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RESEARCH CONTRIBUTIONS:

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LETTER FROM THE EDITORS

JOURNAL OF FOODSERVICE MANAGEMENT & EDUCATION

Welcome to the second issue of the Journal of Foodservice Management and Education for 2013. We would like to take this opportunity to thank the authors and reviewers who make this Journal a continuing success.

Over the past several years, the Journal has presented topics that cover a vast array of topics, ranging from recycling programs in colleges and universities to the efficacy of food safety training. Without the authors who have submitted these articles and the reviewers who take the time from their busy schedules to review the manuscripts, this publication would not be possible. In striving to make the Journal a valuable resource for foodservice educators and practitioners, we would also like to thank the Foodservice Systems Management Education Council and National Association of College and University Foodservice for their continued support.

This issue of the Journal follows a central theme of feeding students. Each article approaches the theme from a different perspective. The first article highlights the use of a tray-free serving system in a college dining center. The second article explores the knowledge and training procedures for child nutrition professionals regarding food allergies. The final article focuses on meeting the whole grain requirement in schools by using pasta.

We would like to invite all of our readers to consider this Journal for your next manuscript submission. This is the second year that we have been able to publish two issues, and we would like to continue this. With that in mind, please continue to keep the Journal of Foodservice Management and Education in mind as you consider journals in which to publish your work.

Again we would like to thank all of the individuals who have served as reviewers for this issue of the Journal. Without your dedication to our profession this Journal would simply not be possible.

Warmest Regards,

Kevin R. Roberts, PhD
Co-Editor

Kevin L. Sauer, PhD, RD
Co-Editor

ABSTRACTS

Research Manuscripts

Suggestions for implementing trayfree dinning in a selected dinning unit

Trayfree dining has become a popular method of improving the sustainability of university dining facilities. Telephone interviews were conducted with foodservice professionals to identify benefits, challenges, best practices, and recommendations. Student focus groups evaluated the operational feasibility of implementing trayfree dining at a Midwestern university. Recommendations for successful implementation of trayfree dining are presented.

Child Nutrition Professionals' Knowledge and Training Practices Regarding Food Allergies in U.S. Schools

To examine training and knowledge requirements about food allergies for Child Nutrition Professionals (CNPs), 1500 randomly selected CNPs in the U.S. were surveyed. Mean food allergy knowledge score of 350 respondents was 31.9±3.3 (max=39). Forty percent of CNPs (n=140) provided food allergy training, and the majority used group training (n=96) annually (n=76). Those who had received food allergy training and demonstrated higher knowledge scores were more likely to provide food allergy training. Lack of time and financial resources were barriers to providing food allergy training. Food allergy training is needed to prevent food allergic reactions in child nutrition programs.

Pasta dishes as a vehicle for meeting whole grain requirements in school meals: Challenges, opportunities and benefits

Pasta, a popular versatile grain food served in many venues, is served much less frequently in schools. The purpose of this paper is to understand the challenges and opportunities involved in pasta procurement, preparation and service by foodservice directors (FSD). FSD reported benefits of serving pasta to include variety, affordability, lower fat, potential sources of whole grain and fiber and pasta foods being well-liked by children. Despite these benefits, pasta dishes appear less frequently compared to other entrees and side dishes. Serving pasta more frequently may incorporate less expensive, nutritious and versatile dishes that would closely meet the new nutrition standards for school meals.

Research Contribution

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SUGGESTIONS FOR IMPLEMENTING TRAYFREE DINING IN A SELECTED DINING UNIT

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ABSTRACT

Trayfree dining has become a popular method of improving the sustainability of university dining facilities. Telephone interviews were conducted with foodservice professionals to identify benefits, challenges, best practices, and recommendations. Student focus groups evaluated the operational feasibility of implementing trayfree dining at a Midwestern university. Recommendations for successful implementation of trayfree dining are presented.

Keywords: trayfree dining, university foodservice, sustainability, management

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INTRODUCTION

Sustainability and going green have become popular trends among individuals and organizations globally. Despite this motivation towards sustainable actions, our nation continues to struggle with the amount of waste generated and the most efficient waste management strategies. In 2010, the United States (U.S.) generated 250 million tons of municipal solid waste, 13.9% of which was estimated to be food scraps (Environmental Protection Agency [EPA], 2011). University dining operations struggle with the management of the considerable waste they generate. Saphire (1995) reported that university dining operations generate nearly 3.6 million tons of waste per year; 10-20% is estimated to be food. Other studies also have demonstrated the large amounts of food waste being disposed of by students in on-campus facilities (Norton & Martin, 1991; Shanklin and Ferris, 1992; Whitehair, Shanklin, & Brannon, 2013; Van Handel, 2004). Shanklin and Ferris (1992) determined that more than 83 tons of edible food items were being disposed of annually on student trays in a single facility. Others have reported that students discarded an average of more than two ounces per meal of edible food waste (Norton & Martin, 1991; Van Handel, 2004; Whitehair, Shanklin, & Brannon, 2013). This amount of food represents thousands of dollars in food products and tons of solid waste.

Foodservice waste involves products, time, energy, water, and other resources (American Dietetic Association, 2001; Wie, Shanklin, & Lee, 2003). Foodservice operations often manage this waste by utilizing garbage disposals and transporting waste to landfills (Ferris, Flores, Shanklin, & Whitworth, 1995). While convenient, these methods of waste management contribute their own problems to the cycle of sustainability.

Colleges and universities are initiating more sustainable practices due to their increased concern about the environment (Sustainable Endowments Institute, 2010). Recycling, composting, bioconversion, and animal feed are options suitable for foodservice waste (Ferris et al., 1995; Shanklin & Ferris, 1992; Wie, Shanklin, & Lee, 2003). Some universities have implemented methods to repurpose various waste products rather than dispose of it. Colorado State has implemented the use of residence hall graywater (water from sinks and showers) for surface irrigation (Colorado State Department of Public Relations, 2011). George Washington University initiated their "Green Office Program" to encourage their offices and departments to reduce printer and copier paper use, and increase recycling (International Perspectives on Green Business, 2011). A student-run farm is fertilized by compost produced by utilizing campus food waste at Kansas State University (Baer, Blattner, Boss, Ostmeyer, & Wiens, 2009).

Programs, such as these, are initiated in an effort to educate university students and employees while improving the sustainability of the campus environment. While evaluating methods of managing waste is a step in the right direction, evaluating the entire cycle of the food production process and implementing strategies to prevent food waste initially may be a better approach (Kantor, Lipton, Manchester, & Oiveira, 1997).

One method of waste reduction is the removal of dining trays. Many campus dining facilities are implementing a trayfree style of service. Simply removing the option of using a dining hall tray has been found to decrease the amount of food waste and reduce the water and chemicals used in dishmachines (Aramark, 2008; Davis, 2008; Karstens & Moe, 2009; Saavedra, 2008). Aramark (2008) observed a 25% reduction in per-person food waste when trays were removed. Sodexo estimated saving nearly 200 gallons of water daily for every 1,000 meals served (Sodexo, 2008). A reduction of more than 11 tons of food waste and $14,000 in food cost resulted from the removal of dining hall trays at San Diego State (Saavedra, 2008). Thiagarajah and Getty (2013) observed an 18.4% reduction in solid food waste per university patron when trays were removed in a buffet-style operation. They also reported the dining staff was in support of the change. Trayfree dining has allowed these facilities to reduce their environmental footprint and save money.

Statement of the Problem

While foodservice operators may strive to implement changes that direct them towards a more sustainable facility, the options may seem daunting. Trayfree dining has been implemented in many facilities and has been shown to decrease the amount of edible food disposed of while also reducing water, energy, and chemical use (Aramark, 2008; Karstens & Moe, 2009; Saavedra, 2008; Sodexo, 2008). However, foodservice managers may still be skeptical about implementing a service style change due to concern about customer satisfaction and reduced profitability. Having access to guidance and suggestions to evaluate the operational feasibility of implementing trayfree dining would be valuable information for managers considering the implementation of such a system.

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Currently little information is available in regards to customer acceptance and facility, equipment, and service needs for the removal of dining hall trays. Past research has focused on the environmental and economic benefits of trayfree service based on pre and post tray removal comparisons (Aramark, 2008; Karstens & Moe, 2009; Saavedra, 2008). Limited research was found that explored foodservice managers' experiences in implementing trayfree dining. Results of research of this nature could be useful when identifying best practices for the successful implementation of trayfree service.

Purpose of Study

The primary purpose of the study was to conduct a best practices review with managers of university dining facilities involved in the management of a trayfree style of service. The operational research used telephone interviews with foodservice professionals to obtain data about their experiences implementing trayfree dining. The second purpose was to explore the feasibility of implementing a trayfree dining program in a Midwestern university dining facility. This dining unit was an "all-you-care-to-eat" cafeteria style facility catering to approximately 540 students residing in three primary residence halls. Breakfast, lunch, and dinner were served Monday through Friday with an average daily service of 1,027 meals. Focus groups with students were conducted to investigate perceptions of tray removal in this facility. Based on the interviews and focus groups, recommendations for evaluating the operational feasibility and the successful implementation of such a program were identified and are presented.

METHODOLOGY

The scope of this research was two-fold in that input from both university foodservice professionals and dining center student patrons was desired. The study protocol, best practices review interview outline, and focus group questions were approved by the university's Institutional Review Board prior to any contact with participants.

Best Practices Review

Recruitment Method and Participants: The population for this study was university foodservice professionals who were members of The National Association of College and University Foodservice (NACUFS) and regional universities identified as having trayfree dining facilities. The 2010 NACUFS publication of "Trayless Members in NACUFS" was used to identify 70 foodservice professionals involved in trayfree dining (NACUFS, 2010). In addition, thirteen regional universities were identified as being trayfree by website research and personal contact. These 83 professionals from across the United States were contacted via e-mail, provided details of the study, and asked to participate. Follow-up e-mails were sent to non-responding professionals one week after initial contact. Dates and times for phone interviews were scheduled via e-mail. Twenty-four of the NACUFS professionals contacted agreed to participate in the telephone interviews and thus composed the final convenience sample. No regional organizations responded with their willingness to participate.

Development of Instrument: Seven open-ended interview questions were developed after reviewing trade and peer reviewed publications about the trayfree dining system and determining the specific input desired to assist this dining unit in evaluating the feasibility of implementing trayfree dining (Figure 1). The interviews were used to explore university foodservice professionals' perceptions on the implementation of trayfree dining in their facilities. The open-ended interview questions asked managers to provide input on the challenges, benefits, and recommendations related to implementing or evaluating the feasibility of a trayfree system. They were also asked to provide general information about their facilities and the timeline for trayfree implementation. During the interviews, the directors were prompted to elaborate on their responses.

Data Collection:

The 24 managers willing to participate were contacted via e-mail to schedule a time for the telephone interview. The researcher followed a written script to facilitate progress and to ensure that information was gathered uniformly during the scheduled phone interview (Figure 1). Participants were informed that the conversations would be audio -recorded. All interviews were confidential and participants had the opportunity to refuse to answer questions or withdraw at any time.

Student Focus Groups

Recruitment Method and Participants: Promotional materials inviting students to participate in a focus group discussing trayfree dining were posted on various bulletin boards and throughout the dining center. Individuals who consumed at least one meal a day in this facility, lived in a residence hall within the complex, and were at least 18 years of age were asked to sign-up to participate in the focus group. Three focus groups of residence hall students were scheduled to be conducted in March of 2011, however, only two sessions were conducted due to insufficient response to the invitation. A total of eleven students signed-up to participate.

Focus Group Discussion: Each of the focus group discussions was held after dinner in the dining hall. The purpose of the focus group was to determine student familiarity with trayfree dining, identify perceived barriers and potential benefits, and document recommendations they may have for the future of this dining unit. The researchers developed and followed a focus group guide which contained disclosure, guideline information, and questions to facilitate the discussion. Permission was granted to audio record the discussions to aid in documentation.

During the focus group the students completed a survey which allowed for quantitative analysis of the students' support for and concern with the implementation of trayfree dining and the changes that the students perceived would be needed. Students were asked to rate their agreement with five statements ranging from Strongly Disagree (1) to Strongly Agree (5). The students were asked to dine the following week without using a tray, and then follow up with the researcher on an individual basis to revisit the discussion and complete a post-trayfree experience survey. This process allowed for further analysis of student perceptions of trayfree dining after their exposure to the trayfree service style.

DATA ANALYSIS

Interview data was compiled and sorted by category: problems, benefits, best practices, and recommendations. NVivo software (version 9, 2010, QSR International, Australia) was used to organize themes for the qualitative data. Frequency and descriptive statistics were determined using SPSS (version 13.0, 2004, SPSS, Inc., Chicago: IL).

Results and Discussion

Interviews: All managers were asked general questions about their operations. The managers indicated the number of years their trayfree-style of service had been in operation ranged from one to four years. The number of meals served daily by these facilities ranged from 500 on a campus with a single trayfree facility to over 20,000 at a university with five on-campus dining facilities. Twenty-three operations were self-operated; only one was managed by a contract foodservice company. A majority of the operations were all-

Telephone Interview Guide

Contact Name: _____ Desired Time of Contact:_____.
University:_____ Actual Contact:_____.

Hello. This is <<Interviewer's Name>> from Midwest University. May I please speak to <<Primary contact's name>>.

- Hi, I am calling from the Hospitality Management and Dietetics Program at Midwest University.
- We are conducting a study to identify best practices in implementing a trayfree dining program. We are contacting all <<NACUFS members or regional universities>> who have implemented trayfree dining. You received an e-mail about this within the last week.
- Do you have 15 minutes now to respond to a few questions?
  - If yes – Do you mind if I record this conversation for clarity? All of your responses will remain anonymous.
    - If yes – ask questions #1-#7.
  - If no – when can I call you back later today? (Schedule a specific time and note the details.)
- Thank you for your time and participation.

Date	Time	Interviewer	Results						
			No Answer	Unavailable	Will Return (Note name and time to contact)	Refused (Note when and why)	Call Completed	Partially Completed (Note when call ended and why)	Wrong Number
Notes:									

Phone Interview Questions (Allow for continued discussion or additional topics):

1. When did you implement your trayfree dining program?
2. How many meals do you serve in this facility?
3. What changes to your facility did you have to make prior to the implementation?
4. What complications or problems have you encountered along the way? How did you resolve the problems or address the complications?
5. What benefits have you seen from the implementation of trayfree system?
6. What recommendations or advice do you have for university dining centers who are exploring trayfree dining?
7. What one best practice would you advise others to follow when investigating the feasibility of trayfree dining?

Figure 1. Telephone Interview Guide

you-care-to-eat operations with both self-serve and employee-served options. Five were all-you-care-to-eat facilities comprised of entirely self-serve food delivery stations.

The managers were asked to identify any changes that were made to their facility to accommodate the trayfree style of service. Two managers indicated no changes were made to their facilities to accommodate the new format. Fifteen managers described physical dishroom changes that had to be made to facilitate the trayfree operation. These physical changes were simple modifications, such as adding trays or solid surface material to their carousel/accumulator style dish return areas (n=12) and reformatting belt returns to have sides to prevent spillage (n=2). No managers indicated that remodeling or equipment changes were necessary for their dishroom and sanitation areas to accommodate the trayfree operation.

Thirteen managers discussed the need to relocate silverware stations in their facilities. Silverware was made available throughout their service areas rather than at a single entry-area dispenser. Locations included serving lines, self-serve stations, beverage areas, and dining rooms. Similarly, three operations relocated their service ware (plates, bowls) to the serving line and self-serve areas. Overall, no major renovations or capital purchases were required in any of these facilities to implement trayfree dining.

Themes Identified in Interviews: The telephone discussion allowed specific topics to be covered but the open-ended format allowed managers to speak freely and provide personal experiences and opinions. Figure 2 demonstrates the primary topics of discussion. Specific response patterns became evident.

Benefits: Decreased food waste was identified as the primary benefit of tray removal by twenty managers (Table 1). Two facilities reported a 30% reduction in food waste, one reported a 40% reduction, and another reported a 50% reduction. Benefits of reduced waste included less "chaos" in the dishroom, lower labor requirements for sanitation, and lower waste removal costs.

Decreased utility use was noted by sixteen managers. The utilities discussed included water and energy and supported findings of previous studies (Aramark, 2008; Sodexo, 2008). Fourteen facilities reported a reduction in water use. The water savings reported ranged from 20% to 50%. One facility reported washing 220,000 fewer trays per year. Another saved approximately one million gallons of water in the first year of tray removal. Energy savings was identified by four managers as a benefit. Many managers mentioned the difficulty in reducing energy use in their dishroom areas because the machines are often left to idle between loads. This practice reduces water usage, but energy is still required for maintenance of the machine temperatures.

Table 1. Benefits of Trayfree Dining Identified by Foodservice Managers (n=24)

Benefits	n	%[a]
Decreased Food Waste	20	83.33
Decreased Water Use	13	54.17
Decreased Chemical Use	10	41.67
Decreased Food Cost	10	41.67
Improved Dishroom Efficiency	9	37.50
Improved Service and Satisfaction	7	29.17
Good Public Relations	6	25.00
Student Health Benefits	5	20.83
Decreased Energy Use	4	16.67
Decreased Beverage Cost	4	16.67
Less Napkin Use	2	8.33
Student Lifestyle Changes	1	4.17

[a]Percentage of all respondents who identified this specific benefit.

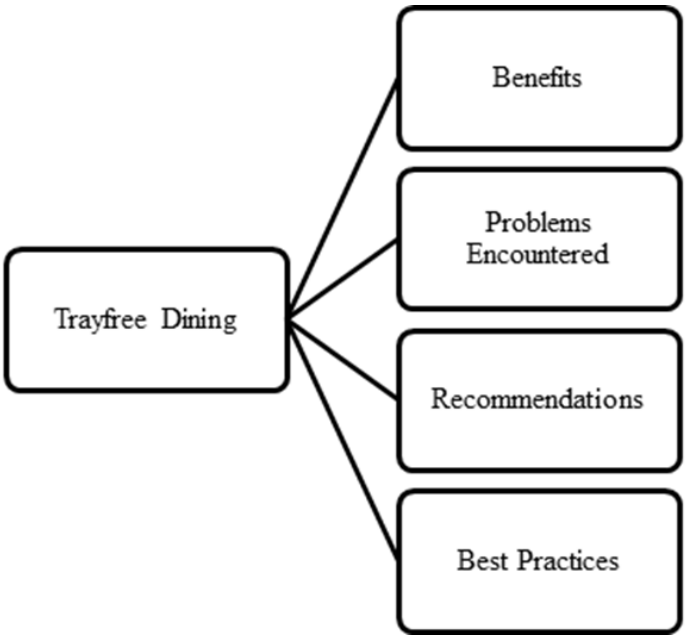

Figure 2. Trayfree Phone Discussion Theme Diagram

Other savings identified as benefits of tray removal included reduced chemical use, decreased beverage and food costs, and reduced food production needs. Reduction in chemical use in the dishroom area was identified as a benefit by 10 managers. Ten managers reported a food and beverage cost reduction, similar to reports by Saavedra (2008). Two managers identified the need to prepare less food as the primary reason for this reduction in cost. One manager reported a 30% savings in beverage expenses, while another observed a 23% reduction in milk purchases alone.

Six managers identified positive public relations as a benefit of the tray removal. Their trayfree programs had received coverage by campus groups and newspapers based on their positive sustainable action. Five managers reported an unexpected increase in customer satisfaction directly related to their trayfree program. One manager described positive student perceptions of the improved sustainability of the facility, while four indicated shorter lines and customer waits improved student perceptions. These shorter lines were explained to be a result of less "wondering around" and "grazing" by the students. Managers reported that students made more focused choices rather than taking a little of something from each serving area. Decreased wandering by students was considered by five managers to provide a health benefit to their student population. These managers reported that the lack of trays forced students to make better choices by preventing tray loading. Managers also identified improved portion control and decreased calorie consumptions as positive outcomes of their trayfree program.

Table 2. Problems of Trayfree Dining Identified by Foodservice Managers (n=24)

Problems	n	%[a]
Complaints	17	70.83
Messing Dining Room Tables	16	66.67
Dishroom Problems	5	20.83
Increased Dish Breakage	4	16.67
More Spills	4	16.67
Did Not Monitor Data of Change	3	12.50
Student Issues with Change	3	12.50
Dirtier Floors	2	8.33

[a]Percentage of all respondents who identified this specific problem.

Problems Encountered

Table 2 illustrates the problems identified by the foodservice managers. Seventeen managers indicated that their facilities received complaints regarding the removal of trays. Complaint topics included needing to make multiple trips between the serving and dining areas, having difficulty carrying personal items and food without trays, and the spillage of more beverages. However, all of these managers stated that the complaints were minimal and subsided within the first two weeks after the removal of trays. Three of the managers indicated that most complaints were received from faculty and staff, and not students dining in their facilities.

Sixteen managers stated that dining room cleanliness became a problem. Tables were messier due to crumbs and spills. These managers indicated that adding an employee to clean tables throughout the meal period was a necessity. When asked if additional labor was needed for this, five of these managers indicated that dishroom labor was reallocated from pulling trays in the dishroom to wiping tables in the dining areas. Two facilities organized a self-serve sanitation area in which students could retrieve the materials needed to clean their own spills; both indicated positive student participation.

RECOMMENDATIONS

When asked for recommendations for a successful transition to trayfree dining, nineteen managers indicated some form of marketing communication prior to and during the transition process was necessary (Table 3). Sixteen managers stressed the importance of involving students in the transition. Focus groups, student interest group interaction, and peer groups to introduce the new process were all methods shared. Fifteen managers indicated the importance of using a marketing campaign to educate students on the reasons behind the change and the benefits of a trayfree facility. Ten managers encouraged using waste audits for gathering data to reinforce the educational efforts. These recommendations mirrored those provided by Aramark (2008).

Five managers suggested implementing the new trayfree program at the beginning of the fall semester. The managers stressed that preventing incoming students from being exposed to a dining hall tray would benefit the operation greatly. Five managers indicated that removing the trays entirely from the facility was the best method of implementation. These managers recommended avoiding occasional trayfree events and days of service. They felt it was confusing to the students and often allowed more comparison between the methods of service. Other recommendations from these managers included involving upper administration, planning ahead, and being consistent in implementing the plan when students, faculty, or staff complained.

Table 3. Recommendations for Trayfree Dining Identified by Foodservice Managers (n=24)

Recommendations	n	%[a]
Involve Students	16	66.67
Market and Educate	15	62.50
Conduct Waste Analysis	10	41.67
Communicate	9	37.50
Remove All Trays at One Time	5	20.83
Implement at Beginning of Fall Semester	5	20.83
Evaluate the Change	4	16.67
Ease into the Change	2	8.33
Consider Individuals with Disabilities	1	4.17
Involve Upper Administration	1	4.17
Purchase Larger Plates	1	4.17
Plan Ahead	1	4.17
Stand Your Ground	1	4.17

[a]Percentage of all respondents who identified this specific recommendation.

Best Practices

The telephone discussions with these managers identified best practices for implementation of trayfree dining (Table 4). Two overall best practices were identified by a majority of the managers interviewed.

Ten managers stressed the importance of having data to quantify the impact of the tray removal. Waste and expense audits were used to provide quality information to evaluate the success of such a change. Using the waste itself and the data collected as demonstrations of the change were identified as successful methods of student education and increased awareness.

Communication, marketing, and student involvement were identified by twelve of the managers as the best practice when implementing a service-style change such as tray removal. Managers discussed the positive outcome of allowing students to feel involved and to have input on the change. Postings, face-to-face interactions, and events were all methods used to engage students in the topic of trayfree dining. One facility encouraged having a manager available during

Table 4. Best Practices for Trayfree Dining Identified by Foodservice Managers (n=24)

Best Practices	n	%[a]
Quantify the Change	7	29.17
Market and Educate	5	20.83
Involve Students	4	16.67
Communicate	3	12.50
Demonstrate the Waste	3	12.50
Focus on Environment Not Savings	3	12.50
Start At the Beginning of the Semester	3	12.50
Involve Upper Administration	2	8.33
Stand Your Ground	2	8.33
Using the Savings on Students	2	8.33
Conduct Waste Trials	2	8.33
Ease Into the Change	1	4.17

[a]Percentage of all respondents who identified this specific practice.

meal service to answer questions about the trayfree program and gain insight into students' perceptions of the change.

Focus Groups

Eleven students participated in focus group discussions regarding trayfree dining at the facility. The students reported having very little exposure to dining facilities without the option of trays. The primary type of trayfree dining exposure was restaurant buffets.

When asked to identify obstacles to trayfree dining, many students discussed the congestion in serving areas. They felt that spills and dish breakage would happen more often due to the crowds and lack of space to move around. However, their concerns focused on others around them and not their own ability to handle a trayfree experience. Only one suggestion was made about increasing the size of beverage glasses, however, a student suggestion regarding the use of divided tray-type plates became quite heated. Many students felt a divided tray would allow for multiple food options without items having to touch and overlap on their plates. This would decrease tray washing while still allowing the students flexibility on their choices. When probed as to why this idea of a divided tray had so much support, it was obvious that freedom of choice and the ability to separate food items was important to the group.

Students were asked to discuss changes they perceived as necessary for trayfree dining to work in this dining center. Many students indicated it would be important to move silverware throughout the facility. One student suggested placing silverware on dining tables, while others indicated having it available near serving lines and in dining rooms would be sufficient. The carousel-type dish return was discussed to be appropriate for such a change although solid surfaces were suggested to prevent items from falling through. Some students thought others may stack items high and cause spills in this area. One student suggested having students sort their own trash and silverware at the dish return area. However, a majority of the students enjoyed the current relaxed, carefree atmosphere and indicated that having students sort their waste would take away from the current atmosphere. These comments suggested that avoiding unnecessary changes in students' routine is important when implementing trayfree dining.

The timing and manner in which trayfree dining should be implemented was discussed. Few students indicated that easing into a change such as this would be successful. They indicated that if a trayfree day was implemented that students who were against the change would simply eat elsewhere on those days. A majority indicated that removing trays at the beginning of a semester when many students would be new to the facility would be the best option. The students agreed with the foodservice managers that it would be best not to present the tray option to new students to avoid the comparison of systems. At this point, it was also recommended to advertise the removal of the trays the prior semester. Students noted that advance notification to returning students would give them the opportunity to move elsewhere if they did not support the change and believed they could not adapt. Overall, the focus group participants stated that students may be upset at first but would learn to adapt.

The focus groups indicated the students had little concern about the removal of trays in this dining facility. However, the survey administered during the initial focus groups indicated only slightly higher than neutral (3.00) level of support in implementing trayfree dining (M = 3.18, SD = 0.60). The survey completed after the students voluntarily dined trayfree showed an improvement in acceptance indicating they more than agreed (4.00) that they would support the implementation of trayfree dining (M = 4.29, SD = 0.76). Students' rated their level of agreement that trayfree dining can facilitate decreasing food waste higher than neutral (3.00) both prior to (M = 4.27, SD = 0.66) and following their trial experience with trayfree dining (M = 4.71, SD = 0.49).

The level of agreement with suggested service ware changes increased from the pre to post-experience survey. Following their trial experience with trayfree dining the students more than agreed (4.00) that larger glasses (M = 4.79, SD = 0.39), larger plates and/or bowls (M = 4.00, SD = 1.00), and relocating silverware to the dining room (M = 4.29, SD = 0.95) would assist in making trayfree successful at this facility.

Overall, the focus group participants showed positive support for the implementation of trayfree dining. Their recommendations for minor changes were the same as the best practices identified by the foodservice managers.

Suggestions and Rationale for Implementing Trayfree Dining

All 24 managers reported immediate benefits from the removal of dining hall trays. No managers indicated the need for major purchases or renovations for the success of their trayfree program. Furthermore, multiple facilities reported an increase in student satisfaction. Student focus group participants also indicated their support while providing suggestions for only minor changes to the operation for success. Given the overall positive outcomes from the discussions with these individuals and the ease of transition other foodservice facilities have experienced, implementation of trayfree dining is recommended.

The removal of dining trays from the facility would likely stimulate a decrease in the amount of edible food items being disposed of. Many of the managers interviewed indicated that students make more informed choices and take less food from the serving areas when they do not have a tray to place extra menu items. The decrease in the amount of food each student takes, and therefore consumes, has many benefits. Several managers stated that the amount of food items prepared in their facilities decreased. Therefore, it is likely that food costs would decrease in response to the need for less production. These savings would benefit the operation financially as less food would need to be purchased and less food waste processed.

A second benefit of the decrease in food taken is the potential health improvements gained by the students. Improved awareness of serving sizes and more informed food choices were indicated by multiple managers as positive outcomes of trayfree dining. Since students have limited space on the plates, they must select items that fit, thus they may review the menu board in advance and determine food choices. Rather than taking larger servings of their favorite items, they may choose to take smaller amounts as to allow more items to fit on the plate they will be carrying. Overall, these eating behavior changes will influence their lifestyle and may improve their current and future health status.

Fifteen managers indicated the need to educate students on the transition and student focus groups reinforced this recommendation. While the financial benefits may seem appealing to the facility, the educational marketing campaign should focus on benefits valued by the students. Managers suggested waste and expense audits be conducted before, during, and after the implementation. Sustainability is important to many students and focusing on the

positive outcomes of this change would help gain students support. Demonstrating the amounts of waste produced by students prior to and following the implementation of trayfree dining is recommended for maximum impact. Printed information about the actual weight of waste may have an impact, but being exposed to the large volume of edible food requiring disposal may leave an overwhelming impression on these students.

Directors also recommended educating the students on the health benefits of trayfree dining including the relationship between portion control and calories consumed. The impact of such a nutrition education campaign on nutritional choices and personal growth should be assessed.

Finally, waste and cost audits are recommended prior to and throughout the implementation of trayfree dining. These audits will provide financial data for continued support of such a change. These data will also be useful in the development of educational campaigns for students. The physical waste can be used to demonstrate improvements based on the removal of trays. Information that supports sustainability in such facilities can be utilized to recruit students, promote the operation, and advance university operations within their national association.

CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS

This study evaluated the operational feasibility of implementing trayfree dining within a university dining facility. Recommendations for the facility management team were identified and were based on results of foodservice manager interviews and student focus groups. Previous research has examined the outcomes of trayfree dining in university facilities. The current study identified similar outcomes, such as decreased food cost, reduced waste, and fewer resources needed (Aramark, 2008; Karstens & Moe, 2009; Sodexo, 2008). This research also supplemented these findings with recommendations for implementation and success of trayfree dining. While the purpose of this study was focused on evaluating the feasibility of trayfree dining in a particular dining unit, the findings may be of considerable use to managers of other university operations considering this change.

Generally, student involvement, communication, and timing were indicated to be primary methods of successful trayfree implementation. While savings of resources and products were identified as benefits of trayfree dining, unexpected outcomes such as improved student satisfaction and lifestyle choice impact were described as additional benefits of this style of service. Future research in this area is recommended. Determining the impact of tray removal on student weight gain and lifestyle influence may contribute to the factors supporting such a change.

The research found that focus groups involving students can provide useful information. However, the impact of multiple participants can cause the discussion to divert to unrelated topics. The researcher recommends conducting individual interviews with students to obtain individual student's perspectives. This format may prevent the impact of peer influence and random topic introductions. The individual foodservice manager interviews provided useful information on specific topics while allowing additional questions to obtain more in-depth understanding of the topic.

Future work should focus on evaluating methods of communication and student education that can best benefit the implementation and continued success of trayfree dining. While past research, as well as the current study, demonstrate the environmental and financial benefits of trayfree dining, evaluation of the continued impact and success of such a change is recommended. Determining whether introduction of this form of environmentally friendly service impacts students' selection and evaluation of academic institutions to attend would be interesting. Given that student recruitment and retention are vital to the success of colleges and universities, evaluation of a wide variety of sustainability practices that potentially impact students' institutional preferences is recommended.

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Research Contribution

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CHILD NUTRITION PROFESSIONALS' KNOWLEDGE AND TRAINING PRACTICES REGARDING FOOD ALLERGIES IN U.S. SCHOOLS

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ABSTRACT

To examine training and knowledge requirements about food allergies for Child Nutrition Professionals (CNPs), 1500 randomly selected CNPs in the U.S. were surveyed. Mean food allergy knowledge score of 350 respondents was 31.9±3.3 (max=39). Forty percent of CNPs (n=140) provided food allergy training, and the majority used group training (n=96) annually (n=76). Those who had received food allergy training and demonstrated higher knowledge scores were more likely to provide food allergy training. Lack of time and financial resources were barriers to providing food allergy training. Food allergy training is needed to prevent food allergic reactions in child nutrition programs.

Keywords: Child Nutrition Programs, food allergy, knowledge, training, barriers

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INTRODUCTION

A Food allergy is an adverse health effect arising from a specific immune response that occurs reproducibly on exposure to a given food (National Institute of Allergy and Infectious Disease [NIAID], 2010). A food allergic reaction occurs after direct contact, consumption, or even inhalation of food allergens. It is estimated that 6 million children in the United States (U.S.) have food allergies and this number continues to rise (Gupta et al., 2011). Between 2004 and 2006, there were a total of 9,537 hospitalizations due to diagnosed food allergies among children aged 17 years or younger compared to 4,135 between 2001 and 2003 (Centers for Disease Control and Prevention [CDC], 2008). Because food allergies are incurable, avoidance of known food allergens is crucial for this population (Food Allergy Research and Education , 2013).

Most children spend over 30 hours a week in the school environment (National Institute of Child Health and Human Development [NICHD], 2012); therefore, school professionals play a significant role in providing a safe environment for children with food allergies. A study showed that over 60% of the 4,586 children who were registered with the Peanut and Tree Nut Allergy Registry experienced allergic reactions either at schools or in childcare centers (Sicherer, Furlong, Desimone, & Sampson, 2001). Furthermore, 10 out of every 63 fatalities in educational institutions occurred due to food allergic reactions (Munoz-Furlong & Weiss, 2009). Within schools, cafeterias are a common location where food allergic reactions occur. For example, research conducted in Mississippi revealed that 17% of the reported food allergic reactions in 2009 occurred in school cafeterias (Pulcini, Marshall, & Naveed, 2011).

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Hidden food allergens in processed foods and cross-contact between allergen-containing food and non-allergenic food have been found to be the main reasons for food allergic reactions in schools (Molaison & Nettles, 2010). Lack of awareness about food allergies among cafeteria and general staff at schools and the inability to respond promptly to an allergic reaction lead to multiple fatalities (Yunginger, Squillace, Richard, Jones, & Helm, 1989). Schools nationwide have implemented various strategies to prevent food allergic reactions, such as providing meal substitutions, establishing allergen-free areas, and instituting "no food sharing" policies (Nowak-Wegrzyn, Conover-Walker, & Wood, 2001). However, some parents of children with food allergies reported that schools were unprepared to accommodate their children's needs (Nowak-Wegrzyn et al., 2001).

The Americans with Disabilities Act of 1990 ~~(ADA)~~ requires that public schools accommodate children with food allergies. The Amendment of the Rehabilitation Act 1973, Section 504, also prohibits federally funded schools from discriminating against students with disabilities or special needs (Asthma and Allergies Foundation of America ~~[AAFA]~~, 2013). The U.S. Department of Agriculture's (USDA) guideline entitled "Accommodating Children with Special Dietary Needs" suggests that children with food allergies should be provided safe replacement meals according to the instructions and advice of their physicians (USDA, 2013).

Food allergy training is imperative for enhancing necessary knowledge and food handling skills of food handlers. A study conducted in Texas found that food allergy knowledge of school foodservice employees improved significantly following a food allergy workshop (Lemons, 2004). Nevertheless, food allergy training has neither been adequately addressed nor provided to school foodservice employees (Pulcini et al., 2011). For instance, among 37 schools studied, 62 classroom teachers, 48 administrators, and 22 teaching assistants have been trained on food allergic reactions, whereas only five foodservice staff received such training (Pulcini et al., 2011). Obtaining more information regarding school foodservice employees' knowledge may assist in identifying food allergy training needs and consequently preventing future food allergic reactions in school foodservice operations. However, currently there is a paucity of research regarding food allergy knowledge and training practices in school foodservice operations. This gap in research underscores the purpose of this study, to examine the training and knowledge requirements about food allergies among Child Nutrition Professionals (CNPs). This study also aimed to examine the barriers to providing food allergy training and identifying strategies to overcome such barriers to increase food allergy training in school foodservice operations.

METHODS

Subjects

Prior to data collection, an approval to use human subjects for this study was obtained from Kansas State University Institutional Review

Board. The target population was defined as CNPs such as directors, managers, and other supervisory personnel involved in planning or implementing training programs in school foodservice operations in the U.S.

To collect information on CNPs, we accessed a database comprised of school district websites from 37 states; this database was previously developed for use in other studies on child nutrition programs. Each school district website listed in this database was accessed, and the list of names, postal addresses, and email addresses of CNPs was compiled into a separate database and further categorized based on the seven USDA Food Distribution Regions (USDA, 2012). Overall, the school district websites provided data for 3,588 CNPs, of which 1,500 CNPs were selected from all the geographic regions of the U.S. as the study sample. The sample size was calculated based on Dillman, Smyth, and Christian's (2007) recommendations that a population of 2,000–4,000, with a sampling error of ±5%, 50/50 split, with an anticipated response rate of 25%, requires a sample size of 322–351 respondents for research.

Instrument Development

To identify relevant variables for the national survey, three focus groups were conducted with 21 CNPs who had attended a training program sponsored by a Department of Education of a Midwestern state Child Nutrition and Wellness Program or an annual state School Nutrition Association conference. The focus group participants were recruited through emails sent by the meeting organizers and briefed about the research purpose and the anonymity of their responses. Each participant completed a demographic questionnaire and signed a consent form prior to participating in the discussion. During the focus group sessions, the CNPs were asked open-ended questions regarding the research objectives based on a structured discussion guide (Hennink, Hutter, & Bailey, 2011). Each focus group session lasted for approximately one hour and was audio-recorded. The recordings were transcribed by a professional transcription company (www.cabbagetreesolutions.com). The transcript was validated against the audio recording and then independently coded by two facilitators. The codes were compared and reconciled to limit redundancy, and they were used to develop common themes for the quantitative survey questionnaire.

An online questionnaire was developed based on focus group results and the previous literature (Lemons, 2004; Molaison & Nettles, 2010). The questionnaire comprised four sections and the following items: 12 items to define demographic characteristics, 14 items about food allergy training practices, 12 items about food allergy knowledge, nine items about attitude toward food allergies, eight items related to issues dealing with food allergies, seven items about perceived barriers to providing food allergy training, and five items about cues that influence the respondents' decision to provide food allergy training. Food allergy knowledge was assessed using multiple choice or true/false questions. The maximum possible score for the food allergy knowledge was 39. Attitudes and perceived barriers to food allergy training were measured using 5-point Likert-type scales, ranging from 1, "strongly disagree", to 5, "strongly agree".

A pilot study was conducted with a convenience sample of 15 CNPs. Cronbach's alpha tests were used to evaluate inter-item reliability and $\alpha > 0.70$ was considered acceptable for internal consistency (Cronbach, 1951). The results of the Cronbach's alpha test indicated that all scales measuring the attitude toward food allergies ($\alpha = 0.76$) and perceived barriers ($\alpha = 0.90$). The participants of the pilot test were also asked to rate the clarity of the instructions and questions. No further revisions were made to the questionnaire after the pilot study.

Data Collection and Analyses

The survey invitation, which included an introduction and link to the online survey, was sent independently through email to each participant. Follow-up email reminders were sent twice to non-respondents before concluding the 3-week survey (Dillman, 2000).

The Statistical Package for the Social Sciences (SPSS) (version 19.1.21, 2011, SPSS, Chicago, IL) was used for data analysis. Prior to this, dummy coding was applied to recode several variables (i.e., whether a participant had received training previously, had a food allergy, or had family members with food allergies). To determine the most desirable topics for food allergy training, each respondent was asked to rank three of the six options. Subsequently, the top ranked item was recoded as "3," and the second and third ranked items were recoded as "2" and "1" respectively. Other items were recoded as "0." The mean score of each item was calculated and used to evaluate the relative importance of each topic. For knowledge questions, correct and in-correct answers were re-coded as "1" and "0." Total knowledge scores (i.e., the sum of correct answers) were calculated using the "compute" function of SPSS prior to further analyses. Independent sample t-tests and analysis of variance (ANOVA) with post-hoc analyses were used to compare the mean scores of knowledge and other scaled data for CNPs with different demographic characteristics. The most challenging barriers to providing food allergy training were evaluated using the repeated measures multivariate ANOVA (MANOVA) tests. Logistic regression was used to investigate variables that were associated with the implementation of food allergy training during the past 12 months. Statistical significance was set at $p < 0.05$.

RESULTS

Response Rate and Participant Characteristics

Of the 1,500 invitation emails sent, 72 were undeliverable, yielding an effective sample size of 1,428. After excluding 75 incomplete questionnaires, 340 usable questionnaires (23.8%) were available for data analyses. The majority of respondents were female (n = 309, 90.9%) and belonged to the age group of 51–60 years (n = 163, 47.9%). Moreover, most of the respondents held a bachelor's degree (n = 109, 32.1%) and were directors of school nutrition or foodservice programs (n = 264, 77.6%). Approximately 39% (n = 131) of the respondents held School Nutrition Specialist or School Nutrition Professional certificates, and 18% held the Registered Dietitian (RD) credential (n = 60). Approximately 73% (n = 248) of the respondents held ServSafe® certification (Table 1).

The respondents' overall length of service in school foodservice ranged from three months to 40 years (mean = 16.0 ± 9.8 years), whereas their length of service in a management position ranged from three months to 35 years (mean = 12.5 ± 8.4 years). Of the 296 respondents who worked at the school district level, 116 respondents (39.2%) were employed at small districts (up to 2,499 students), 112 (37.8%) at medium-sized districts (2,500–9,999 students), and 68 (23.1%) at large districts (over 10,000 students) (Table 1).

Of 340 respondents, 60.0% (n = 204) had received food allergy training, mainly through professional conferences/workshops (n = 166), self-study (n = 131), and/or on their job (n = 122). Most of the respondents indicated that they had obtained food allergy training materials from state agencies (n = 165, 48.5%), School Nutrition Association (SNA) (n = 161, 47.4%), and USDA Food and Nutrition Services (FNS) (n = 149, 43.8%). Others indicated that they had obtained resources from the Academy of Nutrition and Dietetics (formerly known as the American Dietetic Association), State Dietetic Associations, school nurses, and contract management companies (Table 2).

Among respondents who worked at the district level (n = 270) or were responsible for operations in multiple schools (n = 26), 221 had received special dietary requests due to food allergies in the current academic year (range = 1 to 910). Of the remaining 44 respondents, who were responsible for operations in a single school, 35 had received the similar requests (range = 1 to 100). Allergic reactions in school cafeterias were rare, with 251 respondents (73.5%) indicating "zero" incidences in the past 12 months. Very few respondents reported one (n = 18, 5.4%), two (n = 13, 3.8%), and three (n = 2, 0.6%) allergic reactions in their facilities.

Food Allergy Knowledge and Training

Of the maximum 39 points possible, the mean food allergy knowledge score was 31.9 ± 3.3 (range = 22 to 38). CNPs had basic food allergy knowledge regarding the consequences (i.e., a food allergic reaction could lead to death [98.2%]), causes (92.1%), and lack of a cure for food allergies (87.9%). Approximately 21% (n = 71) of the respondents failed to recognize that lactose intolerance and milk allergy were two different conditions. Only 25.0% of the respondents (n = 85) recognized the current Food Allergen Labeling and Consumer Protection Act (FALCPA) requirements that the major eight food allergens needed to be listed on food labels. For multiple choice questions, most of the respondents accurately identified all the common symptoms of food allergic reactions (range = 87.9% to 98.2%) except vomiting (n = 242; 71.2%) and asthma (n = 186; 54.7%).

Over 90% of the respondents were able to identify six of eight major allergens correctly. However, 36.8% (n = 125) and 24.4% (n = 83) of the participants did not recognize soy and fish as major allergens, respectively. Only 29.4% (n = 100) of participants recognized all eight major allergens.

Approximately 19% (n = 63) of the respondents correctly identified all the terms used to indicate the presence of peanut or peanut derivatives except "arachis oil," which was recognized by only 76 participants (22.4%). Less than 15% (n = 50) correctly identified that milk allergen may be present in the form of "artificial butter flavor" (Table 3).

Independent sample t-tests showed that the participants with RD credentials had significantly higher food allergy knowledge scores (34.4 ± 2.9) than others (31.3 ± 3.2) (t = 4.73, P < 0.05). Results of one-way ANOVA analyses indicated that food allergy knowledge scores also differed based on the size of the school districts (F = 13.65, P < 0.001). The respondents who worked for small districts had significantly lower food allergy knowledge scores (31.2 ± 2.9) than their counterparts from medium (32.7 ± 3.0, P < 0.05) and large (33.5 ± 3.1, P < 0.001) districts.

Of those who had provided employee food allergy training during the past 12 months (n = 140, 41.2%), most training was provided by the respondents themselves (CNPs, n = 99). Food allergy training was provided either as stand-alone sessions (n = 74) or as a part of general food safety training (n = 68). Out of six given choices, the following three topics were ranked as the most important topics to be included in the food allergy training: "Identifying food items that contain allergens" (1.9 ± 1.2), "Avoiding cross-contact with food allergens" (1.0 ± 1.1), and "Reading ingredient listings" (0.9 ± 1.1), in that order.

Table 1. Characteristics of Child Nutrition Professionals (n = 340)

Characteristics	n	%
Gender		
Female	309	90.9
Male	31	9.1
Age (years)		
21-30	19	5.6
31-40	45	13.2
41-50	75	22.1
51-60	163	47.9
61 or older	38	11.2
Education Level		
High school or General Education Development (GED)	53	15.6
Some college	73	21.5
Associate degree	32	9.4
Bachelor's degree	109	32.1
Master's degree	61	17.9
Doctoral degree (PhD, EdD, etc.)	2	0.6
Other	10	2.9
Job Title		
Director of a school district	264	77.6
Manager of a single school	34	10.0
Coordinator of several schools	26	7.6
Coordinator of a certain program within a school district	6	1.8
Supervisor within a single school	10	2.9
Professional Credentials[a]		
School Nutrition Specialist	131	38.5
Registered Dietitian (RD)	60	17.6
Certified Dietary Manager	20	5.9
Dietetic Technician, Registered	5	1.5
Other	158	46.4
Food Safety Certification[a]		
ServSafe®	248	72.9
Food handlers' certification	103	30.3
Food safety certification by state	78	22.9
I do not currently hold any food safety certification	30	8.8
Other	27	7.9

[a] The total number of responses exceeded 340 due to multiple responses.

Table 2. Respondents' Previous Food Allergy Training (n = 340)

Characteristics	n	%
Previous food allergy training received		
Yes	204	60.0
No	136	40.0
Methods of Training [a]		
Professional conferences or workshops	166	48.8
Self-study (e.g., reading, education modules, etc.)	131	38.5
Through the daily work done at the job	122	35.9
Academic degree program (college courses, technical schools, etc.)	47	13.8
Other	15	4.4
Sources of Food Allergy Training Materials [a]		
State agency (e.g., Department of Education)	165	48.5
School Nutrition Association (SNA)	161	47.4
USDA, Food and Nutrition Services (FNS)	149	43.8
National Foodservice Management Institute (NFSMI)	100	29.4
Food Allergy and Anaphylaxis Network	87	25.6
I have not obtained materials from any of these organizations	73	1.5
Other	31	9.1

[a] The total number of responses exceeded 340 due to multiple responses.

Table 3. Food Allergy Knowledge Scores among Respondents (n = 340)

Questions	*n (%)* *Answered Correctly*	*Answered Incorrectly*
Food allergic reactions occur when the body's immune system reacts to the proteins in the food.	199 (58.5)	141 (41.5)
Lactose intolerance is the same as having a milk allergy.	269 (79.1)	71 (20.9)
A child can die from a food allergic reaction.	334 (98.2)	6 (1.8)
Modern medicine can cure food allergies.	299 (87.9)	41 (12.1)
A food allergic reaction can occur if a child touches a food item that contains allergens.	313 (92.1)	27 (7.9)
If a student has a milk allergy, removing cheese from an already assembled deli sandwich will prevent an allergic reaction.	290 (85.3)	50 (14.7)
Federal law requires all food allergens to be listed on food labels.	85 (25.0)	255 (75.0)
Mark ALL symptoms or conditions in the following list that could indicate that someone is having a food allergic reaction:		
Hives/rashes[a]	335 (98.5)	5 (1.5)
Swelling of throat[a]	334 (98.2)	6 (1.8)
Facial swelling[a]	331 (97.4)	9 (2.6)
Tingling sensation in or around the mouth[a]	326 (95.9)	14 (4.1)
Shortness of breath[a]	322 (94.7)	18 (5.3)
Anaphylaxis[a]	299 (87.9)	41 (12.1)
Vomiting[a]	242 (71.2)	98 (28.8)
Asthma[a]	186 (54.7)	98 (28.8)
Which of the following are the **EIGHT MAJOR FOOD ALLERGENS**?		
Peanut[a]	340 (100.0)	0 (0.0)
Shellfish (shrimp, lobster, crab, etc.)[a]	333 (97.9)	29 (2.1)
Eggs[a]	332 (97.6)	8 (2.4)
Milk[a]	325 (95.6)	14 (4.4)
Wheat[a]	325 (95.6)	14 (4.4)
Tree nuts (almonds, walnuts, pecans, etc.)[a]	311 (91.5)	29 (8.5)
Fish[a]	257 (75.6)	83 (24.4)
Soy[a]	215 (63.2)	125 (36.8)
Beef	333 (97.9)	7 (2.1)
Herbs (basil, thyme, chives, rosemary, etc.)	330 (97.1)	10 (2.9)
Citrus fruits (lemon, orange, etc.)	290 (85.3)	50 (14.7)
Corn	257 (75.6)	83 (24.4)
Artificial colorings (red dyes, yellow dyes, etc.)	184 (54.1)	156 (45.9)
A person with a peanut allergy should avoid products having which of the following on the ingredient label? Mark ALL the options that apply.		
"Processed in a factory that also processed food containing peanuts"[a]	334 (98.2)	6 (1.8)
"Whey"	333 (97.9)	7 (2.1)
"Contains peanuts"[a]	333 (97.9)	7 (2.1)
"May contain ground nut/mixed nuts"[a]	320 (94.1)	20 (5.9)
"Arachis Oil"[a]	70 (20.6)	270 (79.4)
A person with a milk allergy should avoid products having which of the following on the ingredient label? Mark ALL the options that apply.		
"Contains milk"[a]	338 (99.4)	2 (0.6)
"Milk solids"[a]	329 (96.8)	11 (3.2)
"Whey"[a]	240 (70.6)	100 (29.4)
"Casein"[a]	209 (61.5)	131 (38.5)
"Artificial butter flavor"[a]	50 (14.7)	290 (85.3)
The most effective response to a severe food allergic reaction is: Injecting epinephrine (EpiPen)	321 (94.4)	19 (5.6)

[a]Correct answers

Barriers to Food Allergy Training

Perceived barriers to providing food allergy training for employees were assessed in two tiers. The respondents who indicated that "Providing food allergy training to the foodservice employees in my school district is difficult" or "very difficult" (n = 97 out of 340 respondents) were directed to a list of questions related to challenges to implementing employee food allergy training. "Time constraints of the respondent themselves" (3.8 ± 1.0) and "The lack of time of the employees" (3.5 ± 1.1) were among the greatest training challenges. Another critical barrier to implementing food allergy training programs was financial resources (3.5 ± 1.0). "Lack of support from school administrators and staff" was not viewed as a major challenge (2.9 ± 1.1) because 45 of 97 respondents expressed a neutral view about the level of support offered by school administrators and staff (Table 5).

Logistic regression analysis (Logit) was performed to identify the variables that were associated with food allergy training during the past 12 months. The goodness-of-fit for the model was $\chi^2 = 22.51$ ($p < 0.01$), and it accurately predicted 34% of the responses regarding (pseudo $R^2 = 0.340$) whether the food allergy training was implemented in the past. The results further showed that the scores for receiving previous food allergy training ($B = 1.87$, $p < 0.001$) and food allergy knowledge ($B = 1.21$, $p < 0.01$) were significantly associated with food allergy training implementation.

Table 4. Food Allergy Training Practices in School Foodservice Environment (n = 340)

Characteristics	*n*	*%*
Food Allergy Training Provided to Employees[a]		
Yes	140	41.2
No	200	58.8
Food Allergy Training Provider[bc]		
Themselves	99	70.7
Another staff manager	38	27.1
State agency staff	33	23.6
Private training provider	16	11.4
Other	20	14.3
Structure of Training[b]		
Part of food safety training	66	47.1
Separate session(s) on food allergies	74	52.9
Form of Training[b]		
Group training	96	68.6
Individual "one-on-one" training as needed	30	21.4
Other	14	10.0
Frequency of Training[bc]		
Annually to all foodservice employees	76	54.3
Once a year for foodservice employees who work directly with children with food allergies	52	37.1
When a foodservice employee is newly hired	33	23.6
Other	19	13.6
Total Hours of Training Provided[b]		
Less than 1 hour	59	42.1
1–2 hours	69	49.3
3–4 hours	8	5.7
More than 4 hours	4	2.9

[a]Sample size = 340
[b]Sample size = 140
[c]The total number of responses exceeded 140 due to multiple responses.

DISCUSSION

To the best of our knowledge, this is the first study to have comprehensively assessed CNPs' food allergy knowledge and established a baseline for current food allergy training practices in school foodservice operations. The demographics of the participants were similar with previous studies conducted among CNP's, such as predominantly females, aged 50 and above, and had a bachelor's degree (Pratt, Bednar, & Kwon, 2012; Rushing, Nettles, & Johnson, 2009a). During the current academic year, a majority of the respondents (74.6% of the district-level CNPs and 79.5% of the school -level CNPs) reported that they had received special dietary requests due to food allergies, indicating that food allergies may become a persistent challenge in the school foodservice environment (Young, Munoz-Furlong, & Sicherer, 2009).

The level of knowledge regarding food allergies was fair to moderate, with the greatest opportunity for improvement related to distinguishing differences between food allergies and food intolerances, legal aspects of food allergies, symptoms of food allergies, and the terminology related to allergenic food ingredients. RDs demonstrated greater knowledge regarding food allergies than non-RDs, possibly due to the formal education and supervised practice requirements for RDs (Mincher, Symons, & Thompson, 2012). The data also suggests that directors from larger school districts had higher food allergy knowledge scores than their counterparts. This is possibly because large districts are equipped with more robust technological infrastructures (Rushing et al., 2009b) have access to different resources (Youn & Sneed, 2003), and are led by more experienced directors (Youn & Sneed).

Two-thirds of the respondents had completed some form of food allergy training, primarily by self-study, daily work, or attending professional conferences. Meanwhile, another study found that food allergy management skills were learned and developed through conferences (37%), course work (29%), and mentoring (20%) (Carlisle, Vargas, & Noone, 2010). This suggests that respondents mostly depend on themselves to explore the topic of food allergies. More systematic and structured food allergy training programs may enable CNPs to develop appropriate knowledge about food allergy management.

Although the federal government has mandated several food safety programs, similar regulations for food allergy training have not yet been firmly established. The 2011 School Nutrition Association Operations Report showed that 55.6% of the respondents required all of their employees to be trained about food safety (School Nutrition Association [SNA], 2011); however, this study showed that less than half the respondents had provided food allergy training to their employees (41.2%, n = 140). A previous study found that, on average, kitchen managers received over 10 hours of food safety training, whereas food handlers underwent eight hours of training (SNA, 2011). Our study found that 59 participants received less than one hour and another 69 received one to two hours of food allergy training. Since managing food allergies presents similar challenges to managing food safety risks, efforts to promote food allergy training should be encouraged in the school foodservice environment.

The three top-ranked topics for food allergy training were identifying food items that contain allergens, avoiding cross-contact with food allergens, and reading ingredient lists. This finding was consistent with a previous study indicating that reading labels (66%), menu or recipe substitution (56%), and cross-contact prevention (50%) were among the important topics related to food allergies (Verduin & Corbett, 2009). Understanding CNPs' topics of interest and food

Table 5. Perceived Barriers to Providing Employee Food Allergy Training (n = 97)[a]

		n (%)				
Items	*Mean ± SD*	*Strongly disagree*	*Disagree*	*Neither agree nor disagree*	*Agree*	*Strongly agree*
I don't have enough time	3.8 ± 1.0[w]	2 (1.9)	11 (10.5)	18 (17.1)	49 (46.7)	25 (23.8)
I don't have adequate funding	3.5 ± 1.1[x]	5 (4.8)	14 (13.3)	28 (26.7)	35 (33.3)	23 (21.9)
Employees don't have time to attend food allergy training	3.5 ± 1.1[x]	6 (5.7)	13 (12.4)	24 (22.9)	42 (40.0)	20 (19.0)
Training resources are not easily accessible	3.5 ± 1.0[x]	3 (2.9)	13 (12.4)	31 (29.5)	40 (38.1)	18 (17.1)
There is a lack of food allergy expertise in my district	3.4 ± 1.0[x]	5 (4.8)	10 (9.5)	35 (33.3)	42 (40.0)	13 (12.4)
Employees aren't interested in l earning about food allergies	3.2 ± 1.0[xy]	7 (6.7)	18 (17.1)	34 (32.4)	38 (36.2)	8 (7.6)
I don't have support from school administrators and staff	2.9 ± 1.1[xyz]	11 (10.5)	21 (20.0)	45 (42.9)	19 (18.1)	9 (8.6)

Five-point Likert Scale: 1 = Strongly disagree; 3 = Neither agree nor disagree; 5 = Strongly agree
SD = Standard Deviation
[a] Based on 97 respondents who indicated that providing employee food allergy training was "difficult" or "very difficult"
[w, x, y, z] Means with different superscripts differ significantly in the repeated measure of MANOVA ($P < 0.05$).

allergy knowledge deficiencies may facilitate the development or revision of training materials to best assist school foodservice operations in safely serving students with food allergies.

Since 40% of the respondents had not provided any employee food allergy training, there was a need to investigate barriers to providing this training. Some barriers identified in this study were similar to those identified in previous studies about Hazard Analysis Critical Control Point (HACCP) implementation in school foodservice, including lack of resources, time constraints, high costs, employee anxiety, lack of assistance for program implementation, high employee turnover, and staff shortages (Giampoli, Sneed, Cluskey et al., 2002; Hwang, Almanza, & Nelson, 2001). The results of this study also showed that respondents' time constraints were primary barriers to training implementation. To address these problems, training should be customized to the school foodservice environment and be conducted at a time that is convenient to the employees. CNPs could also choose to use appropriate state agencies that provide food allergy training, especially if they feel uncomfortable about delivering training content.

Focus group participants indicated that it was difficult to retrieve all the necessary information about food allergies because "*they are not in one place*," while respondents only slightly agreed to this statement. Previous research indicated that many school foodservice directors and managers were not aware of the resources offered by the Department of Education, SNA, National Restaurant Association, local health agencies, or extension offices (Hwang et al., 2001). In fact, the federal government (i.e., USDA, FNS), state agencies (i.e., Massachusetts Department of Education), and professional organizations (i.e., National Food Service Management Institute [NFSMI], Food Allergy Research and Education , and American Academy of Asthma and Immunology) have many printed and/or online food allergy management and training materials that are readily available for school food service staff. However, CNPs may not know about these resources (Koerner, 2000). Therefore, these

Table 6. Logistic Regression of Factors Differentiating Facilities with and without Food Allergy Training during the Past 12 months (n = 340)

Variables	*B*	*Wald*	*Exp(B)*	*95% CI (Lower , Upper)*
Constant	-10.98	8.70	0.00	
Credentials	0.37	0.29	1.45	(0.37, 5.65)
Years of school foodservice experience (regardless of position)	0.01	0.01	1.00	(0.90, 1.13)
Yeas of school foodservice experience (management position)	0.40	0.28	1.00	(0.91, 1.18)
Previous food allergy training received	1.87	6.61***	6.48	(1.56, 26.95)
Previous food allergic reaction happened in the school cafeteria	0.34	0.16	1.41	(0.26, 7.52)
Food allergy knowledge scores	1.21	4.50**	1.24	(1.02, 1.51)
Barriers to proving training	0.29	0.50	1.33	(0.60, 2.96)
-2 log Likelihood	78.00			
Model χ^2			22.51	
Negelkerke R^2			0.34	

CI = Confidence Interval
*** $P < 0.001$
** $P < 0.01$

organizations need to reach out to the CNPs to familiarize them with the educational materials developed by them; this could enable school food service personnel to benefit from available resources.

Results of logistic regression indicate that participants who have received food allergy training and those who demonstrated higher food allergy knowledge were more likely to provide food allergy training in their facilities during the past 12 months. This could be explained by previous engagement with and greater awareness about the importance of food allergy training (Walker, Stanton, Kazi, Salmon, & Jenkins; 2009). Moreover, those who are more knowledgeable about food allergies would be more confident about discussing these matters with their employees (Manojlovich, 2005a, 2005b); Counter intuitively, previous food allergy reactions did not influence the decisions to implement food allergy training. This may be due to the low incidence of food allergic reactions reported in school foodservice operations.

CONCLUSION AND APPLICATION

Food allergies will continue to be a growing concern for all professionals involved in the continuum of food. The SNA's Back to School Trends Report reiterated that all schools have registered an increase in the number of requests for special diets (SNA, 2010). Therefore, it can be concluded that CNPs who administer programs that directly serve children should possess the unique and necessary knowledge and leadership acumen to effectively decrease food allergy risks in the school environment.

One way to minimize the potential risks present in school foodservice operations is through education and professional preparation of CNPs and foodservice employees (Mincher et al., 2012). Mincher (2010) showed that leaders of CNPs play a decisive role in designing, planning, and/or executing policies in school cafeterias to promote good health among students and in implementing training for foodservice employees. The CNPs provide leadership in the form of awareness and education at schools through training. The *Competencies, Knowledge, and Skill Statements for District School Nutrition Directors/Supervisors* published by the NFSMI identified 13 competencies that school nutrition directors/supervisors should possess to perform their daily jobs (Cater & Carr, 2002); six of these are training-related competencies. Possessing this extensive list of competencies is required to ensure the success of training programs.

This study found that a majority of the CNPs learned about food allergies through their daily work or self-study, yet most of them also served as training provider for their employees despite their lack of confidence. Several participants in the focus group study also expressed preference to have "*individuals with credentials*" to conduct such training. Hence, the CNPs may need guidance to develop more skills in food allergy management and conduct training.

In addition, the results indicated that food allergy training in school foodservice operations is lacking primarily due to time restraints. Future studies should address the frequency and duration of food allergy training programs and explore practical options for necessary training. The financial costs of food allergy training should be further explored to enable the allocation of adequate resources. The training delivery methods (e.g., videos, printed materials, role-play) could also be explored to identify which method is more cost-effective and highly flexible to fit in the hectic schedules of the CNPs and school foodservice employees.

This research supports the previous literature in recognizing RDs' food allergy knowledge and their unique potential to complement the school environment (Koerner, 2000). This study also found food allergy knowledge level differed based on school district size. Since all schools across the nation have reported an increased in food allergy cases (SNA, 2010), there is a need for the CNPs to be trained in food allergy despite their credential status and school size. Approximately 73% of the participants were ServSafe® certified and 40% were Certified School Nutrition Specialist, both of these certificates or programs could include more extensive food allergy-related topics to reach more audiences.

The study has the following limitations. One limitation is related to the single-mode of survey administration. The survey was only administered online and yielded a response rate of 24%. Previous research by Sullivan, Harper, and Charles (2002). found that some food service managers do not have access to the Internet; therefore, they do not respond to online surveys. Furthermore, Dillman (2000) addressed that the complexity of online survey tools and limited computer accessibility may negatively influence online survey participation. In the school foodservice setting, some CNPs spend a majority of their time directly within the operation (Conklin & Nettles, 1994) rather than performing office-related administrative tasks. Therefore, it is difficult to obtain information from those CNPs who do not have online access.

The second limitation was the timing of the survey. The survey was distributed during the announcement of the new federal child nutrition new meal pattern guidelines. Therefore, CNPs might not have had adequate time to respond to this survey. Researchers received multiple emails from CNPs who were unable to participate in this survey due to time restraints; however, they did not want to provide comments about food allergy issues. Another limitation of this study was that the CNPs who chose to participate in this survey might already have been concerned about food allergies, thereby demonstrating higher food allergy knowledge scores than non-respondents. This is further validated by the greater proportion of CNPs who provided food allergy training in this study (60%) than those in the 2011 School Nutrition Association Operations Report (41.2%) (SNA, 2011).

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Research Contribution

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PASTA DISHES AS A VEHICLE FOR MEETING WHOLE GRAIN REQUIREMENTS IN SCHOOL MEALS: CHALLENGES, OPPORTUNITIES AND BENEFITS

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ABSTRACT

Pasta, a popular versatile grain food served in many venues, is served much less frequently in schools. The purpose of this paper is to understand the challenges and opportunities involved in pasta procurement, preparation and service by foodservice directors (FSD). FSD reported benefits of serving pasta to include variety, affordability, lower fat, potential sources of whole grain and fiber and pasta foods being well-liked by children. Despite these benefits, pasta dishes appear less frequently compared to other entrees and side dishes. Serving pasta more frequently may incorporate less expensive, nutritious and versatile dishes that would closely meet the new nutrition standards for school meals.

Keywords: pasta, whole grain pasta, school meals, foodservice directors

INTRODUCTION

Whole-grain intake is associated with reduced risk for certain chronic diseases, including obesity, diabetes, and heart disease (Lutsey et al., 2007; McKeown et al., 2009; Newby et al., 2007; Sahyoun, Jacques, Zhang, Juan, & McKeown, 2006). The 2010 Dietary Guidelines for Americans (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2010) and MyPlate (U.S. Department of Agriculture, 2011) recommend a healthier diet placing greater emphasis on plant sources, by choosing fiber-rich fruits, vegetables, and whole grains. Despite the whole grain recommendation suggesting at least half of all grains consumed as whole grains, the National Health and Nutrition Examination Survey (NHANES) indicates only 1 in 10 individuals including school-aged children consume the recommended amount of at least three whole grain servings per day with the majority consuming less than one (Krebs-Smith, Guenther, Subar, Kirkpatrick, & Dodd, 2010).

Since 2004, some schools have voluntarily participated in the Healthier US School Challenge (HUSSC) to promote healthier school environments through better nutrition and physical activity. More recent nutrition standards have been proposed by the Institute of Medicine (IOM) (Institute of Medicine [IOM], 2009) and the USDA School meals program (Nutrition Standards in the National School Lunch and School Breakfast Programs; 2012) to promote healthier school environments which include: increasing the availability of fruits, vegetables, whole grains, and fat-free and low-fat fluid milk in school meals; reducing the levels of sodium and saturated fat in meals; and helping to meet nutritional needs of school children within their calorie requirements. All grains offered in the school meals program must be whole grain rich by July 1, 2014.

Stakeholders including public and private schools and food manufacturers have already begun to investigate the challenges of incorporating more whole grains into various grain products. Plate waste studies conducted in elementary schools demonstrate that whole grain flour can be successfully incorporated at varying levels into grain-based foods, ranging from entrees such as pizza crust (Chan, Burgess-Champoux, Vickers, Reicks, & Marquart, 2008; Schroeder, Ronnei, Arndt, & Marquart, 2010), pancakes (Chu et al., 2011; Hur & Reicks) hamburger buns/dinner rolls (Rosen, Sadeghi, Schroeder, Reicks, & Marquart, 2008) and tortillas (Chu et al., 2011; Hur & Reicks; Toma et al., 2009) to desserts and snacks such as cookies (Toma et al., 2009) and crackers (Sadeghi & Marquart, 2009; Sadeghi & Marquart, 2010). With an increased demand for whole grain foods, manufacturers have reformulated a variety of popular grain-based foods to contain more of the whole grain ingredients (Mancino, Kuchler, & Leibtag, 2008). However, fewer efforts have focused on developing higher quality, child-friendly whole grain pasta products for schools.

Consumers of lower socioeconomic status with children, seeking lower cost, convenient and healthy pasta options have recently driven growth in the pasta and pasta-based meals segment (Ellis, 2010). When it comes to offering whole grain pasta products, retail groceries greatly exceed the foodservice sector. Restaurants may offer whole grain pasta, however, this menu component appears about 10% of the time compared to the refined counterparts ("Mintel Menu Insights Weekly Top 10," 2011). As whole grain pasta appears more frequently on the shelves in the retail market (Nielsen Retail Sales, 2010) and becomes more common in restaurants, a question remains - how is whole grain pasta faring in the school environment?

Analysis of a nationally representative sample of 398 school menus indicated that only 4% of all lunch meals offered pasta regardless of pasta type (whole wheat or refined) which appeared 3%, 5%, and 8% of the time on elementary, middle and high school menus, respectively (Condon, Crepinsek, & Fox, 2009). Despite the low frequency of pasta being served in schools, it is a popular well-liked food among children, a good source of energy, low fat, and versatile (Rosen, Hauge, Arndt, Veal, & Marquart, 2011). Regardless of the significant advantages of pasta related to likability, nutritional value and potential use in a wide variety of entrees and side dishes, pasta and more specifically, whole wheat pasta is currently underrepresented in school meals.

Whole wheat pasta was first introduced into the school meals program through the USDA commodity program during the 2008-2009 school year (U.S.D.A. Food and Nutrition Service, 2008). Few districts (< 25%) obtained the whole wheat pasta and preferred to allocate funds to higher priced commodity items including fruits, vegetables or entrees (Rosen et al., 2011). This led to the procurement of pasta through local purveyors with a subsequent purchase of refined products due to a lack of availability of whole grain pasta (Rosen et al., 2011).

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The limited availability of pasta in school meals suggests challenges to overcome in serving whole grain pasta for school meals. There is much opportunity to increase whole grain intake of school children through the inclusion of whole grain pasta in grain-based entrees and side dishes. Grains must meet the "whole grain rich" definition for which FDA does not currently have a standard label for the whole grain content of foods. Therefore USDA requires meeting one of the temporary following criteria: whole grains per serving must be ≥ 8 grams, product includes FDA's whole grain health claim or first ingredient is whole grain (HUSSC criteria)(Nutrition Standards in the National School Lunch and School Breakfast Programs, 2012). Given the low moisture content of pasta, the "whole grain rich" serving can be met without having to be 51% of the total flour as whole grain flour, similar to various ready to eat cereals. These partial whole grain pasta products could offer a unique opportunity to dramatically increase whole grain intake in schools without compromising food quality, taste and consumption.

The purpose of this study was to identify challenges, opportunities and benefits associated with the introduction and use of refined and whole grain pasta in the National School Lunch program though a nationally represented sample of school foodservice directors.

METHODS

Study Development and Survey Design

Survey items were developed based on initial interviews and focus groups conducted with managers and foodservice directors related to purchasing, perceptions, and service of whole grain pasta in school settings (Rosen et al., 2011). The survey was broadened to include questions regarding refined grain pasta as interviews and focus group results indicated foodservice personnel had little to no experience with whole grain pasta in most schools.

The survey included questions about demographic characteristics, factors affecting purchase, service and perceptions of pasta use in schools. Demographic questions included foodservice occupation, school district size, percentage free and reduced meals, location, and registered dietitian status. To assess purchasing a series of questions were asked about types (shapes) of pasta purchased (refined and whole grain), brand names and manufacturers. Four items further investigated general pasta procurement (scaled from 1-5 where 1 = strongly disagree and 5 = strongly agree) while additional questions asked about commodity products (4 questions) and a specific national brand (3 questions).

Several items were used to determine the perceptions of pasta in school foodservice by foodservice directors. School foodservice directors (SFD) were asked to rate pasta in terms of importance to the overall meal (ranked from 1-10 where 1 = lowest and 10 = highest) corresponding benefits (9 items) and barriers (7 items). Use of pasta in school meals was investigated (7 items scaled from 1 to 6 where 1 = not at all important and 6 = very important). Questions were asked about methods used by SFD to identify (7 items) and determine the amount of whole grain (2 items) included in the pasta. To investigate an ideal whole grain pasta, 12 items were included ranging from physical characteristics like shape, appearance, and taste to fortification and packaging (scaled from 1 to 6 where 1 = not at all important and 6 = very important). Frequency of pasta use by school level (elementary, middle and high), menu option (entrée or side dish) and preparation as being labor intensive (scaled from 1 to 6 where 1 = not at all important and 6 = very important) was asked.

Frequency and means of purchasing practices, perceptions and serving pasta were determined. Scores were computed by summing the responses across the items that comprised the procurement categories as well as availability of pasta products, brands and manufacturers. The pilot survey was administered and pre-tested with a convenience sample of SFD (n = 6) to assess clarity and comprehensiveness of items. Revisions were made as needed.

Participants

The survey was emailed in January 2010 to pre-registered participants from the Annual Nutrition Conference (ANC) for the School Nutrition Association (SNA). Approximately two weeks later a second survey was emailed to non-responders. For completing the survey, respondents were entered into a raffle drawing for $50 Visa gift cards (n = 2) or a netbook (value $300). There were 707 valid email addresses of which 320 surveys were completed, resulting in an overall response rate of 45%. However, only surveys with respondents indicating Foodservice Director for their primary or most recent position were used for analysis (n = 237). The study was approved by the University of Minnesota Institutional Review Board with passive consent procedures.

Statistical Analysis

Survey data were analyzed with SAS version 9.2 (2008, SAS Inc, Cary, NC). Frequency distributions were generated. Nonparametric Kruskal-Wallis tests were used to determine differences in mean values for ordered categorical variables by region. Differences with $P < 0.05$ were accepted as statistically significant.

RESULTS AND DISCUSSION

Survey respondents indicating Foodservice Director (FSD) as their current or most recent position were included in the analysis (n = 237). Five surveys were discarded due to >85% incomplete because <15% had been completed.

Geographical distribution included: Midwest (30%), South (34%), West (17%) and Northeast (19%). The majority (>92%) of FSDs indicated that all schools in their district participated in the National School Lunch Program however, the school level mostly likely not to participate was high school. Sixty percent of FSDs stated enrollment was less than 10,000 students while the percentage of free and reduced meals was highly diversified with the majority (70%) ranging from 10 to 60%. Over half of FSDs indicated that the method most often used to plan menus was food based planning over the nutrient standard menu planning. Less than 20% of respondents indicated they were dietitians.

Refined pasta was served much more frequently in schools than the whole grain counterpart (Figure 1). FSDs indicated refined pasta types were served on average three times more than the whole grain pasta equivalent (mean 4.9 ± 2.8, 1.5 ± 1.6, respectively). The top ranking pasta shapes (spaghetti, macaroni, and rotini) did not differ by type (refined vs. whole grain). The pasta shapes ranked in this study are similar to those served in restaurants where spaghetti continues to be the most popular refined-grain pasta shape followed by penne and macaroni ("Mintel Menu Insights Weekly Top 10," 2011).

Pasta brands and Manufacturers were mentioned by 66% (n = 159) of FSDs. Although commodity (USDA) pasta was mentioned most frequently, 38% of FSDs reported not using commodity pasta. A majority (76%) reported they would rather spend commodity dollars on food items other than pasta. Most FSDs agreed or strongly agreed that brands of pasta purchased depended on cost (74%), pasta being included as an option from commodity products (62%), belonging to a buying group or alliance (56%), and the broker/vendor (52%).

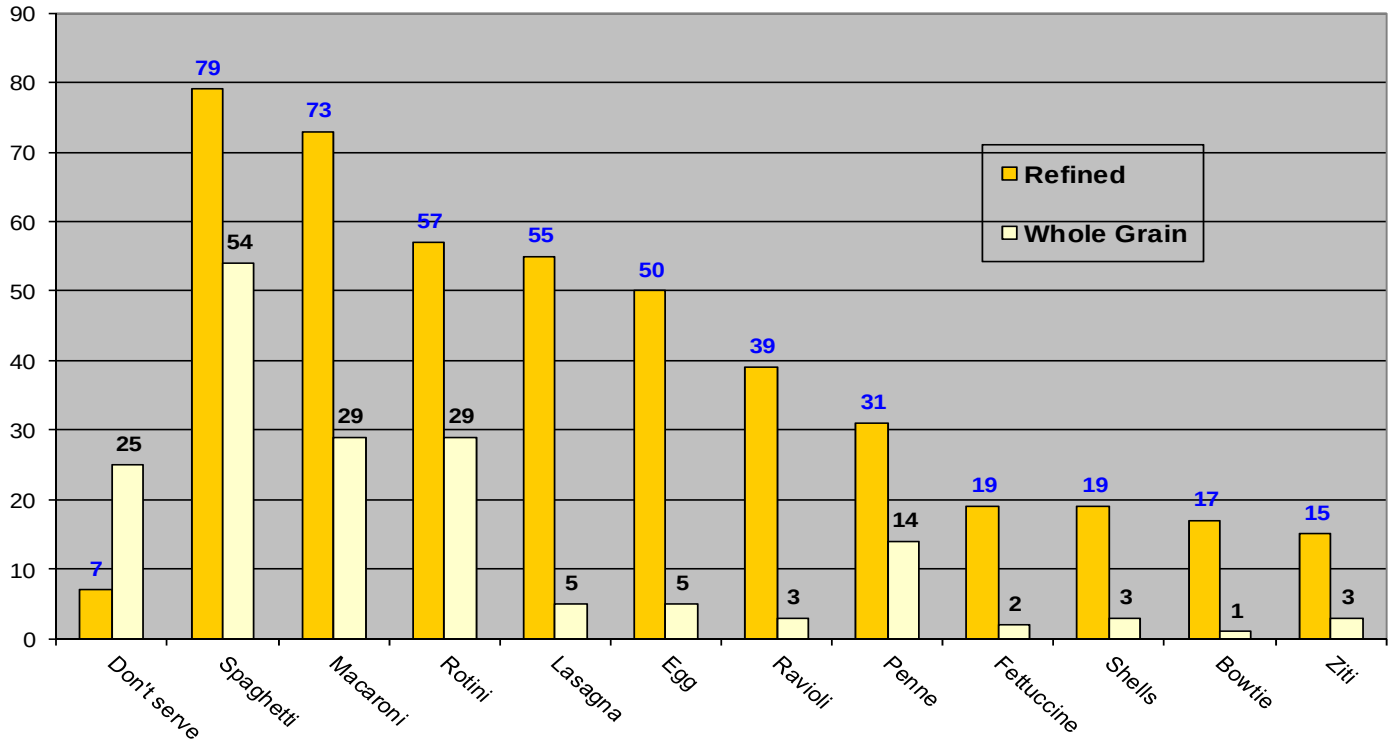

Figure 1: Pasta types served by foodservice directors

In order to understand the importance of pasta as part of the school meal, FSDs rated pasta on a scale of 1 to 10. Overall pasta was rated relatively high (mean = 6.65) as demonstrated by the following positive attributes: affordable, satisfying / filling meal, versatile, high student meal count and well-liked food (Table 1). To assess the difference between the advantages and disadvantages related to the importance of pasta, scores were calculated for each. Scores related to advantages to serving pasta remained fairly positive for all geographical regions while the disadvantage to serving pasta were less frequently reported and similar between regions (Table 1).

To elicit knowledge specifically about whole grain pasta, FSDs were asked if the content of whole grain was known when whole grain pasta products were ordered and if product identification/verification methods were used. Only two-thirds of FSDs answered these questions while slightly over half of respondents indicated that the grams and percentage of whole grain was known (60% and 63%, respectively). The preferred way to verify a whole grain product was to read the labels (first ingredient was whole grain) or other markings such as stamps or claims. A low response rate to these whole grain identification/verification knowledge questions suggests that this aspect of purchasing may be confusing to school nutrition professionals (Chan, Hesse, Reicks, & Marquart, 2009; Hesse, Braun, Dostal, Jeffery, & Marquart, 2009).

The ideal whole grain pasta, as reported by FSDs included an appearance (5.0 ± 1.1), taste (5.0 ± 1.1), and similar texture (4.9 ± 1.2) to the refined counterpart. Manufacturers have been working on these sensory aspects of whole grain pasta addressing the darker color and grainier texture of traditional whole grain pasta by making pasta with various levels and types of flour, such as finely ground white whole wheat flour, which closely matches traditional pasta in color, texture and acceptance by children (Chan, Marquart, & Burgess -Champoux, 2005). Fortifying pasta with fiber and calcium ranked relatively high (range 4.4 ± 1.2 to 4.6 ± 1.1) while protein fortification was not quite as popular (4.0 ± 1.5). Having the appropriate foodservice packaging (4.5 ± 1.3) appeared to be important to FSDs while incorporating other whole grains (4.1 ± 1.4) and lowering the cost of a pre-cooked option (4.0 ± 1.6) were moderately favorable. FSDs reported shape and additional flavor or color (3.9 ±1.5 and 3.4 ± 1.5 respectively) as least important for an ideal pasta product.

Despite many positive comments by FSDs pasta was served rather infrequently during school meals. Pasta was served every other week or monthly in elementary schools (61%), and on a daily or weekly basis in middle (54%) and high (59%) schools. Regardless of grade level, pasta appeared more frequently as a main entrée (92% to 96%) than as a side item (68% to 74%). The School Nutrition Dietary Assessment (SNDA) report indicated similar results where pasta only appeared in 4% of all school menus with the highest frequency in high schools (Condon et al., 2009). Challenges to increasing pasta use in schools includes competition with popular and less labor intensive items (e.g. burgers or pizza), constraints in kitchen and/or cafeteria facilities, and lack of appropriate equipment (Rosen et al., 2011). FSDs reported that labor had little influence on the service of pasta in school meals (2.8 ± 1.7). However, the managers may indirectly, through verbal or non-verbal information, influence the director's decision to purchase and serve pasta (Rosen et al., 2011).

Limitations of this study included a relatively low response rate and skipped questions, which might indicate some response bias. No information was available from survey non-respondents, further limiting our ability to generalize our findings to a broader group of FSD. However, the response rate (40%) was within the range of 30% to 50% observed for other published survey results from food and nutrition professionals (Gilmore, Maillet, & Mitchell, 1997; Rogers, 2003). Despite having a low response rate respondents included a national sample of FSD that reflects pasta use in schools.

Table 1: Advantages and Disadvantages Related to Pasta Served in Schools

	Response percentage (n)	Overall Mean ± SD	West[a] (n = 42) Mean ± SD	Midwest[b] (n = 70) Mean ± SD	South[c] (n = 79) Mean ± SD	Northeast[d] (n = 44) Mean ± SD	Kruskal Wallis p-value
Pasta rating score	97% (235)	6.7 ± 1.8	6.2 ± 1.8	6.7 ± 1.7	6.3 ± 1.8	7.3 ± 1.8	0.005
Advantages*							
Affordable	70 (166)						
Satisfying/ filling	62 (145)						
Versatile	60 (141)						
High count / well liked	57 (135)						
Comfort food	49 (115)	4.6 ± 2.4	4.2 ± 2.4	5.0 ± 2.3	4.2 ± 2.5	5.3 ± 2.3	0.028
Nutritious	49 (115)						
Sub to rice /potato	43 (102)						
Low in fat	43 (100)						
Adds fiber	40 (94)						
Disadvantage**							
Allergies	2 (4)						
Whole grain not available	3 (7)						
Consistency varies with product	12 (28)						
Labor intensive	13 (31)	1.0 ± 1.1	1.1 ± 1.1	1.0 ± 1.1	1.0 ± 1.1	1.0 ± 1.1	0.94
Consistency varies with cooking	14 (34)						
Competes with other entrée items	26 (61)						
Important as other meal components	33 (77)						

[a]AK, HI, WA, OR, CA, NV, ID, UT, AZ, MT, WY
[b]ND, SD, NE, KS, MN, IA, MO, WI, IL, MI, IN
[c]TX, OK, AR, LA, MS, TN, KY, AL, GA, FL, SC, NC
[d]PA, NJ, NY, CT, RI, MA, NH, VT, ME
Scale scores were computed by summing the response for each participant across the advantages (*Scale 0 to 9) and disadvantages (**Scale 0 to 7).

CONCLUSION AND APPLICATIONS (for both industry and education)

With the new school nutrition regulations, whole grain pasta can make a significant contribution to overall whole grain and fiber intake as well as help meet other dietary recommendations, such as increasing vegetables and decreasing sodium through recipe formulation. Pasta is versatile from a food formulation and nutritional perspective because various milled grains as well as dried vegetable and bean flours may serve as pasta ingredients. When looking at other common grain foods served in schools, most contribute similar nutrients and calories. For example, rice, a whole food rather than an ingredient, cannot be significantly changed unless genetically modified like golden rice (Enserink, 2008; Huang, Hu, Rozelle, & Pray, 2005). Pasta offers more grain density, and may allow for lower proportionate levels of whole wheat ingredient to reach 8gms/serving or meet the "whole grain rich" without having to be 51% whole grain flour such as in some bread items. However, pasta made with 51% whole wheat would provide at least 2.5 times more fiber than 51% whole wheat bread. Pasta can be a healthy low-cost food option for schools through the use of versatile ingredients and serve as a delivery vehicle to meet other dietary recommendations through smart ingredient selection and recipe development.

Whole grain pasta is an adaptable food that combines well with vegetables, legumes and low fat dairy in both main and side dish applications. Combining other plant-based foods with whole grain pasta will help familiarize children with a variety of textures and flavors and may increase their desire to eat more foods that are consistent with the Dietary Guidelines for Americans (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2010). New or slightly altered traditional recipes need to be kid-friendly in appearance, taste and texture but even small changes possess great potential to increase the inclusion of whole grains, vegetables, and legumes on school menus and their consumption by children. Similar clandestine methods have been investigated with children and adults using whole grains (Rosen et al., 2008) as well as vegetables (Blatt, Roe, & Rolls, 2011).

When it comes to reducing added salt or solid fat and added sugar, whole grain pasta may serve as a vehicle to help meet both school nutrition requirements and taste expectations of children. This could be addressed through kitchen preparation (type and amount of oils/ butter, salt, sugars), various toppings, lower in fat and calories (e.g. cheeses sauces, meats, etc), and standardized serving sizes. This will require cooperation of manufacturers and distributors for appropriate pasta products and accompanying ingredients for successful kitchen preparation of more healthful pasta dishes.

Innovative solutions from various stakeholders may overcome barriers and provide unique opportunities for increasing whole grain pasta in school meals (Table 2). One approach is to link product developers with school foodservice personnel, with the intention of designing whole grain pasta products that accommodate cost, labor, equipment, preparation and service challenges associated with the service of quality whole grain pasta in school kitchen and cafeteria

Table 2: Benefits and opportunities for stakeholders when whole wheat or whole grain pasta is increased in the school environment

Stake holder	Opportunities	Benefits
Government	• Incorporate whole wheat or whole grain • Incorporate more vegetables • Collaborative efforts with stake holders	• Help children meet dietary guidelines • Standardized whole grain pasta products and labeling

Manufacturers	• Work more closely with SFD on what is needed related to pasta products characteristics
	  • Make products with ↓cooking time
	  • Whole grain/whole wheat products similar to refined
	  • Appropriate packaging
	• Create items that are "kitchen/environmental" friendly
	• Create new pasta items that are finger foods
		• Increased demand for whole grain/whole wheat products
		• Taste profile expanded to home environment
		• Ability to gradually incorporate and be able to change product to meet various guideline

Distributors	• Increased demand for certain whole grain/wheat pasta products to meet school requirements	• Less slots for slow moving products • Longer product contracts with manufacturers & schools • Fewer special orders for schools

SFD	• Collaboration with
	  • Manufacturers
	  • Chefs
	• Introduce new foods/vegetables
	• Incorporate new whole grains
		• Using pasta can help meet all food group requirement
		• Using pasta can increase familiarity, acceptance and consumption of new foods & vegetables

Managers/cooks	• Innovative way to make pasta • Use other equipment to cook (e.g. fryers) • Decreased labor time with pasta combination products	• Make it "environmental" friendly • May cut back on other prep work if main entrée incorporates many food categories
Children	• Condition taste preferences for a natural transition • Familiarize children to new foods/vegetables	• Decrease obesity by increasing familiarity and consumption of whole grains and vegetables

environments. Positive deviance—which is based on the observation that in every community there are certain individuals or groups (the positive deviants), whose uncommon but successful behaviors or strategies enable them to find better solutions to a problem than their peers. These individuals or groups have access to similar resources and face some of the same challenges and obstacles as their peers, but somehow they figure out a process to make things work. This may be one method that might be valuable in examining those schools that successfully procure, prepare and serve whole grain foods that children will eat (Pascale, Sternin, & Sternin, 2010).

To meet the new 'whole grain rich' requirement several recommendations can be gleaned from this research: development of new whole grain pasta products should be similar in texture, taste and color to the refined pasta currently served in schools. A gradual approach, where substitution of relatively low levels of various whole grain flours in pasta products, may be an effective method to increase whole grain consumption among school children. This gradual approach has been shown to be successful in schools with products including buns, rolls (Rosen et al., 2008) and snacks (Sadeghi & Marquart, 2010).

These new products will involve an increased level of communication across several sectors of the school supply chain, eliciting the cooperation among foodservice personnel, chefs, product developers to develop pasta products for recipe development overcoming challenges of issues related to convenience and taste.

Despite the many benefits of pasta, there are some challenges to include pasta as frequently as other entrees and side dishes in school menus. In addition to making products, foodservice directors need to overcome the barriers related to the incorporation of whole grain pasta into the school foodservice menus related to availability and cost. Lastly, research needs to be conducted in school facilities (kitchens) to examine preparation, holding and servicing of pasta products. Schools that are already successfully incorporating more whole grain pasta into school meals need to be used as models. The new whole grain rich requirement for all grain products including pasta can be more readily achieved by schools through collaborative efforts within the entire school supply chain from growers to consumers.

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