
Impact of the Nutrition Environment on Food Consumption and Body Mass Index of 6th and 8th Grade Middle School Students

EXECUTIVE SUMMARY

The number of children who are overweight and have been diagnosed with type 2 diabetes is increasing at an alarming rate. Researchers have identified food choices and sedentary lifestyle as two major factors contributing to these health concerns. Children's eating behavior is influenced by personal characteristics and by environmental factors in the home, school, and community. Children spend a significant portion of their day at school, and school nutrition environments influence their eating habits and daily energy consumption (Bordi, Park, Watkins, Caldwell, & DeVitis, 2002; Carter, 2002).

This study measuring the impact of the school nutrition environment on middle school students was originally designed to create a model describing the relationship between sources of energy overconsumption during the school day and school nutrition environments. One Texas school conducted a pilot that included a one-day food recall, focus groups, Body Mass Index (BMI) percentage calculations, nutrient analysis of school menus, snacks and beverages sold in vending machines, and school stores. Due to the complexity of the study, complete data were not gathered. The study methodology was assessed and redesigned to achieve the original intent of the study with less complicated procedures.

Two schools in Mississippi and one school each in Texas and in Colorado participated in the redesigned study. These states were chosen because Mississippi has one of the highest adult rates of obesity, while Colorado has the lowest rate in the nation. Texas was selected because of its statewide comprehensive nutrition policies for all public schools participating in the Federal Child Nutrition Programs.

A Three-Day Food Diary was used to gather food intake information from 6th and 8th grade students from the four schools. Data to calculate BMI percentiles also were gathered from participating students. Specific protocol for completing the food intake record and measuring heights and weights were used. School menus, a list of snacks and beverages sold in vending machines and school stores, and school demographics were gathered from each school to create a school nutrition environment profile.

The Centers for Disease Control and Prevention (CDC) guidelines were used for calculating age and sex specific BMI. Results showed that 15.4% (40) of the participants were at risk for being overweight, and 17.4% (45) were overweight. No difference was found between gender, grade, or race for BMI percentile; however, a significant

difference between schools was found. School #1 was significantly different from School #3. School #1 had the highest mean BMI at the 71st percentile, while School #3 had the lowest mean BMI at the 51st percentile.

Using servings as the basic unit of consumption, a Food Guide Pyramid (FGP) score was developed using a methodology parallel to the one used by USDA to develop the Healthy Eating Index and used by Melnik, Rhoades, Wales, Cowell, and Wolfe (1998) (Kennedy, Ohls, Carlson, & Fleming, 1995). FGP scores were calculated by averaging the number of servings consumed for each FGP food group. Possible scores for each food group ranged from 0 to 10 with a maximum total FGP score equal to 50. The score for fats/sweets was the mean number of servings consumed. The total number of servings consumed within each food group was summed for each child and school and averaged for the study population. The mean FGP scores were bread 5.8; milk 6.7; meat 8.7; vegetable 3.1; and fruit 3.0. The minimum consumption for fats/sweets was 0 with a maximum of 12 and a mean of 2.2. No difference between gender, grade, or ethnicity was found for total FGP score. Analysis of variance showed a significant difference between schools for the total FGP score. School #3 had a higher mean FGP score (29.1) than School #4 (24.9). Further analysis showed that the mean FGP bread score and mean FGP fruit score for School #3 was different from that of the other schools. School #3 means were higher in these two FGP groups. For the mean FGP milk score, School #3 (7.2) also was different from School #2 (5.8). Mean FGP vegetable scores were significantly different for School #1 (3.6), school #3 (2.7), and School #4 (2.4).

Results showed that students were consuming over 30% of the total number of food servings at school. The proportion of daily intake at school averaged 36% for bread, 38% for milk, 34% for meat, 49% for fruit, and 41% for vegetables. However, only 23% of servings from the fats/sweets group were consumed at school.

Given the FGP scores and BMI percentile for School #3, it does appear that the nutrition environment can have an impact on students. School #3 provided the most healthful school nutrition environment with healthful options offered in the snack bar line of the cafeteria and vending machines. It also is located in one of the few states that have a statewide school nutrition policy. However, there are a large number of intervening variables that may have affected these results. Variables such as nutrition education, the average physical activity performed daily by students, school physical education requirements, community health programs, and state and local obesity initiatives were not measured. These intervening variables could have influenced the BMI percentile and food intake of study participants.

These results confirm that schools are providing healthful foods for students. Parents, health professionals, and community leaders should recognize the role that school meals play in the health and wellness of students. Parents should assume more responsibility for the health of children and work with schools to enhance school wellness programs that reach into the community and benefit children as well as adults.

