

## Vending Machine Practices in Louisiana High Schools

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*Please note that this study was published before the implementation of Healthy, Hunger-Free Kids Act of 2010, which went into effect during the 2012-13 school year, and its provision for Smart Snacks Nutrition Standards for Competitive Food in Schools, implemented during the 2014-15 school year. As such, certain research may not be relevant today.*

### ABSTRACT

#### Purpose and Objectives

The purpose of this study was to determine the presence and regulation of vending machines in Louisiana high schools, type of foods in the machines, and the relationship between the number of vending machines and student participation in the National School Lunch Program (NSLP).

#### Methods

Foodservice directors of the Louisiana high school that participate in the NSLP were interviewed by telephone to obtain information about the number of vending machines in their respective schools, the types of foods offered in vending machines, times of operation, who profits from vending sales, and demographic data. The 90 high schools that participated (76% participation rate) were divided into two groups, large urban and small rural, based on student enrollment.

#### Results

All the urban schools and all but six of the rural schools offered vending services to students. The number of vending machines for student use in the schools ranged from 1 to 25. Urban schools had more vending machines than rural schools ( $7\pm 5$  vs.  $3\pm 2$ ,  $p < 0.05$ ). The larger urban schools also had a greater variety of vending items and less participation in the NSLP than the smaller rural schools ( $65\pm 13\%$  vs.  $77\pm 12\%$ ,  $p < 0.05$ ). The most popular items offered in the vending machines included carbonated beverages, water, candy, and chips, all of which are considered low nutrient-density foods. A majority of the schools deposited the funds raised from vending operations into a general fund.

#### Applications to Child Nutrition Professionals

Strict federal guidelines are needed for vending machines in school systems. Federal nutrition standards, which limit fat and sugar content, should be established for food items sold in school vending machines. Foodservice directors should advocate for policies that offer more nutritious foods in vending operations.

### INTRODUCTION

School meal programs and the school environment impact students' food choices and dietary intake. More than half of school children in the United States eat either school breakfast or

school lunch (Burghardt et al., 1995), but students also may purchase food from other sources in the school. Student participation in the National School Lunch Program (NSLP) may be at risk due to the increase of competitive foods offered in school systems (Harris, 2002). The presence of vending machines, with well-liked but low-nutrient density foods, may discourage students from eating meals provided by the NSLP and encourage eating habits that are not consistent with nutrition recommendations.

The United States Department of Agriculture (USDA) defines competitive foods as foods available in schools that are not reimbursable. Competitive food items are often sold in snack bars, vending machines, and school stores (USDA, 2002). Some states allow for competitive food sales in the school cafeteria through a la carte programs. Vending machines appeal to schools due to their convenience and record of revenue generation. They are the most common way of selling competitive food items (Kramer-Atwood et al., 2002). In addition, vending machines typically offer few healthy alternatives (Harnack et al., 1999).

The NSLP was established in 1946 as an answer to poverty and malnourishment among school-aged children. The program is federally funded and operates in 99,800 public schools across the nation (USDA-FNS, 2004). The Child Nutrition Act of 1966 established the School Breakfast Program (SBP) to provide a morning meal to low-income children (American Dietetic Association [ADA], 1996). In recent years, the nutritional concerns for school children have changed from under-nutrition to over-nutrition. Intake of total fat, saturated fat, and sodium are all above recommended levels (Gleason & Suitor, 2001). The diets of school children include a high intake of carbonated beverages and high-sugar snacks (Cullen et al., 2000; French et al., 1999; Harnack et al., 1999; Ludwig et al., 2001).

The School Meals Initiative for Healthy Children (SMI) was initiated in 1995 by USDA to improve the nutritional quality of meals served to school children. SMI requires lunches to meet the *Dietary Guidelines for Americans*, which recommends, over the course of a week, limiting total fat to no more than 30% of total calories and saturated fat to no more than 10%, and providing one-third of the Recommended Dietary Allowances for protein, calcium, iron, vitamin A, and vitamin C (USDA, 1995). In order to promote the NSLP and SMI, the USDA designed Team Nutrition, an education initiative that encourages public and private partnerships to promote healthy foods, helps teachers integrate nutrition education into schools; and aids foodservice staff in preparing meals that meet nutritional standards (USDA, 2001).

Food habits are established early in life and the availability of high-sugar, high-fat snacks in vending machines may discourage participation in the NSLP and influence life-long eating habits (ADA, 2003). The purpose of this study was to determine the presence and regulation of vending machines in Louisiana high schools, type of foods in the machines, and the relationship between the number of vending machines and student participation in the NSLP.

## Methodology

Foodservice directors of the Louisiana high school that participate in the NSLP were interviewed by telephone to obtain information about the number of vending machines in their respective schools, the types of foods offered in vending machines, times of operation, who profits from vending sales, and demographic data. Permission to conduct the study was obtained from the

Louisiana Department of Education and the Human Subjects Committee for Louisiana Tech University.

### Subjects

There are 118 high schools in Louisiana, and these were divided into 64 large and 54 small schools, based on enrollment data obtained from the Louisiana High School Athletic Association (Louisiana High School Athletic Association, 2001). Generally, the larger schools are in urban areas of the state, while the smaller schools are located in the state's rural regions. The high schools that participated in the federal school meal programs were identified from the Louisiana Team Nutrition Web page (Louisiana State Department of Education, 2001). Three attempts were made to contact each foodservice director. After three unsuccessful attempts to contact, or a refusal to participate, the school was dropped and the next school on the list was contacted.

### Data Analysis

Data were analyzed using the Number Cruncher Statistical System. Descriptive statistics were used to determine means and frequencies. A t-test was used to compare the number of vending machines and differences in NSLP participation between the large, urban and small, rural high schools. Chi square analysis was used to determine differences in the types of vending machine items sold between the smaller and larger schools. Correlation was used to determine the relationship between the number of vending machines per school and student participation in the NSLP.

## Results And Discussion

Of the original pool of 118 Louisiana high schools, 90 high schools (76%) were included in the study and all of these were participants in the NSLP. Twelve schools refused to participate in the survey, 9 schools were excluded because they were not participants in the NSLP, and 7 foodservice directors were unavailable for interviews. Enrollment ranged from 103 to 815 students in the rural schools and 816 to 2,700 students in the urban schools. Schools participating in the study had various grade levels from pre-kindergarten through 12th Grade but all included Grades 10 through 12. Other characteristics of the high schools participating in the study are reported in Table 1.

Characteristics	Rural Schools (n=44)	Urban Schools (n=46)
Mean enrollment	329±148	1404±403*
Mean No. Vending Machine	3±2	7±5*
Mean No. Students/Vending Machine	108±68	318±319*

Mean Percent Participation in NSLP	77±12	65±13*
Mean Percent Full Price	41±22	64±18*
Mean Percent Reduced/Free	59±22	36±18*
Operating Hours of Vending Machines		
Recess/After School	26	18

Last 10 Minutes of Lunch	16	25*
All Day	2	3*
Receiving Funds from Vending Machines		
General Fund	29	45*
Athletics	10	15*
School Activities	8	15*
School Organizations	2	5*
Office Supplies	6	0*
Books	4	2*
Type of Lunch Service Provided		
Select Hot Line	33	46*
Non-Select Hot Line	11	0*
Cold Sandwich	16	19
Salad Bar	18	29*
Scramble System	3	0
Hot Fast Food	17	32*
*Significant difference between rural and urban schools, t-test for means and Chi-square for frequencies, p<0.05.		

All urban schools and all but six rural schools offered vending services to its students. The number of vending machines for student use in the schools surveyed ranged from 1 to 25. The urban schools had more vending machines than rural schools (Table 1).

Ninety-four percent of senior high schools in the United States have vending operations available for student use (USDA, 2001). Research has demonstrated that school meal programs contribute to students' diets (Gordon et al., 1995), yet the survey found only 77% of students from rural schools and 65% of students from urban schools in Louisiana participated in the NSLP. The NSLP in Louisiana is underused.

There was a significant inverse relationship between the size of the school and participation in the NSLP ( $r=-.43$ ,  $p<0.05$ ). The larger urban schools had a greater variety of vending items and less participation in the NSLP than the smaller rural schools. A two-sample t-test indicated a larger mean percent of students eating school lunch in rural schools as compared to urban schools (77+12% vs. 65+13%,  $p<0.05$ ). Also, a higher proportion (59+22% vs. 36+18%,  $p<0.05$ ) of students in rural schools qualified for free or reduced-priced lunches (Table 1). An analysis of

all 90 schools revealed no correlation, however, between the number of vending machines per school and student participation in the NSLP, even when divided by size.

Types of vending items sold in these schools are reported in Table 2. The majority of items offered are considered low nutrient-density. Chi-square analysis showed that urban schools were more likely to offer almost every category of food item except for sandwiches, fruits, and vegetables. None of the urban schools and only one rural school offered fruit or vegetable items in vending machines. Carbonated beverages were the most frequent item sold in both the urban and rural schools surveyed. The most popular items offered included carbonated beverages, water, candy, and chips. Other research has documented a similar trend. Ho et al. (1992) found that popular vending machine items include candy bars, chips, carbonated beverages, milk, water, sandwiches, and ice cream. A recent study in Minnesota also showed that carbonated beverages were the most popular item offered in school vending machines (French et al., 2002). Likewise, the School Nutrition Dietary Assessment Study (Burghardt et al., 1995) found that carbonated beverages were the most common competitive item offered to students in the school environment.

Table 2: Types of Vending Items Offered  
By Rural and Urban High Schools

Item	Rural Schools (n=44)	Urban Schools (n=46)
Soda	37	46*
Bottle Water	27	46**
Candy	18	31**
Chips	15	28**
Crackers/Cracker Sandwiches	10	18*
Juices	9	15*
Cookies	8	12*
Peanuts	6	11*
Sandwiches	2	2
Fruits/Vegetables	1	0*
Ice Cream Novelties	1	2*
Milk	0	0
*Significant difference between rural and urban schools, Chi-square, $p < 0.05$ .		
**Significant difference between rural and urban schools, Chi-square, $p < 0.01$ .		

Revenue from vending operations may contribute significantly to school operations. According to a USDA study of competitive foods in federal school meal programs, school boards are entering into contracts that give soft drink companies exclusive placement in school vending machines in return for a percentage of profits or a flat fee (USDA, 2001). Schools reported using profits from the vending machines for various purposes. While urban schools were more likely to use the funds earned from vending machines for the general fund (97% vs. 65%,  $p < 0.05$ ), rural schools were more likely to use monies for office supplies and books (14% vs. 0%;  $p < 0.05$  and 9% vs. 4%;  $p < 0.05$ ; Table 1).

In a survey of California foodservice directors, Craypo et al. (2002) reported profits from competitive foods were used to support extracurricular activities, athletics, and educational programs, but there were differences between urban and rural schools. Although 95% reported selling fastfoods and other a la carte items in the school cafeteria, those schools not selling fastfoods or other a la carte items were in the rural areas of the state. As a result, rural schools were more likely to depend on vending machine revenues for general operations (Craypo et al., 2002).

USDA reports that children make poor choices when selecting food. USDA research (2001) shows that only 2% of school-age children meet the recommendations of the Food Guide Pyramid. Two-thirds of females between ages 14 and 18 exceed recommendations of total fat intake and consume diets high in sugar. Helping students change their eating habits will require long-term, integrated policies from the food industry, policymakers, communities, schools, and families.

Although federal regulations prohibit the sale of foods of minimal nutritional value in the foodservice area during meal periods, they do not restrict the sale of foods and beverages in other areas or at other times (USDA, 2002). Regulations in Louisiana allow the use of vending machine operations for 7th through 12th Grade during the last 10 minutes of the lunch period (USDA, 2001). The majority of both urban and rural schools in Louisiana reported that they followed the state regulations. According to the results of this study, five of the schools offered vending operations all day (Table 1). Other states report similar policies on vending operations. Eighty-one percent of participating Minnesota high schools limited vending hours, but only one-third limited the hours until after the lunch period (French et al., 2002).

Many nutrition, health, and educational organizations advise changing the availability of competitive foods in the nation's schools (ADA, 2003). Widley et al. (2000) recommended educating school principals on the importance of offering lowfat convenience foods to students. French et al. (2002) suggested that schools provide mostly healthful food choices in vending operations. Kramer-Atwood et al. (2002) recommended displaying the nutrition information on all types of competitive food items offered in the schools.

## Conclusions And Applications

It is important that all foods and beverages available on school campuses contribute to eating patterns that are consistent with the Dietary Guidelines for Americans. Currently, some states have regulations limiting the time of vending operations, however, all federal, state, and local policies should ensure that available foods and beverages promote healthy eating behaviors. Strict federal guidelines are needed for vending machines in the school systems. Vending machine hours should be restricted to after lunch period. Federal nutrition standards, which limit fat and sugar content, should be established for food items sold in vending machines in schools. Foodservice directors should advocate for policies that provide more nutritious foods in vending operations.

There are several limitations to this study. First, the information was self reported over the telephone. Second, additional questions (such as who owns the vending machines; does the school allow students to leave campus for lunch; and what other sources of competitive foods are offered in the school), should have been included on the questionnaire. Future research should focus the consequences of substituting items of high nutritional value for low-nutrient items in vending machines, particularly the impacts on vending sales and student participation in the NSLP.

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