

## **Participatory Marketing of Fruits and Vegetables During School Lunch**

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### **Research Objectives**

Recent studies suggest that providing increased access alone to fruits and vegetables does not necessarily lead to an increase in consumption (Cummins, 2005 & 2009). Harnessing the power of marketing to promote increased consumption of healthy foods could lead to substantive improvements in consumption. The objective of this study was to evaluate the effectiveness of student involvement in the design of promotional materials in schools on fruit and vegetable (F&V) consumption.

### **Method**

Four elementary schools participated including one control school (CON). Fourth grade students at an Involvement and Marketing (I&M) school and Involvement Only (IO) school received two lessons on health benefits of F&V, and all students in the schools were asked to design materials to promote F&V. Promotional items from the I&M school were subsequently posted in the I&M and a Marketing Only (MO) school. Consumption data was assessed by analysis of ~100 random students' trays (2nd-5th grade) at each school using a validated, digital photography method. Number of servings of F&V chosen, consumed, and wasted at baseline and during the marketing campaign was compared between schools.

### **Results**

F&V consumption was significantly greater in the I&M school when compared to the CON school ( $p < 0.001$ ). No difference was seen in either the IO or MO schools compared to the control school. This result was driven by vegetable consumption, with I&M and IO seeing increases in vegetable consumption of 108% and 74%, respectively.

### **Application of Results**

Including students in the design of healthy food promotional materials appears to enhance consumption of F&V. The increased consumption may be due to several factors such as increased familiarity, a greater sense of choice, and higher intrinsic motivation, all of which have been shown to have positive effects in the acceptability of healthy foods.

## **School Garden-Based Dry Bean Education and Its Impact on Knowledge and Preference in K-12 Schools**

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### **Research Objectives**

Currently, in the U.S., heart disease is the leading cause of death, while diabetes is seventh; both are primarily diet-related diseases. Despite the evidence that pulses in the diet may reduce risks of these diseases, they are an underutilized food. Healthy eating behavior learned at an early age will likely continue throughout adulthood. Garden-based education can be an effective tool for teaching K-12 students healthy eating habits, and school gardens are found in 32% of school districts nationwide. The goal of this study was to determine if a 3-week garden-based pulse nutrition and biology curriculum had a positive impact on knowledge of and preference for dry beans by fourth-grade students.

### **Method**

In Spring 2014, a STEM-focused curriculum was delivered in six fourth-grade classes in Northwest Washington (n = 120), and results were compared with a control class (class that did not receive the education; n = 18) via a pre- and post-education survey. The curriculum included three one-hour lessons which included planting 2-4 varieties of dry beans in the school garden and calculating percent emergence and average plant height, as well as classroom nutrition and biology lessons.

### **Results**

Results from the pre- and post-education student survey indicate that the education had a positive impact on the students' preferences towards eating pulses and on knowledge regarding dry bean nutrition and biology. After the education program, half of the students (52%) reported an increase of positive feelings toward more dishes made with dry beans being served in the school cafeteria. A third of the students (31%) reported eating more beans post-education, and 35% of the students said they would like to increase their frequency of eating dry beans. Also after the education program, 43% of students agreed to a stronger degree that dry beans are a healthy food choice, and 38% of students learned that dry beans are an excellent source of dietary fiber. Most students (63%) already knew that dry beans are in both the vegetable and the protein food group, and most students (78%) already knew that beans were found in a pod on the plant.

### **Application of Results**

The overall increase in preference for dry beans suggests students who receive this education will be more likely to demand this food at school and will be more likely to consume dry beans.

## **Employees Food Safety Practices in School Foodservice Operations in Costa Rica: An International Experience**

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### **Research Objectives**

Identify food safety practices of school foodservice employees in 12 private and public schools in Costa Rica.

### **Method**

Observations were conducted in school foodservice operations. Three different employees were observed during a three hour period in three different areas: storage, production, and service. Areas were selected considering food safety risks. An observation form was developed and used for data collection.

### **Results**

A total of 12 schools participated in the study, and 36 employees were observed during 108 hours. Related to personal hygiene, only 78% of foodservice employees used the required attire or uniform (without any visible dirt), and only 57% of the foodservice employees used a complete uniform (hat or hair restraint, apron, and water repellent work shoes). No jewelry was worn on 54% of observed foodservice employees. Related to time and temperature control, 49% of employees cooked the food until it reached the adequate internal temperature. On 54% of the observed school foodservice operations food was held at 57°C or above. Only 5% of the foodservice operations used the proper cooling method. One of the observed barriers to follow food safety practices was that 5% of operations did not have a thermometer on site. Cross contamination practices were observed. Only 5% of the cutting boards were washed and sanitized after every use. Washing and sanitizing fruits and vegetables was done only in 3% of the operations.

### **Application of Results**

Information about food safety practices in private and public schools is presented. Foodservice employees have a knowledge gap when it comes to critical topics such as time and temperature control, cross contamination, washing and sanitizing of fruits and vegetables, and personal hygiene including specific appropriate attire. It is imperative to continuously train employees about safe food safety practices and provide them the necessary tools such as thermometers to follow those practices.

## Comparison of Menu Quality Across Two School Districts

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### Research Objectives

In order to address the nationwide childhood obesity epidemic, the Healthy, Hunger-Free Kids Act initiated drastic changes to the National School Lunch Program (NSLP) nutrient standards. While each school food authority has the responsibility to adhere to NSLP standards, urban and rural schools may interpret and implement policies in different ways. The purpose of this research was to examine the NSLP menus of selected urban and rural school districts in Mississippi and compare menu quality between districts as well as to NSLP requirements.

### Method

Each school district's production menus and percentage of free and reduced meals from September 2014 were collected. Nutrient data were analyzed for calories, total fat, saturated fat, protein, calcium, iron, vitamin A, vitamin C, and sodium with NutriKids. Trans-fat was not analyzed because all ingredients used in each recipe were trans-fat free. Weighted weekly averages were compared to NSLP standards. Using SPSS, independent samples t-tests were used to compare weighted daily averages of nutrients between schools.

### Results

The rural district had fewer students than the urban (2,632 vs. 7,132), was primarily Caucasian (86% vs. 37%), and had lower free/reduced eligibility (66% vs 78%). Based on weighted weekly averages, districts met all NSLP standards. Rural school menus provided significantly more calcium ( $p=.013$ ) and vitamin C ( $p=.032$ ).

### Application of Results

Districts met weighted weekly average standards. That is encouraging considering the numerous NSLP changes in the 2014-2015 school year. The urban district did not have consistent weighted daily averages. Daily variation is expected; however, extreme variation may be problematic if children are only eating on days where calorie counts are extremely high or low. Describing rate of adherence to updated standards and comparing menu quality across districts may help identify training or technical assistance needs. Future research should include plate waste measures in order to determine actual nutrient composition of lunches consumed.

## **Differences in Self-operated and Contract Managed School Foodservice Farm to School Activities**

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### **Research Objectives**

The purpose of this study was to explore whether self-operated and contract managed school foodservices differ in number of Farm to School activities.

### **Method**

The eight National FTS regions were used, and one state with the most FTS programs was identified in each of those regions. Participating foodservice directors within that state helped in distribution of questionnaires to employees. The paper questionnaire had been developed by the researchers and determined to be reliable and valid. Thirteen FTS activities (e.g. farmers visiting classroom, growing a school garden) were identified, and employees checked their participation in FTS activities. A total of 369 questionnaires were distributed at 21 different school districts in eight states. The Statistical Package for Social Sciences (SPSS 22.0), was used to analyze differences between FTS activity frequency at self-operated schools as compared to contract managed.

### **Results**

A total of 239 questionnaires were returned (65%). The majority of respondents worked at self-operated (79%) foodservices. Employees at self-operated foodservices most frequently reported these FTS activities: 1) incorporating local produce into the school lunch program (n=122, 51%), 2) purchasing fresh produce from local farmers (n=120, 50%), and 3) educating students about local produce (n=84, 35%). Employees from contract managed operations most frequently reported: 1) incorporating local produce into the school lunch program (n=28, 12%), 2) purchasing fresh produce from local farmers (n=22, 9%), and 3) incorporating local produce into school breakfast program (n=18, 8%). When comparing the number of reported FTS activities between types of management, a statistically significant difference was found with self-operated foodservice employees reporting about one more FTS activity than contract managed (  $p=0.028$ ;  $p\leq 0.05$ ).

### **Application of Results**

This study identifies levels of reported FTS activities in contract managed and self-operated school foodservices. FTS activities have been shown to be effective in engaging students about local produce and increasing consumption of fresh fruits and vegetables.

## **Measuring Plate Waste to Evaluate Fruit and Vegetable Intake of School Children**

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### **Research Objectives**

Interventions such as Farm to School have effectively increased fruit and vegetable (FV) availability in schools; yet student consumption of FV still falls below recommendations. Increasing FV intake could benefit students' health as well as decrease waste for school meal programs. The purpose of this study was to evaluate FV plate waste during Farm to School Month in two elementary schools.

### **Method**

A sample tray containing all lunch items was photographed to establish standard serving sizes. Students' lunch trays were photographed before and after consumption. Total FV waste was calculated by comparing photos of trays before and after consumption to the sample tray. Descriptive data were generated using SPSS (v. 20). Of 177 5th grade students, 74 (42%) participated.

### **Results**

Participants were generally Caucasian (63%), female (50%), and 10 years old (53%). A total of 84.5 vegetable servings and 35.7 fruit servings were selected while 32.6 vegetable servings and 14.7 fruit servings were wasted (38.6% and 41.2%, respectively). Students consumed an average of 1.4 vegetable servings and 0.55 fruit servings. Peas and carrots were the most wasted vegetable (86.6%) while canned pears were the most wasted fruit (100%).

### **Application of Results**

As in similar school plate waste studies, students in this study wasted large amounts of FV. Short lunch periods lasting only thirty minutes could be a factor. While both schools offered a wide variety of FV choices, maintaining this variety may be difficult due to cost of ingredients and preparation time. Despite the small sample size, this study can yield valuable information for decreasing plate waste in schools by describing FV items most wasted. Palatability and preferences should be considered when encouraging consumption of FV through nutrition education, taste-testing, and appealing presentation of FV.

## **Handwashing: Why Aren't Employees Doing It?**

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### **Research Objectives**

Assess handwashing frequencies and procedures of school foodservice employees in private and public schools in Costa Rica. Determine barriers for handwashing in school foodservice operations.

### **Method**

Observations were conducted in school foodservice operations; private and public schools participated in the study. Three different employees were observed during a three hour period in three different areas, storage, production, and service. Areas were selected considering food safety risks. An observation form was developed and used for data collection.

### **Results**

A total of 12 schools participated in the study, and 36 employees were observed during 108 hours. Of the 222 instances where foodservice employees should have washed their hands, the Food Code recommended procedure and frequency was observed only on 20 (9%) occasions. On 153 occasions, employees should have washed hands and did not do it. Main identified barriers to follow the recommended procedure and frequency were: handwashing sink distance, lack of handwashing sinks, lack of soap and towels, and handwashing behaviors.

### **Application of Results**

This study presents important information for schools about the need to continuously train foodservice employees on handwashing. It addresses the importance of keeping the necessary supplies for ensuring a correct handwashing procedure. It also provides information about some considerations when remodeling or making improvements to infrastructure, given the fact that most foodservices did not have a complete hand washing station or did not have one at all.

## **Food Safety Practices in School Nutrition Programs: Behavioral Factors that Affect Employees' Performance**

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**Kevin Sauer, PhD, RD; Ellen Thomas, PhD; Kerri Cole, BS**

**Kansas State University; Manhattan, KS**

### **Research Objectives**

Assess employees' attitudes, social pressures, and behavioral controls to perform various food safety practices: proper handling of food and work surfaces, proper handwashing, and using a thermometer to check food temperatures.

### **Method**

Focus groups were conducted to determine three factors that affect employees' behavior (attitudes, social pressures, and behavioral control) that may prevent them from applying their knowledge to follow ideal food safety practices. Questions related to the likelihood of employees following three practices were asked. Practices were related to proper handling of food and work surfaces, proper handwashing, and using a thermometer to check food temperatures. Each focus group lasted approximately one hour.

### **Results**

Four focus groups conducted in three different states included a total of 43 school nutrition employees. Employees' attitudes, social pressures, and behavioral controls to perform all three practices were identified and categorized. Employees' attitudes were related to having a sense of pride for their job and having a commitment for doing their job correctly. Employees' perceived social pressure to engage or not in the behavior related to obeying state food safety regulations and the importance of keeping students, teachers, and staff healthy and safe. Employees' behavioral controls to perform the practice related to ensuring food quality and taking time to implement the practice. Reported barriers to follow the practices were related to needing more time and better resources.

### **Application of Results**

An employee's behavior is influenced by individual attitudes, social pressures, and behavioral controls to perform the behavior. Thus, this study provides important information for child nutrition professionals about these three components of behavior change. Results from this study serve as a reference for training initiatives that target specific food handling behaviors in order to encourage employees to follow safe food practices in schools.



## **Exploring the Utilization of Key Performance Indicators by School Nutrition Directors**

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### **Research Objectives**

The purpose of this study was to explore school nutrition (SN) directors' usage and perceptions of key performance indicators (KPIs). The relationship between these variables and SN professionals' personal characteristics and SN program characteristics were also investigated.

### **Method**

A day and a half expert panel meeting with 10 SN professionals was convened to gather information to support the development of a draft national survey to meet the study objectives. The draft survey was validated with the assistance of a review panel of 21 SN professionals. The validated survey was mailed to a random sample of 700 SN directors representing the seven USDA regions. Survey data were analyzed using SPSS Version 21.0 for Windows.

### **Results**

The survey response rate was 29.3% (N=205). Most SN directors reported having access to the necessary data to calculate SN KPIs, especially average daily participation (ADP) (98.0%), cost per meal (CPM) (94.0%), and meals per labor hour (MPLH) (93.6%). Further, these KPIs were most often used by SN directors for decision making (ADP = 91.2%, CPM = 88.7%, and MPLH = 82.0%). Conversely, most SN directors do not calculate percent over-production (58.6%), staff turnover rate (53.4%), or inventory turnover rate (50.2%), and these KPIs are the least frequently used for decision making (33.2%, 29.6%, and 36.6% respectively). SN directors from districts with student enrollment of >2,000 were significantly more likely to perceive that KPIs are a valuable tool for managing SN operations compared to directors from smaller districts ( $p < .05$ ).

### **Application of Results**

It is recommended that training activities and resources be developed to support SN professionals (state agency child nutrition directors, SN directors, district-level supervisors, and unit level managers) on the appropriate utilization of standard SN KPIs.

## **School Nutrition Directors' Usage and Perceptions of USDA Recipes**

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**National Food Service Management Institute; Hattiesburg, MS**

### **Research Objectives**

The purpose of this study was to explore the frequency of usage of USDA recipes and investigate factors influencing their usage. The relationship between these variables and school district size was also investigated.

### **Method**

A day and a half expert panel meeting of eight school nutrition (SN) professionals convened to identify the major issues associated with the usage of USDA recipes. Findings from the expert panel were used to develop an online survey. The survey was sent to a random sample of 2,100 SN directors, representing the seven USDA regions. Descriptive statistics included frequencies, percentages, means, and standard deviations. Chi Square and one-way analysis of variance (ANOVA) with Tukey's post hoc tests were conducted to determine the relationship between research variables.

### **Results**

As student enrollment increased, usage of USDA recipes significantly decreased ( $p < .001$ ). The majority of respondents (76.1%) from districts with student enrollment of  $< 10,000$  reported using USDA recipes, while a little less than half (48.5%) of those with student enrollment of  $> 10,000$  reported using the recipes. Most SN directors indicated that the USDA recipes adequately support participation in the National School Lunch Program, menu planning for meat items; and the skill level of SN staff. However, the majority of directors rated the USDA recipes unfavorably for participating in breakfast initiatives, menu planning for dark green vegetables, complying with sodium regulations, supporting budget constraints for food cost, or meeting the trends of today.

### **Application of Results**

Results of this study suggest the need for improvements to the USDA recipes. It is recommended that further research be conducted to identify ways of adapting the USDA recipes to better support the program needs of SN directors regardless of school district size.

## **School Lunch Quality Following Healthy, Hunger-Free Kids Act Implementation**

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### **Research Objectives**

The Healthy, Hunger-Free Kids Act (HHFKA) guidelines were implemented in school cafeterias beginning in July 2012. Research is limited regarding the quality of meals since the implementation of the HHFKA. The objective of this research was to investigate the effect of meal component changes by the HHFKA on school lunch quality and consumption among elementary students, grade 2-5 before and after the HHFKA guidelines were implemented using the Healthy Eating Index (HEI) as an indicator of diet quality. HEI assesses conformance to federal dietary guidance and is based on 10 dietary components and a maximum score of 100. Based on previous studies, American children's diets averaged an HEI score of 49.8 in 2007-2008.

### **Method**

This investigation compared the nutritional content of National School Lunch Program (NSLP) meals in four Washington state elementary schools that earned HealthierUS School Challenge (HUSC) awards. Nutritional content of the meals selected and consumed were assessed using before and after digital photos. Meals were scored using the HEI to determine meal quality.

### **Results**

Results were based on 1,033 lunches (509 pre-HHFKA in Spring 2012 and 524 post-HHFKA in Spring 2013) and revealed improved HEI scores for the post-HHFKA lunches both served (52.2 pre-HHFKA to 57.0 post- HHFKA) and consumed (49.8 pre-HHFKA to 53.2 post-HHFKA). Noteworthy component scores that improved included empty calories from 14.1 to 15.3 (maximum score 20) and sodium from 4.6 to 5.3 (maximum score 10).

### **Application of Results**

The current study indicates that menus selected by child nutrition professionals in four schools in Washington state improved the nutritional quality of lunches served and consumed when comparing pre-HHFKA lunches to post-HHFKA lunches. Post-HHFKA school lunch HEI scores were higher than the national HEI scores for children.

## **Outcomes of the Montana Cook Fresh Culinary Workshop**

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### **Research Objectives**

The Montana Cook Fresh Workshop is a culinary skills class designed to provide K-12 school food service professionals with skills necessary to utilize whole, fresh food in school food service. This research aimed to assess participant satisfaction with the class as well as the impact of the workshop on participants' knowledge, confidence, attitudes, and intentions surrounding the use of whole, fresh foods.

### **Method**

A total of 53 participants took part in four separate sessions of the workshop. Participant satisfaction was evaluated with a 13 statement Likert scale questionnaire and series of open ended questions. Researchers used a pre-test/post-test design to assess participants' knowledge, confidence, attitudes, and intentions at base line and immediately following the workshop. Statistical analysis was used to identify significant changes in participant scores in each construct and differences in score change amongst participants with varying levels of food service experience, from different size food service programs, and in different professional positions.

### **Results**

Results of the workshop assessment point to high participant satisfaction and significant change in measured constructs. For each of the statements assessing participant satisfaction, 96-100% of participants selected "agree" or "strongly agree," indicating high levels of participant satisfaction. From pre to post test, participants' knowledge, confidence, and intentions to use whole, fresh food increased significantly. Additionally, participants in positions of authority showed significantly greater change in confidence and attitudes than participants not in positions of authority.

### **Application of Results**

With new professional development standards as well as increased interest and demand for scratch cooking to meet nutrition standards, effective and appropriate culinary skills training will be an increasingly vital part of school nutrition continuing education. The success and appeal of the Montana Cook Fresh Workshop supports the use of hands-on classes to address the changing training needs of school food service professionals.