Food Environment in Secondary Schools: À La Carte, Vending Machines, and Food Policies and Practices

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Objectives. This study described the food environment in 20 Minnesota secondary schools.

Methods. Data were collected on school food policies and the availability and nutritional content of foods in school à la carte (ALC) areas and vending machines (VMs).

Results. Approximately 36% and 35% of foods in ALC areas and in VMs, respectively, met the lower-fat criterion (≤5.5 fat grams/serving). The chips/crackers category constituted the largest share of ALC foods (11.5%). The median number of VMs per school was 12 (4 soft drink, 2 snack, 5 other). Few school food policies were reported.

Conclusions. The availability of healthful foods and beverages in schools as well as school food policies that foster healthful food choices among students needs greater attention. (*Am J Public Health.* 2003;93:1161–1167)

Currently, 14% of US adolescents aged 12 to 19 years are overweight, a 27% increase in prevalence in the past 10 years.[1,2] Environmental influences can promote excess energy and fat intake, which are a potential factor in this upward secular trend in obesity, through greater availability and intense marketing of high-fat foods as well as larger portion sizes and lower prices.[3,4] The school food environment can have a significant impact on adolescents' food choices, because 35% to 40% of youths' total daily energy is consumed at school.[5,6] Secondary schools in particular have undergone rapid changes in recent years in terms of the number and types of foods and beverages available and marketed in schools.[5,7–13]

Reimbursable school meals offered through the US Department of Agriculture (USDA) National School Lunch Program must meet federally mandated nutrition guidelines; "competitive foods" such as those sold à la carte (ALC) or in a vending machine (VM) have no federal nutrition guidelines.[14,15] The few available data suggest that these foods are higher in fat compared with foods sold as part of a school lunch program.[7–9] A recent national study found that most high schools offered high-fat cookies or cakes (80%); pizza, burgers, or sandwiches (76%); and french fries (62%) in ALC areas and that 95% had soft drinks and candy or snack VMs available. However, 90% offered fruits and vegetables, and 48% offered low-fat yogurt, low-fat cookies, or low-fat pastry.[9] Few school or school district policies were reported that could support more healthful food choices by students at school.[9]

Despite the potential influence of competitive food availability and school nutrition policies on student food choices, few descriptive data are currently available. We provide detailed descriptive information on the food environment in secondary schools to help better the understanding of current environmental influences on adolescents' food choices and to improve the planning of more effective school-based nutrition interventions and policies targeting environmental influences on adolescents' food choices at school.

METHODS

Trying Alternative Cafeteria Options in Schools (TACOS) is a 2-year, group-randomized, school-based nutrition intervention trial. The purpose of TACOS is to increase student purchases of lower-fat ALC foods by increasing availability of lower-fat foods in ALC areas and VMs and to encourage student selection of lower-fat foods through student-based, schoolwide promotional activities. Twenty secondary schools in the Minneapolis–St Paul, Minnesota, metropolitan area agreed to take part in TACOS. Of the 25 eligible schools invited to participate, 5 declined, primarily owing to concern about the burden that compliance with research protocols would place on food service staff.

We collected baseline data during spring 2000, before the random selection of schools into experimental conditions. Schools were predominantly suburban in location and ranged in enrollment from 812 to 3157 students (median=1731). On average, 14% of students were non-White (median=8%, range=3%–77%), and 9% were eligible for free lunch (median=5%; range=1%–57%). Two school food services were run by food service management companies; 18 were run by school district food services. Nineteen of the 20 schools prepared school meals on site, and all 20 participated in the USDA National School Lunch Program.[14]

Data Collection Procedures

We defined ALC foods as any foods that were available for sale during lunch periods at ALC areas in the cafeteria. ALC foods did not include foods sold primarily as part of the reimbursable school meal (e.g., second servings of the federally-reimbursable school meal entrée), food bar items that could not be separately monitored for sales or nutritional information (e.g., pasta, potato, or salad bars), or beverages (e.g., soft drinks, milk, flavored fruit ices, fruit drinks, sports drinks, water, teas). One school offered an ALC salad bar and 1 school offered an ALC pasta bar, whereas 2 schools offered ALC potato bars. Beverages were excluded from data collection because the focus of the TACOS intervention was on food availability.

TACOS research staff completed a comprehensive ALC food inventory before the random selection of schools into experimental conditions. The staff was trained according to the school food service menu data col-

lection protocols used by the Nutrition Coordinating Center, University of Minnesota.[16] Information collected on all foods available for sale in ALC areas included brand name, package size, serving size, and grams of fat per serving. Information on school-prepared foods (school-prepared pizza, other entrees, cookies, muffins) was obtained from the school's food service director or kitchen manager. Teams of 2 or 3 TACOS staff members met with kitchen managers at each school to review and verify the ALC food list; however, TACOS staff made return visits to the school and also follow-up telephone calls to food service staff and food manufacturer representatives to gather details about foods offered and their nutritional information.

We grouped individual foods under several broader categories during the data collection process (Table 1). We designated food categories based on (1) foods similar in fat or other nutrients of interest or (2) foods that composed a large share of a la carte sales (e.g., pizza, bagels, soft pretzels; each of these had its own category due to large sales volume for these items). A complete description of the ALC data collection and categorization protocol is available from the authors.

TABLE 1—Foods Available in À La Carte Areas, by Category (N = 1612): 20 Secondary Schools in Minnesota

Food Category	Items (n)	% of Total	Schools That Offer Items (n)	Items (Mean)	Mean (Range) Price/Item (in $)
Chips/crackers	185	11.5	19	9.7	0.62 (0.25–1.75)
Entrees	162	10.0	14	11.6	1.71 (0.75–3.95)
Ice cream/frozen desserts	160	9.9	20	8.0	.94 (0.35–2.00)
Cookies/bars: packaged	140	8.7	18	7.8	0.50 (0.10–1.00)
Pastry: school-prepared	89	5.5	16	5.6	0.76 (0.40–1.50)
Pastry: packaged	87	5.4	17	5.1	0.78 (0.25–1.10)
Cookies/bars: school-prepared	85	5.3	17	5.0	0.69 (0.25–2.10)
Candy/candy bars	77	4.8	10	7.7	0.72 (0.25–1.25)
Fruit/vegetables	72	4.5	17	4.2	0.57 (0.25–2.75)
Miscellaneous[a]	68	4.2	17	4.0	0.47 (0.05–1.50)
Fruit candy	66	4.1	15	4.4	0.65 (0.25–1.25)
Breakfast items[b]	63	3.9	14	4.5	0.75 (0.50–1.75)
Soup combo[c]	43	2.7	5	8.6	1.49 (1.10–3.00)[d]
Soup	40	2.5	4	10.0	1.25 (1.00–2.00)[e]
French fries/onion rings/fried cheese sticks	36	2.2	13	2.8	1.11 (0.50–2.25)
Nachos with cheese	33	2.0	20	1.7	0.82 (0.50–1.25)
Non–frozen dairy products	32	2.0	14	2.3	1.38 (.75–1.75)
Bagel	30	1.9	13	2.3	0.70 (.50–1.00)
Bagel with cream cheese	30	1.9	9	3.3	0.88 (0.60–1.50)
Pizza: school-prepared	22	1.4	9	2.4	2.03 (1.25–3.00)
Pizza: vendor	21	1.3	7	3.0	1.58 (1.00–2.10)
Breads	21	1.3	9	2.3	0.98 (0.30–2.00)
Soft pretzel	16	1.0	15	1.1	0.74 (0.35–1.25)
Soft pretzel with cheese	13	0.8	10	1.3	1.18 (0.75–1.75)
Dressings[g]	13	0.8	5	2.6	NA
Dessert: school-prepared	5	0.3	2	2.5	0.93 (0.85–1.25)
Salads: prepackaged	3	0.2	2	1.5	1.68 (1.55–1.80)

Note. NA = not applicable.
[a]E.g., cheese sauce, cream cheese, beef jerky, peanut butter.
[b]E.g., dry cereal, oatmeal, egg sandwich.
[c]E.g., soup with bread sticks, bread bowl, or sandwich.
[d]Pricing data available from 5 schools only.
[e]Pricing data available from 4 schools only.
[f]E.g., yogurt, cheese, pudding.
[g]Dressing was offered free at 19 of 20 schools.

School Vending Machines

Trained research staff collected VM information via site visits to the 20 TACOS schools and verified all VM locations with the food service director and the study contact person before the site visit. During the data collection site visit, TACOS staff searched the school for any VM that might have been omitted. A vending machine was counted if it was in a location that was accessible to students (e.g., lunchroom, hallway, student locker area, gymnasium, common area) but not if it was in a faculty lounge area.

For each school, staff counted the total number of VMs and recorded machine types. Snack VMs were defined as those that were nonrefrigerated and sold candy bars, candy, chips, pretzels, pastry, gum, and mints. Soft drink VMs were defined as those that sold primarily soft drinks. Staff recorded a machine as Other if more than half of the machine's columns were filled with drinks other than soft drinks.

For snack VMs, information on product name, package size/weight, serving size, and total grams of fat per serving was collected for each item in the machine. The number of lower-fat items in snack VMs was determined according to a definition of ≤ 5 fat grams per serving. The proportion of lower-fat foods available in a snack VM was determined by dividing the number of lower-fat items by the total number of items available in the machine. We defined daily hours of VM operation as those during which a machine was turned on and accessible to students, as reported by the school staff member who served as study contact. We obtained separate hours of operation for soft drink and snack VMs.

We collected information on school food-related policies and practices via surveys mailed to school principals and food service directors at each of the 20 TACOS schools during spring 2001. Survey questions as-

sessed school food-related policies and practices during the previous school year. TACOS researchers developed the survey instrument on the basis of previously published surveys about the school food environment.[5–10]

We entered ALC food items into a database and generated nutritional information with the NDS-R system software version 4.02, developed by the Nutrition Coordinating Center, University of Minnesota.[16] We also calculated descriptive statistics for macronutrients and micronutrients of interest, including energy, total and saturated fat, percentage fat energy, and selected minerals and vitamins. In addition, we calculated the mean percentage of foods meeting the TACOS lower-fat criterion within each of the 27 food categories (Table 1). Lower-fat foods were defined as those with ≤5.5 fat grams per serving—or, for entrée-type foods, per 100 grams.[17] We used the SAS statistical software package[18] to generate descriptive information (presented as means, medians, and percentages) on ALC menu data, VM data, and survey data collected from school principals and food service directors.

RESULTS

À La Carte: Number and Types of Foods

The number and types of foods available for sale to students in ALC areas at the 20 subject schools are presented in Table 1. Overall, 1612 individual food items were available across the ALC areas of all 20 schools; these items are divided into 27 food categories in the first column. The 1612 food items included the same item offered across different schools, so that if "Grandma's chocolate doughnut" was offered at 3 different schools, it was counted 3 times in the total (N=1612) and in the second column, "Items (n)," showing the number of food items within a given food category (e.g., pastry: packaged). The third column shows the percentage of the 1612 foods that were included in each specific food category. The chips/crackers category constituted the largest proportion (11.5%) of total ALC foods available; 19 schools offered at least 1 item in this category, and, on average, 9.7 of such items were available per school. The average price of an item in the chips/crackers category was $0.62 (range=$0.25–$1.75).

The food categories that contained the largest numbers of ALC foods were chips/crackers, entrées (e.g., hamburgers, sandwiches), ice cream/frozen desserts, and cookies/bars: packaged. Items in the fruit/vegetable category (usually apples, oranges, and bananas; mean=4.2 items) were available at 17 schools. All 20 schools offered nachos with cheese and ice cream/frozen desserts. Overall, the average number of ALC food items typically available per school was 79.8 (range=39–156). The food category with the lowest average price (excluding miscellaneous) was cookies/bars: packaged (average price, $0.50; range=$0.10–$1.00). Fruits/vegetables was the second least expensive food category, with an average price of $0.57 per item (range=$0.25–$2.75).

À La Carte: Nutrition Profile of Available Foods

Nutrition information about the foods available for sale to students in ALC areas at the 20 secondary schools appears in Table 2, in which food categories from Table 1 are ordered by their percentage share of the total ALC offerings; the first category comprises the largest ALC share (chips/crackers, 11.5%) and the last category the smallest (prepackaged salads, 0.2%). Columnar data represent average values for the foods in the 27 food categories per 100 grams: total energy, fat grams, percentage fat, and percentage saturated fat per 100 grams, along with values for other nutrients of interest such as sugar, calcium, vitamins A and C, fiber, and iron. In addition, Table 2 shows the mean percentage of the foods meeting the TACOS lower-fat criterion. The value in this column is based on per-serving size for all food categories except entrée-type items (e.g., sandwiches, pizza). The lower-fat criterion for the entrée-type items was applied on a per-100-gram basis.[17]

For the 20 subject schools, the median percentage of lower-fat ALC foods available was 35.4% (mean=36.4; range=22.4%–60.7%). As shown in Table 2, the most energy-dense food category was chips/crackers (average kcal/100 g=515); on average, 50% of these kcals were from fat. Only 10.8% of the foods in the chips/crackers category met the TACOS lower-fat criterion of ≤5.5 fat grams/serving, a remarkable observation because this category also comprises the largest share of total ALC food offerings (Table 1). The second most energy-dense food category was cookies/bars: school prepared (487 kcal/100 g; 43.1% fat kcals), in which only 1.2% of the items met the TACOS lower-fat criterion. By contrast, all items in the fruit candy, nonfrozen dairy products, bagel, and soft pretzel categories and 97% of the fruit/vegetable items met the TACOS lower-fat criterion.

The food categories varied in their contribution of other essential nutrients. The largest category, chips/crackers, contributed little in terms of other important nutrients. High-sugar categories included candy and fruit candy as well as cookies/bars: school prepared, cookies/bars: packaged, and dessert: school prepared. Several categories provided 100 mg or more calcium per serving, including pizza: school prepared, pizza: vendor, nachos with cheese, nonfrozen dairy products, soft pretzel with cheese, and french fries/onion rings/fried cheese sticks (due to the inclusion of fried cheese sticks in this category). However, the nonfrozen dairy products, pizza (both school-prepared and vendor), and soft pretzel with cheese categories were much lower in fat than the other categories that were good calcium sources. Although the fruit candy items were fortified to provide substantial amounts of vitamins A and C, they were second only to regular candy in their sugar content. Breakfast items were modest in sugar content, low in fat and energy, and provided notable amounts of calcium, iron, and vitamin A.

Vending Machines: Prevalence

Table 3 shows the prevalence of VMs by type. The median number of VMs in schools was 12. Machines in the Other category offered mostly fruit juice/juice drinks, water, or sports drinks. School administrative staff reported that 88% of snack VMs and 37% of soft drink VMs were turned on at all hours; 21% of soft drink VMs were turned on at all hours except during lunch, and 26% of soft drink VMs were turned on before or after school only. The median percentage of lower-fat snacks (≤5 fat grams/serving) in the snack

TABLE 2—Nutrition Information for À La Carte Foods: 20 Secondary Schools in Minnesota

Food Category	Kcal	Fat (g)	Fat (%)	Saturated Fat (%)	Meets Low-Fat Criteria (%)[a]	Sugar (g)	Calcium (mg)	Vitamin C (mg)	Vitamin A (IU)	Fiber (g)	Iron (mg)
Chips/crackers	515	28.8	50.3	8.0	10.8	7.1	51.2	9.3	86.2	4.7	2.6
Entrées	253	12.4	44.1	16.3	14.2	3.2	90.9	3.1	273.8	1.4	1.8
Ice cream/frozen desserts	157	5.5	31.4	16.0	50.6	19.1	77.3	0.9	134.5	0.4	0.3
Cookies/bars: packaged	442	18.6	37.8	15.6	37.9	34.6	37.0	1.0	367.3	2.5	3.0
Pastry: school-prepared	376	17.1	40.8	12.6	3.4	25.5	44.6	0.7	285.0	1.3	1.9
Pastry: packaged	386	15.1	35.2	9.8	21.8	26.2	36.8	0.5	364.0	1.9	2.5
Cookies/bars: school-prepared	487	23.3	43.1	13.6	1.2	29.4	37.0	0.04	251.3	2.0	2.5
Candy/candy bars	458	17.9	35.1	16.4	29.9	59.4	80.1	10.3	43.2	2.0	0.7
Fruit/vegetables	64	0.6	8.7	2.4	97.2	11.9	15.6	20.4	273.0	2.3	0.2
Miscellaneous[b]	236	17.5	66.9	34.0	41.2	8.0	109.7	3.7	677.0	0.6	1.1
Fruit candy	343	0.5	1.3	0.3	100.0	53.6	6.4	49.4	2527.2	0.3	0.3
Breakfast items[c]	222	5.6	22.9	7.9	82.5	15.6	82.8	12.4	891.5	2.1	5.6
Soup combo[d]	83	2.9	31.7	11.2	37.2	2.4	46.8	2.4	375.1	0.8	0.6
Soup	44	1.5	30.6	12.7	67.5	1.7	26.0	2.9	347.8	0.5	0.4
French fries/onion rings/fried cheese sticks	312	17.8	51.2	17.1	2.8	2.1	197.9	7.8	244.9	2.2	1.0
Nachos with cheese	379	22.5	53.5	11.3	3.0	7.1	173.0	0.8	322.2	2.9	1.8
Nonfrozen dairy products[e]	91	1.0	9.6	5.3	100.0	14.7	140.9	0.7	61.0	0.3	0.3
Bagel	276	1.6	5.1	0.7	100.0	2.9	69.8	0.1	1.0	2.4	3.5
Bagel with cream cheese	291	8.2	25.3	13.5	3.3	2.6	71.5	0.1	269.6	1.9	3.1
Pizza: school-prepared	245	11.1	40.8	18.9	0.0	2.6	277.5	5.2	401.5	1.2	1.6
Pizza: vendor	245	10.2	37.4	16.8	0.0	11.3	236.2	3.1	311.0	0.8	1.2
Breads	244	7.3	26.8	10.0	57.1	5.1	75.7	4.4	343.8	2.1	2.2
Soft pretzel	365	1.0	2.4	0.4	100.0	1.3	16.2	0.0	0.0	2.7	4.7
Soft pretzel with cheese	324	6.6	18.3	5.9	30.8	3.4	113.4	0.2	134.4	1.9	3.3
Dressings	310	24.7	71.7	9.8	53.8	15.9	29.6	1.4	126.5	0.3	0.2
Dessert: school-prepared	416	18.1	39.1	12.8	20.0	36.5	26.8	6.0	863.0	1.6	2.0
Salads: prepackaged	104	4.0	34.5	6.5	33.3	1.5	42.4	8.3	1247.7	1.4	1.2

Note. kcal = kilocalories; g = grams; IU = international units.
[a]< 5.5 fat g/serving; for entrees, < 5.5 fat g/100 g.
[b]E.g., cheese sauce, cream cheese, beef jerky, peanut butter.
[c]E.g., dry cereal, oatmeal, egg sandwich.
[d]E.g., soup with bread sticks, bread bowl, sandwich.
[e]E.g., yogurt, cheese, pudding.

VMs was 35% (range = 18%–63%). This high percentage of lower-fat snacks was owing to large numbers of hard-candy items in the machines.

School Food Policies and Practices

Table 4 lists information on school food and nutrition-related policies and practices as reported by school principals and food service directors. Principals (5.9%) and food service directors (27.8%) reported that their school had any policies related to nutrition and food.

With regard to involvement in setting school food and nutrition policy at their schools, principals at 61.1% of the schools reported that food service directors were involved in setting school food policy, whereas only 21.1% of food service directors reported their own involvement. Regarding school policies, 16.7% of principals reported their own involvement in policymaking, whereas only 5.3% of food service directors reported involvement by the principal. Interestingly, 50% of the principals endorsed the view that schools should provide only healthful foods for students at school, whereas only about 31% of food service directors endorsed this view. Most principals and food service directors were in agreement that school food service should be completely self-supporting.

DISCUSSION

Within the food environment of the 20 schools studied (i.e., the foods available in their ALC areas or VMs and their food policies and practices), availability of high-fat foods in ALC areas was high. Items from the chips/crackers and ice cream/frozen desserts categories were available in all but 1 school and, combined, accounted for 21.5%

TABLE 3—Prevalence of Vending Machines, by Vending Machine Type: 20 Secondary Schools in Minnesota

	Median	Mean	Range
Total	12	12.9	5–31
Snack	2	2.7	0–10
Soft drink	4	5.3	2–11
Other	5	5.1	2–10
Drink			
Fruit juice/juice	2	2.1	1–5
Water	1	1.0	0–4
Sports drink	1	1.2	0–3
Ice cream	0	0.3	0–1
Refrigerated food	0	0.2	0–2
Milk	0	0.0	0.0
Other food	0	0.1	0–1
Other beverage	0	0.3	0–3

of available ALC foods. Fruit/vegetable items were available in 17 schools, but these items were only 4.5% of total ALC foods available. These findings raise concerns, because adolescents in secondary schools obtain 35% to 40% of their total energy intake at school, with an increasingly larger share of that intake specifically from ALC areas and VMs.[5–9] If most of the foods available are high in fat, students may consume excess fat and energy and thus increase their risk for excess weight gain. High availability of and easy access to high-fat, high-sugar, low-nutrient foods are inconsistent with and may negate health education in the classroom. High availability of such foods also conveys the message that these foods are acceptable "anytime" foods and may encourage students to choose these foods in preference to the school meal program.[7–9]

Soft drink VMs were extremely prevalent; more than two thirds of schools had soft drink VM contracts. These findings highlight the inroads soft drink companies have made into secondary schools and point to the easy availability to adolescents of high-sugar beverages at school.[9,11–13] During the past 2 decades, soft drink consumption increased by 100% among adolescents aged 11 to 17 years.[19] Recent studies have linked soft drink consumption to excess energy intake[20] and weight gain[21] among adolescents. Thus,

TABLE 4—School Food Policies and Practices as Reported by Principals (n = 18) and Food Service Directors (n = 19) at 20 Secondary Schools

	Principal	Food Service Director
School food policies		
Any school policies about (yes; %)		
Nutrition and food	5.9	27.8
Types of food sold in VMs	16.7	16.7
Types of food sold at school store	0.0	14.3
Teacher use of food as reward to students	11.1	0.0
Open campus during lunch (yes; %)	31.3	26.3
Food and beverage advertising		
Food and beverage advertisements allowed (yes, %)		
In cafeteria	38.9	41.2
Outside cafeteria	33.3	38.9
Food and beverage coupon distribution allowed (yes, %)		
From food service	27.8	73.7
From outside companies	23.5	22.2
VM		
Any school/district soft drink VM contracts (yes, %)	70.6	78.9
Number of VMs (mean, range)		
Snack	2.3, 0–5	2.2, 0–5
Soft drink	5.9, 2–12	5.3, 4–8
Juice/water	2.5, 1–7	3.5, 1–7
VM hours		
Soft drink (VM operation, %)		
All hours (24 hours)	37.5	41.2
All hours except lunch	37.5	29.4
Before/after school only	25.0	11.8
Other combination of hours	0.0	17.6
Snack (VM operation, %)		
All hours (24 hours)	57.1	35.3
All hours except lunch	28.6	35.3
Before/after school only	14.3	11.8
Other combination of hours	0.0	17.6
Nutrition-related school activities		
Any meetings or work groups on school nutrition (yes, %)	50.0	31.6
Food sales allowed for student fundraising (yes, %)	100.0	NA
Teachers use food to reward students (sometimes/often, %)	55.6	63.1
How important is it to have a district/school policy on food and nutrition issues for the high school? (%)		
Very important	16.7	26.3
Somewhat important	44.4	63.2
Neither	16.7	10.5
Somewhat/very unimportant	22.3	0.0
Who is involved in setting school food policy (% of respondents)		
There are no food policies	38.9	0.0
Principal	16.7	5.3
Food service director	61.1	21.1
Kitchen manager	38.9	5.3

Continued

TABLE 4—*Continued*

School board	22.2	10.5
Students	5.6	0.0
Food advisory group	0.0	10.5
School food environment: choose the statement with which you most agree (% of respondents)		
"Schools should provide both healthy and less healthy foods and let students choose"	50.0	68.4
"Schools should provide mostly only healthy foods"	50.0	31.6
School food service financing		
Does the state or district provide monetary support to food service? (% of respondents)		
Don't know	27.8	0.0
State provides	22.2	16.7
District provides	5.6	0.0
State and district provide	22.2	0.0
Food service is self-supporting	22.2	83.3
Should food service be financially self-supporting? (%)		
Completely self-supported	70.6	68.8
Partially supported	11.8	25.0
Completely supported	17.6	6.3

Note. NA = not applicable, VM = vending machine.

soft drink consumption may be contributing to the upward secular trend in adolescent obesity.[1,2,20,21]

Few principals or food service directors reported the presence of any school policies related to nutrition and food, and we observed inconsistency between principals and food service directors regarding responsibility for setting food policy. These data suggest that nutrition policy is not given a high priority within the secondary school environment, a conclusion that also is consistent with national data on school health-related policies.[9,22] Given the epidemic of childhood and adolescent obesity and the linkages between nutrition and chronic disease,[23–25] school policy related to food and nutrition clearly needs increased attention.[26]

Funding of food service and other important school activities remains a pivotal issue in any discussion of school food policies that affect availability and marketing of food and beverages.[5,9–13] Students are an important consumer group, and ALC and soft drink sales to students generate an important revenue stream for food service directors and school principals and districts. Alternative funding sources need to be identified to replace potential revenue reductions that might result from policies that ensure a healthful school food environment.

That the results are based on only the 20 secondary schools included in the study is a limitation that could limit generalizability of the results. Limited information was available about some of the ALC foods (e.g., salad, potato, or pasta bar items). The classification system for the ALC foods was unique and could have been done several different ways. School food policies and practices were measured with self-reports.

Further research should examine whether school food environmental exposures are associated with student food choices and dietary quality. Such research is needed to improve conceptualization and measurement of environmental influences to evaluate their potential effect on food choices. Alternative revenue sources need to be identified to replace current financial incentives schools receive from sales of high-fat or high-sugar foods and beverages to students. ■

About the Authors

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Contributors

S. French implemented the study, conducted the data analysis, and wrote the article. M. Story advised on study implementation and provided editorial input on the article. J. Fulkerson was responsible for oversight of study evaluation activities and provided editorial input on the article. A.F. Gerlach oversaw collection activities for the à la carte data, including protocol development, staff training, and quality control, and provided editorial input on the article.

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Human Participant Protection

The study was reviewed and approved by the University of Minnesota internal review board and human subjects protection committee.

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