification for school wellness policies that improve the school food environment. ■

About the Authors

The authors are with the Agricultural Research Service, United States Department of Agriculture (USDA/ARS), Children's Nutrition Research Center, Department of Pediatrics, Baylor College of Medicine, Houston, TX.

Requests for reprints should be sent to Karen W. Cullen, DrPH, RD, Associate Professor Children's Nutrition Research Center, Department of Pediatrics, Baylor College of Medicine, 1100 Bates Street, Houston, TX 77030-2600 (e-mail: kcullen@bcm.tmc.edu).

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Contributors

K.W. Cullen conceptualized the study, oversaw implementation, and wrote the article. K.B. Watson conducted the data analyses and participated in article preparation.

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Human Participant Protection

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