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School Lunch Before and After Implementation of the Healthy Hunger-Free Kids Act

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ABSTRACT

Purpose/Objectives
This study compares the mean nutrients selected and consumed in National School Lunch Program (NSLP) meals before and after implementation of the new nutrition standards mandated by the Healthy Hunger-Free Kids Act of 2010 (HHFKA) in July 2012. Four elementary schools achieving HealthierUS Schools Challenge awards serving second through fifth grade students were selected to participate.

Methods
In Spring 2012, before implementation of meal standards mandated by the HHFKA, digital photographs of NSLP lunches were taken of second to fifth graders' lunches in four elementary schools before and after the meals were consumed. In Spring 2013, after implementation of meal standards mandated by the HHFKA, digital photographs of lunch were again taken in the same schools before and after lunches were consumed. The photos were used to visually estimate the amounts of food items on trays and determine nutritional content of meals selected and consumed. The nutrition content of the lunches in 2012 was compared to those in 2013 by applying a one-way multiple analysis of variance (MANOVA) followed by post-hoc analyses using multiple *t*-tests to compare mean nutrient amounts.

Results
The current study revealed significant improvements in both selected and consumed key nutrients when comparing meals before implementation of the HHFKA (2012) to the meals after implementation of the HHFKA (2013) nutrition standards. These included reductions in sodium and the percentage of calories from saturated fat and a significant increase in fiber. A reduction in calcium selected and consumed was also observed.

Applications to Child Nutrition Professionals
The current study indicates that child nutrition professionals are making positive changes in their menu selections to meet the requirements of the HHFKA. However, child nutrition professionals may need to evaluate menus for calcium and make modifications as needed to enhance calcium rich foods selected in NSLP meals.

Keywords: National School Lunch Program; Healthy Hunger-Free Kids Act; child nutrition; nutrient requirements; US Dietary Guidelines

INTRODUCTION

Eating a healthy diet is essential for proper development and academic success in children (Bergman & Gordon, 2010). The United States Government subsidizes meals for public and not-

for-profit school children with the intention of providing low cost or free meals to prevent malnutrition and, more recently, over-feeding that leads to obesity (US Department of Agriculture [USDA], 2012a). In 2010, the Healthy Hunger-free Kids Act (HHFKA) was adopted to guide school food programs. The January 26, 2012, *Federal Register* published the final rule for Nutrition Standards in the National School Lunch Program (Federal Register, 2012)**.** This final rule is intended to assist school children in meeting the recommendations for healthy living by aligning school meals with the Dietary Guidelines for Americans (US Department of Health and Human Services [USDHHS] & USDA, 2011). Changes to the program include more frequent monitoring for school food service agencies, a standardized and universal food-based menu planning system, and increased requirements for the amounts of fruits and vegetables served in school meals. In addition, the final rule requires that meals be within a caloric range based on the RDA for both maximums and minimums for each grade group (K-6, 6-8, 9-12). The final rule also limits sodium with a plan to reduce the amount of sodium allowed in the school food over the next ten years to amounts that meet RDA standards. The final rule requires foods served to contain no non-naturally occurring trans fats. In addition, the final rule allocates increased funding for subsidizing the cost of school meals because of the anticipated increase in cost. Table 1 depicts a comparison of previous and current meal requirements. (Federal Register, 2012; USDA, 2012b).

Table 1. ***Comparison of Traditional Elementary School Lunch Meal Pattern 2011/2012 and the 2012/2013 Elementary School Lunch Menu Pattern for 5-Day School Week Meal Requirements***[1]

Food Group	2012 Food-Based Requirement (K-3)	2013 Requirement (K-5)
Fruits and Vegetables	2.5 cups of fruits and vegetables combined	3.75 cups of vegetables plus 2.5 cups of fruit per week
Vegetables	No specifications as to type of vegetable subgroup	Weekly requirement for: • 0.5 cups dark green • 0.75 cups orange • 0.5 cups legumes • 0.5 cups starchy • 1 cup other
Meat/Meat Alternative	7.5 oz eq.	8-10 oz eq.
Grains/Bread	8 oz eq. per week (min. 1 per day)	8-9 oz eq. per week.
Whole Grains	Must be enriched or whole grain	At least half of grains offered must be whole grain-rich in the NSLP beginning SY 2012–2013 and in the SBP beginning SY 2013–2014. All grains must be whole grain-rich in

		both the NSLP and the SBP beginning SY 2014–15.
Milk	5 cups Variety of fat contents allowed; flavor not restricted	5 cups Fluid milk must be low-fat (1 % milk fat or less, unflavored) or fat-free (unflavored or flavored).
Sodium	No set targets	Target 1: SY 2014-15 for Lunch ≤1,230mg (K-5) Target 2: SY 2017-18 Lunch ≤935mg (K-5) Final target: 2022-23 Lunch ≤640mg (K-5)
Calories	Traditional menu planning Lunch: 633 per day (grades K-3) 785 per day (grades 4-12)	Only food-based menu planning allowed Calorie range (min. & max.) Lunch: 550-650 (grades K-5)
Saturated Fat	<10 % of total calories	<10 % of total calories
Trans fat	No limit	0 grams per serving

[1] Adapted from the Federal Register (2012) *Nutrition Standards in the National School Lunch and School Breakfast Programs; Final Rule*; and USDA (2012b).

School meals are an advantageous place to make improvements in the nutrition of many American children (Stang, 2010) According to the USDA (2012a), 31 million children ate NSLP lunches each school day in 2011, and over half of the lunches were provided at a free or reduced rate. More than 21% of children under the age of 18 in the US lived in poverty in 2011 (US Census Bureau, 2012). Children who live in poverty are more likely to be food insecure (Stang, 2010). According to the Dietary Guidelines for Americans 2010, the diets of Americans, in general, do not meet recommendations for good health (USDHHS & USDA, 2011). School meals provide a vital safety net to students who may be at risk for delays in cognitive development due to malnutrition.

The HealthierUS School Challenge (HUSSC) award (USDA, 2014) is a voluntary certification initiative recognizing those schools that have created healthier school environments through promotion of nutrition and physical activity. Specific goals of the program include eating a variety of foods, eating more fruits, vegetables and grains, eating lower-fat foods more often, eating calcium-rich foods, and being physically active.

Purpose
Eating a healthy diet is essential for children to develop optimally and maximize their potential academically and physically. The purpose of the current investigation was to compare the nutrient content of NSLP meals selected and consumed by elementary school children in grades 2 through 5 before and after implementation of the new nutrition standards as defined in the *Federal Register* (2012).

METHODOLOGY

Validation of Methods and Reliability of Data Collectors
Prior to any data collection in 2012 or 2013, a local elementary school served as a test site for validating methods and establishing reliability among the researchers who visually estimated portion sizes. None of the data collected at the local elementary school were included in the final study analysis. All visual estimations were completed by three trained graduate student researchers.

A NSLP lunch was obtained from the serving line and each food item was weighed. Confirmation was obtained that standard serving scoops were being used throughout the food service to ensure accuracy and consistency. Twelve students were given a numbered tray and instructed to obtain their lunch as usual and then bring their tray to the research table to have a "before" photo taken. After the students finished eating, an "after" photo of each tray was taken and trays were collected for weighing. Each researcher visually estimated the amount remaining of each food item and then the items were weighed for comparison. The researchers' ability to accurately estimate food portions from photographs was determined to be statistically valid. The intra-class correlation coefficients (ICC) for intermodal agreement between the actual weights and each researcher's estimates were above 0.9. Validity data were analyzed using IBM SPSS Statistics for Windows, Version 19.0.

Participants
Students in grades two through five from four Washington State elementary schools in two school districts participated in the study. Schools were selected based on their achievement of a HUSSC award in the school year prior to data collection. School districts were also selected based on the free and reduced priced meal status (FRP) of the student population. The first district located in western Washington had two schools with a FRP rate of 83% and 250 eligible participants. The other district located in eastern Washington had two schools with a FRP rate of 16% and 320 eligible participants. All schools participating were HUSSC awarded schools within two years of their initial award.

Passive consent was sought from the parent/guardians via a letter that was mailed home. If the student or parent/guardian did not want the student to participate in the study, they were asked to return the letter to the school. In the western Washington schools, two letters were returned. In the eastern Washington schools, 25 letters were returned. Thus, a total of 27 out of 570 (4.7%) of the total potential participants opted out. The remaining students were eligible to participate. On each day of data collection, students in the lunch line were offered a tray until approximately 15 trays were handed out. Approximately one third of the students approached declined to participate.

Trays were sampled from each school district at both schools in roughly the same number each year of the study. In 2012, data from 547 NSLP meals were analyzed. In 2013, data from 518 meals were analyzed, with 301 coming from the western Washington school district and 217 coming from the eastern Washington school district. Data were collected for approximately 30 days in the months of April and May each year. The kitchens at each location were a production/service system with some onsite preparation including some scratch cooking. All four schools were "offer vs serve" systems where students were given a choice of menu items to place on their trays. All four schools also had daily salad bars for students to select fruit and vegetable options.

Procedure

A custom computer database management program was created at Central Washington University to aid in data collection. The computer program allowed researchers to record and link together "before" and "after" digital photographs of each NSLP lunch studied. The amounts of food selected and remaining after the lunch period were visually estimated using these photographs. These amounts were then linked via the custom program to the portion sizes and nutrition information provided by the schools. The custom program compiled and yielded calorie, carbohydrate, protein, fat, saturated fat, fiber, sodium, calcium, vitamin C, vitamin A, and iron content, selected and consumed, for each lunch.

Teachers and administrators were provided a script to explain the study purpose and procedures. Student participation and procedures for opting out were also included. On the day of data collection, two laptops and two cameras were set up in the lunchroom. The researcher approached students as they stood in line to pick up their NSLP meals and asked each student if he or she would like to participate in the study. The student's eligibility was then verified by name. If the child was willing and eligible, the researcher gave the student a numbered, disposable foam tray. The researcher instructed the child to select his or her lunch as usual and then to stop by the camera table to have a photo of the lunch taken before he or she sat down to eat.When a student approached the table with a lunch, the researcher entered the tray number and asked the student his or her name. After locating the student's name on the school provided list, the researcher scanned a corresponding bar code that linked the student to the tray. The student placed the meal beneath the camera, and a photo was taken of the lunch prior to eating. After the first photo, the student was instructed to return to his or her classmates and to eat lunch as usual. After the student finished eating, he or she returned to the camera table for a second photo before emptying the tray into the trash. The data gathered in 2013 were then compared to similarly collected data from 2012.

Statistical Analyses

The mean nutrients served/selected and consumed per NSLP were calculated for: total food energy, percentage of calories from total fat and saturated fat, carbohydrates, protein, calcium, fiber, cholesterol, iron, sodium, and vitamins A and C. Meals selected and meals consumed were considered separately. A multiple analysis of variance (MANOVA) statistical test was conducted to determine if there was a significant difference in the mean nutrient content of NSLP meals selected and consumed in 2012 with NSLP meals selected and consumed in 2013. This test was

followed by post-hoc analyses using multiple *t*-tests which compared the 2012 meals to the 2013 meals data by individual nutrients ($\alpha = 0.05$).

RESULTS AND DISCUSSION

The results of this investigation include the analysis of 1,065 NSLP meals from elementary school students, grades 2-5, from 2012 and 2013. Data from 547 and 518 NSLP meals were collected and analyzed, respectively. Demographic data were not collected for all of the meals analyzed. However, for those meals for which these data were present the relationships in nutrient consumption reported between 2012 and 2013 NSLP meals remained consistent when controlled for school, sex and age. That is, these variables did not have a confounding effect on the major findings of this study.

When the NSLP meals from 2012 and 2013 were compared, the results support the hypothesis that the implementation of the HHFKA had a significant positive effect on the mean amount of many of the nutrients selected and consumed in the NSLP lunches. Data analysis, shown in Table 2, revealed significant differences between the 2012 meals and 2013 meals in mean content of selected food energy, percentage of calories from total fat and saturated fat, carbohydrates, protein, calcium, fiber, cholesterol, sodium, and vitamin C. No significant differences were seen between the 2012 and 2013 meals' mean content of selected or consumed iron and vitamin A.

Table 2. ***Mean Nutrient Content of Four Healthier US School Challenge Elementary School Lunches Selected and Consumed Compared by Year***

	Selected		Consumed	
	2012 (n = 547)	**2013 (n = 518)**	**2012 (n = 547)**	**2013 (n = 518)**
Calories (kCals)[a,b]	600.27 ± 131.78	513.82 ± 169.07	444.88 ± 151.99	362.31 ± 145.84
% of Calories from total fat[a,b]	27.66 ± 8.44%	20.25 ± 12.91%	26.98 ± 9.61%	20.85 ± 14.82%
% of Calories from saturated fat[a,b]	9.25 ± 4.99%	5.69 ± 2.74	9.04 ± 5.46%	5.77 ± 3.09%
Carbohydrates (g)[a,b]	81.92 ± 24.78	76.96 ± 29.57	60.83 ± 24.04	52.03 ± 23.86
Protein (g)[a,b]	28.40 ± 7.10	20.53 ± 9.18	21.16 ± 8.77	14.41 ± 7.37
Calcium (mg)[a,b]	507.63 ± 220.41	240.31 ± 130.05	373.94 ± 217.51	166.30 ± 114.90
Total dietary fiber (g)[a,b]	6.04 ± 3.07	12.12 ± 26.53	4.43 ± 2.66	9.18 ± 24.14
Cholesterol (mg)[a,b]	53.43 ± 39.70	31.92 ± 24.34	40.27 ± 36.91	24.24± 18.54
Iron (mg)	3.61 ± 1.43	3.63 ± 2.51	2.71 ± 1.47	2.56 ± 1.98
Sodium (mg)[a,b]	1148 ± 427	909.17 ± 442.18	844 ± 414	647.20 ± 369.89
Vitamin A (IU)	2128 ± 3004	2467.40 ± 3850.86	1555 ± 2584	1735.35 ± 3280.83
Vitamin C (mg)[a,b]	36.60 ± 43.18	30.544 ± 27.03	27.05 ± 34.24	19.71 ± 21.70

Note: School Meal Initiative guidelines and HHFKA guidelines were followed in 2012 and 2013, respectively.
[a] Indicates significant difference ($p < 0.05$) between nutrients selected in 2012 and 2013.
[b] Indicates significant difference ($p < 0.05$) between nutrients consumed in 2012 and 2013.

Major changes noted in Table 2 include a reduction in sodium content in both selected meals (1,148 mg for 2012 to 909 mg for 2013) and consumed meals (844 mg for 2012 to 647 mg for 2013). School Nutrition Dietary Assessment (SNDA) studies have shown sodium to historically be at high levels in school meals (Story, 2009; Mathematica Policy Research, 2013). Data for SNDA-IV (Fox & Condon, 2012), were gathered in 2009 and 2010. The SNDA-IV data show that in most schools the average sodium content of NSLP meals served exceeded the recommendation of less than 1,230 mg of sodium per lunch by more than 50%. Unlike the data from SNDA-IV, the current study indicated that sodium means for both 2012 selected meals and 2013 selected meals were below this recommended level. This may be partially due to the fact that the schools in the current study had received HUSSC awards. As such, these schools were evaluated based on healthy changes they had enacted in the school environment. Although reduction of sodium is not specifically listed as one of the major goals of the HUSSC program, increasing fruits and vegetables is one of the goals. This could result in fewer high sodium foods included in the menu. Nonetheless, the final rule (Federal Register, 2012) has targeted sodium as one of the nutrients to be reduced over time as seen in Table 1 (Federal Register, 2012; USDA, 2012b). Reductions in sodium from the 2012 meals to the 2013 meals indicate that school child nutrition program directors are making menu and ingredient changes that reduce sodium in NSLP meals.

The percentage of calories from saturated fat was also reduced when comparing the selected and consumed 2012 meal means to the 2013 meal means. The final rule (Federal Register, 2012) recommends that less than 10% of total calories offered come from saturated fat. Both the 2012 levels (9.25% of calories from saturated fat) and the 2013 levels (5.77% of calories from saturated fat) were below the recommended levels. The reduction from 2012 to 2013 meals indicates that the school child nutrition program directors successfully made menu changes to reduce the percentage of calories from saturated fat in NSLP meals.

Almost all of the significant mean changes were reductions from pre-implementation of the HHFKA in 2012 to post-implementation of the HHFKA in 2013. The one exception is fiber. For fiber, both the selected meals (6.0 g in 2012 to 12.1 g in 2013) and consumed meals (4.4 g in 2012 to 9.2 g in 2013) were higher in 2013 after the implementation of HHFKA. Although there is no established recommended level of fiber per day, increased fiber in the meal would be considered a positive change in the dietary intake of children. This is because of its potential positive health effects such as reduced risk of obesity and heart disease over time (American Academy of Pediatrics Committee on Nutrition, 2004). An adequate level of fiber is approximately the child's age plus 5 to 10 grams per day (Williams, Bollela, & Wynder, 1995). Using this formula, a 10 year old would be encouraged to consume 15 to 20 grams of fiber per day. The mean of 9.2 grams consumed in the 2013 meal would be an adequate level considering school lunch is designed to provide one-third of the child's intake per day. A likely explanation for the increased amounts of fiber between 2012 and 2013 is the HHFKA emphasis on whole grains and increased intake of fruits and vegetables.

The reductions from 2012 meals to 2013 also include vitamin C for both selected meals (36.6 mg for 2012 to 30.5 mg for 2013) and consumed meals (27.1 mg for 2012 to 19.7 mg for 2013) as well as calcium selected meals (508 mg to 240 mg) and consumed meals (374 mg to 166 mg). These changes would be considered negative in the diets of children. While the values in the

2013 meals selected and consumed still represent an adequate amount for vitamin C, children may not have good sources of vitamin C outside of the school meals offered. The recommended level for vitamin C for 9 to 13 year olds is 45 mg. The amount of vitamin C in the 2013 selected meal represents about 67% (30.5 mg/45mg) of this recommended level, and the consumed meal represents about 44% (19.7 mg/45 mg) (Centers for Disease Control and Prevention [CDC], 2014a). There is concern for children who do not have a varied diet at home and hence may require high vitamin C levels in the school meals they receive.

The reduced level of calcium is a potential issue since the recommended levels of calcium for 4 to 8 year olds is 1,000 mg per day, and for 9 to 13 year olds it is 1,300 mg per day. (USDHHS, 2014). The mean selected amount of calcium in the 2013 meal was 374 mg which is approximately 37% (374 mg/1,000 mg) of the recommended amount for 4 to 8 year old children and only about 29% (374 mg/1,300 mg) of the recommended amount for 9 to 13 year old children. This may be an unintended consequence of the HHFKA reduction in saturated fat. Cheese, for example, is a source of both calcium and saturated fat. Consequently, it may be necessary for child nutrition professionals to be aware of this potential and select foods higher in calcium when preparing the menu.

Mean protein levels are also lower in the selected and consumed 2013 meals. However, protein requirements are 34 grams per day for children 9 to 13 years of age. The selected protein in 2013 meals was 20.5 grams per day and the consumed protein was 14.4 grams per day representing 60% and 42% per day, respectively, of the recommended amount of protein. Considering that the NSLP is designed to offer one-third of the required nutrients, the levels of protein selected and consumed are still at adequate levels (CDC, 2014b).

In summary, when considering the results of the combined data from both school districts, the reduction in calories, the percentage of calories from total fat and saturated fat, cholesterol, and increase in dietary fiber reflect the increase in required amounts of fruits and vegetables and a decrease in energy dense, nutrient-poor foods in the HHFKA requirements. The decrease in vitamin C may reflect the new requirement to offer both fruits and vegetables since vegetables are lower in vitamin C than fruits. In addition, the decrease in total food energy, calories from total fat and saturated fat, iron, and protein may also be in part due to the decrease in the daily minimum amount of protein selected for the elementary grade group. The increase shown in dietary fiber may in part be the result of the requirement to include a minimum of 50 % whole grains in the grain food items.

CONCLUSIONS AND APPLICATION

Results of this investigation suggest that implementation of the HHFKA had a positive effect on the nutrient makeup of NSLP meals, both selected and consumed, in four schools in two school districts in the state of Washington. Specifically, the current study indicates that reductions in the percentage of calories from saturated fat, sodium, and increases in fiber have occurred when comparing 2012 meal nutrient means to 2013 meal nutrient means. A potential issue identified with the HHFKA implementation in the four schools sampled was the 2013 meal reduction of calcium selected and consumed. This is an issue that may need to be addressed by child nutrition

professionals to assure that menu selection provides adequate calcium for the students participating in the NSLP.

The American Dietetic Association, the School Nutrition Association, and the Society for Nutrition Education in a combined position paper indicated that integrated nutrition services in schools can improve academic performance (Briggs, Mueller, & Fleischhacker, 2010). Although the data is limited concerning diet quality and academic performance, there are studies supporting the relationship between the two. A study conducted by Florence, Asbridge, and Veugelers (2008) summarizes that even though socioeconomic factors play a role in cognitive development, when those factors are controlled, good diet quality is associated with good academic performance. The association between good nutrition and academic performance is very important for many reasons including children's future educational attainment which is closely related to their future income, socioeconomic status, and health. With good nutrition, children are able to reach their cognitive development potential. Good nutrition also provides the nutrients needed for the attainment of good physical health. The current study indicates that the implementation of the HHFKA can be associated with an improved NSLP meal in the schools investigated. Assuming that this phenomenon is true across the United States in all schools participating in the NSLP, improved cognitive development may follow with an improved diet nationwide.

A high quality diet in the NSLP, including control of calories, saturated fat, and sodium and increased fiber, is generally regarded as a way to promote health in children. A high quality diet also assists in prevention of obesity and chronic diseases (Hoelscher, Kirk, Ritchie, & Cunningham-Sabo, 2013). Well-nourished children have a greater likelihood to be well-nourished adults. Although recommendations about fat intake in children and adults are rapidly changing based on evolving science, adults are advised that dietary fat should provide 20% to 35% of their total energy. This includes increased consumption of n-3 polyunsaturated fatty acids and limited intake of saturated and trans fats. In its position statement on dietary fatty acids, the Academy of Nutrition and Dietetics recommends promotion of a healthy diet including regular consumption of fatty fish, nuts and seeds, lean meats and poultry, low-fat dairy products, vegetables, fruits, whole grains, and legumes (Varnice & Rasmussen, 2014). The current study indicates that the HHFKA is generally improving the quality of the diet offered to children in elementary schools.

Based on the data, calcium offered and consumed were both reduced in the 2013 meal portion of the current study when compared to the 2012 meal portion of the study. Because the schools studied were all offer versus serve, students may not have chosen to take and consume milk as part of their lunch. Calcium intake in the NSLP is of concern because the majority of children and adolescents do not consume the recommended levels of calcium on a daily basis. Calcium intake is very important for the development of bones. To achieve peak bone mass, adequate calcium intake during childhood and into adolescence is necessary. Building peak bone mass during childhood and adolescence is important for reducing the risk of osteoporosis and improving the chances of healthy bones in the later years. One study indicated an association between those children who do not drink cow's milk with low calcium intake and bone mineral content. These children also did not make up for lack of milk-based calcium with calcium supplements or other calcium rich food sources (Black, Williams, Jones, & Goulding, 2002).

To improve the calcium intake in the NSLP, calcium rich food may be selected (USDHHS, 2014). Milk-derived foods such as milk, yogurt, and cheese are plentiful sources of calcium. Nondairy sources of calcium can also make contributions to the overall calcium intake for the day. These include vegetables such as Chinese cabbage, kale, and broccoli. Spinach provides calcium, but its bioavailability is poor. Most grains do not have high amounts of calcium unless they are fortified.

In summary, the current study indicates that changes in meal pattern requirements mandated by the HHFKA improved the quality of the NSLP meals within the four elementary schools participating in the study. This included a majority of the key nutrients and fiber analyzed. The only notable exception to this was calcium. Calcium selected and consumed dropped when compared to the NSLP meals selected and consumed before the HHFKA was implemented. Although this is based on limited data in four schools, it may be prudent for child nutrition professionals to be cognizant about including calcium rich foods in the NSLP menu development pattern.

Study Strengths and Limitations

This investigation was strengthened by the number of trays sampled and the high score of the pre-data collection inter-rater reliability measure. It is further strengthened because the data were collected in the same schools in sequential years. During that time, the NSLP meal standards changed from School Meal Initiative standards to HHFKA standards. Since the same schools were used, many of the other factors that could affect school meals were controlled from one year to the next. There is a greater confidence that the differences seen were because of the implemenation of the new standards.

This investigation was limited because it was a convenience sample of only four HUSSC awarded elementary schools in just the State of Washington. Because of this, it may not be representative of the US elementary school population of second through fifth graders. The generalizability of the comparison of nutrient content of NSLP meals would be increased if the size of the sample was expanded to include more schools from more locations. Future studies should compare schools that have not obtained HUSSC awards with those that have to find if the award status significantly affects the amount of nutrients selected. This investigation is also limited because it compared nutrient intake and not food groups, which is the focus of the new nutrition standards.

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BIOGRAPHY

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