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The Future of Registered Dietitian Nutritionists in Foodservice Management: Millennial Students' Career Motivations and Aspirations

Food and nutrition management is the fastest growing non-clinical sector of dietetics. Existing research suggests little awareness among dietetic students of careers in this sector. The purpose of this qualitative study was to investigate career motivations and aspirations of millennial dietetic students. Four focus groups of dietetic students were conducted at two universities and analyzed using the constant comparative method. Six themes emerged: anticipated career path, factors driving career decision, appealing and unappealing aspects of foodservice management, image of a foodservice RDN, and ideas to elevate awareness. Educators and industry professionals may use these findings to recruit dietetic students into foodservice management careers.

Plate Waste in the National School Lunch Program: Root Cause Analysis, Review, and Educational Implications

Plate waste is a significant financial burden on a resource-limited National School Lunch Program (NSLP). Pilot programs and case studies have identified interventions that can reduce waste; however, the problem persists on a national scale. The purpose of this paper is to explore use of a new method of inquiry in addressing a long-standing problem, Root Cause Analysis (RCA). RCA was used to identify major factors causing NSLP plate waste. We review efforts made thus far in combating plate waste in NSLP and offer additional ideas for study. Educators can use this approach in teaching other concepts in foodservice management.

Research Contribution

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DIETETICS STUDENT-OPERATED RESTAURANT: THE CUSTOMER EXPERIENCE AND PERSPECTIVE

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ABSTRACT
Student-operated restaurants (SORs) can be an integral part of dietetics education and the customer experience is crucial to the success of these operations. No known previous research has explored SORs sponsored by dietetics programs. An electronic survey was used to explore factors that encouraged or discouraged customers from dining at the SOR as well as their choice of on-campus restaurants. "Healthy choices" and "speed of service" influenced dining selection on campus. "Food quality" and "nutritional value" encouraged, while "times open" and "waiting in line" discouraged patronage. Significant differences in factors that encourage dining were discovered between age groups, students and staff, and single or married customers.

Keywords: dietetics education, foodservice management, student-operated restaurant, management education

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INTRODUCTION

Student-Operated Restaurants

Student-Operated Restaurants (SORs, alternatively called Student-Run Restaurants) facilitate experiential learning for students planning to enter the food and nutrition industries. SORs are described as on-campus restaurants in which students prepare and serve meals (Josiam, Foster, Malave, & Baldwin, 2014) and learn quantity food production and service principles (Neis, 1993). Nies (1993) surveyed four-year hospitality management program directors to identify how many programs utilized SORs and to determine how SORs were used for instruction. Nies (1993) found that nearly half (n=38) of responding programs reported the use of SORs. Furthermore, programs with SORs most frequently housed the restaurant in the same building as the academic program (n=22), had a seating capacity of 51-100 customers (n=22), and had varied days of operation for lunch service (Neis, 1993). Though dated, this is the only known national study investigating SORs and is specific to the hospitality management curriculum.

More recently, Josiam et al. (2014) assessed the quality of food, service, and the customer experience at one SOR affiliated with a hospitality management program. They found that customers considered the food, service, and overall experience to be of good quality. The most significant barriers to increased patronage for the customers surveyed were: convenience, parking, and payment methods. Josiam et al. (2014) also found that customer perceptions differed among gender, age, user frequency, and patron type (mature vs. young). Responding customers were interested in improved menu variety, portion size, service time, and payment options. Josiam et al. (2014) did not investigate the customers' interest in and concern for nutrition of food served.

Dietetics Education and Standards

Dietetics is a multi-faceted profession integrating "principles from food, nutrition, social, business, and basic sciences to achieve and maintain optimal nutrition status of individuals and groups" (Academy of Nutrition and Dietetics, 2017, p. 17). The SOR can be an intersection of many of those principles for dietetics students as they experience quantity food production (including food science principles), interact with peers to accomplish time-sensitive tasks, engage with customers, and assure the SOR meets its business objectives. There is certainly a place for the consideration of nutrition principles in the context of quantity food production as menus are developed and customer preferences are assessed.

The Accreditation Council for Education in Nutrition and Dietetics (ACEND) regularly releases education standards that must be met by dietetics education programs. The 2017 ACEND accreditation standards indicate that the curriculum of Didactic Programs in Dietetics and Coordinated Programs in Dietetics must include "food science and food systems, environmental sustainability, techniques of food preparation and development and modification and evaluation of recipes, menus and food products acceptable to diverse populations" (pg. 9). Additionally, the ACEND accreditation standards include a variety of knowledge requirements that could be potentially met in the SOR environment and through associated coursework. To date, there is no known research regarding SORs sponsored by dietetics education programs.

Student-Operated Restaurant Characteristics

The customer experiences at and perspectives of a dietetics-sponsored SOR at a large private university in the mountain west were explored in this study. This SOR serves lunch four days per week (Monday through Thursday) and is open nine weeks per semester. At the time of the study in 2017, there was an average of 135 customers per day and the average check price was approximately $6.78. The SOR experience is currently a three credit hour course for two lab groups of 9-10 junior dietetics students (Monday/Wednesday, and Tuesday/Thursday) and the lab hours are 9:00 AM – 1:30 PM. In the fall semester, two sets of four dietetic interns rotate through the SOR and complete specific management functions as part of their supervised practice experience. Two part-time dietetics faculty members share the management of the SOR in addition to instructing the laboratory experience and complementary coursework. Furthermore, the SOR has several part-time paid student positions: two undergraduate teaching assistants, one cashier, four dishwashers, and one night-cleaner.

The SOR has a fast casual service model with a rotating menu allowing customers to choose from a la carte options such as the main entrée,

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sandwich, entrée salad, soup, taco salad, bread, cookie, and dessert. Customers place selected items on a tray, pay the cashier, and seat themselves in the dining room. When finished, they place their tray and dishes on a cart that is then taken to the dish room by student workers. Finally, the SOR has a reward system that allows customers to earn either a free cookie, drink or fruit salad after five meals are purchased, or they can wait until they have purchased ten meals and receive a free entrée.

At the time of this study, there was no known research regarding the customer experience at SORs sponsored by dietetics education programs. Therefore, the purpose of this study was to explore customer perspectives and experiences at a dietetics sponsored SOR at one university in the mountain west. The specific objectives of this study were to: (1) identify factors that most encouraged or discouraged patronage at the SOR and influenced customer choice of on-campus restaurants, and (2) gather customer feedback about the quality of their experience at the SOR.

METHODS

Questionnaire Development

An electronic survey instrument was developed and administered using Qualtrics (Provo, UT) survey software. Relevant literature related to the customer experience at a SOR served as a reference during survey development and some items (motivators and barriers to patronage as well as rating the quality of the customer experience) were modeled after items from a previous survey (Josiam et. al, 2014). To ensure content validity two experts in the area of SORs, foodservice management, and dietetics education reviewed the instrument and provided specific feedback. Feedback included suggestions to reword (e.g.,"fruit salad" to "fresh fruit" and combining juice, milk, soda, into "beverages") and re-order certain items (e.g., list of menu items was re-ordered based on popularity of items) and those revisions were made to the instrument accordingly. Face validity of the instrument was verified through a pilot test conducted according to guidelines outlined by Dillman, Smyth, and Christian (2009). A group of 13 undergraduate dietetics students and four dietetics faculty (all of whom had eaten at the SOR) completed the questionnaire and responded to additional questions regarding instrument readability, overall survey organization, and the type of device used to complete the survey. Pilot test participants did not suggest any revisions be made to the instrument.

Questionnaire Content

The final survey instrument addressed several topics associated with the customer experience at the SOR (Table 1). Specifically, it included the following: two items regarding frequency of dining, 17 items addressing what factors encourage or discourage customers from dining at the SOR (-5 to -1=discourage, 0=neutral, 1 to 5=encourage), 10 items exploring relevant factors in choosing where to dine on campus (1=not at all important, 5=extremely important), one item asking with whom customers typically dine at the SOR, one item investigating where customers eat when not dining at the SOR, four items regarding the quality of the customer experience (1= terrible, 5=excellent), one item identifying what customers typically ordered at the SOR, two items exploring customers' understanding of the SOR's affiliation to the dietetics program, two items regarding marketing of the SOR, five items addressing participant demographics, and one open-ended question inviting participants to share what they most liked or disliked about the SOR experience. To determine the internal reliability of the measurement scales, Cronbach's Alpha was calculated. Each scale was found to have internal reliability as shown with the following Cronbach's Alpha scores: encourage or discourage (α=0.824, n=17), deciding where to dine (α=0.801, n=10), and quality (α=0.793, n=4) (George & Mallery, 2003 [as cited in Gliem & Gliem, 2003]). The inital view of the survey instrument presented a modified informed consent statement specifiying that completion of the survey indicated agreement to participate. The institutional review board at the host university approved this study prior to data collection.

Recruitment and Distribution

The sample consisted of SOR customers at a large private university in the mountain west who had consented to include their email address on the SOR customer email list (N=5,817). An email was sent to participants through the SOR customer email list which invited them to participate in the study and provided a hyperlink and QR code to the survey. The survey was active for two weeks in April 2017 and a reminder email was sent to participants who had not taken the survey after one week.

Data Analysis

Data was analyzed using statistical software package (SPSS 24, 2016). Descriptive statistics including frequencies, means, modes, and standard deviations were calculated and used to assess the distribution of the data. Means for scaled items (items that encourage/discourage, importance of factors regarding where to dine, and quality) were calculated and used to identify factors most commonly selected by participants. ANOVA was used to identify significant differences between mean scores for factors that encourage or discourage patronage based on demographic characteristics. Three researchers reviewed open-ended responses, identified key themes, and coded open-ended responses accordingly. The codes were counted and reported within each theme.

RESULTS AND DISCUSSION

Demographics

There were a total of 418 responses to the survey, however, responses from customers no longer on campus and incomplete surveys were removed resulting in 379 usable responses (6.5% response rate). Due to the nature of the contact list, there were multiple contacts presumed to be duplicates, no longer utilized, or of people who are no longer affiliated with the university which is likely reflected in the response rate. Response rates in other recent dietetics-focused surveys have ranged from 9-15% (Howells, Sauer, & Shanklin, 2016; Manore et al., 2016; Wynn et al., 2016; Patten & Sauer, 2017).

Table 1: Topics, Number of Items, and Cronbach's Alpha Scores for the Questionnaire

Questionnaire Topic	# of Items	Cronbach's Alpha
Frequency of dining	2	
Factors that encourage/discourage customer from dining	17	α =0.824
Relevant factors in choosing where to dine on campus	10	α =0.801
With whom customers typically dine at the SOR	1	
Where customers eat when not dining at the SOR	1	
Quality of the customer experience	4	α=0.793
What customers typically ordered at the SOR	1	
Customers' understanding of the SOR's affiliation to the dietetics program	2	
Marketing of the SOR	2	
Participant demographics	5	
Open-ended question inviting participants to share what they most liked or disliked about the SOR experience	1	

The majority of participants was female (65.4%, n=248). Nearly half were between the ages of 19-25 (48.0%, n=182) and 30.1% were over 46 years old (n=114). Participants were primarily undergraduate students (50.1%, n=190) or staff, faculty, or administration (39.3%, n=149). Approximately half (46.7%, n=177) were married, and more than one-third had an annual income less than $24,999 per year (n=144).

Participants most commonly dined at the SOR 2-3 times per semester (29.9 %, n=113) or once per semester (26.2%, n=99); they typically dined with friends (53.6%, n=203), by themselves (47.0%, n=178), or with university colleagues (31.7%, n=120). When not dining at the SOR the majority of participants packed a lunch from home (63.1%, n=239) and only 15.3% (n=58) chose to dine at another on-campus restaurant. This was notable to researchers as it was assumed other on-campus options would be the greatest competition to SOR patronage.

Factors Influencing Customer Patronage of SORs

Participants rated to what extent a list of 17 factors encouraged or discouraged their choice to dine at the SOR using the following scale: -5 to -1=discourage, 0=neutral, 1 to 5=encourage (Table 2). The factors receiving the highest mean rating for encouraging/ discouraging participants to dine at the SOR were "quality of food" (3.36 ± 1.55), "nutritional value" (2.73 ± 1.70), "location" (2.59 ± 2.24), and "cleanliness" (2.59 ± 1.73). The factors that received the lowest mean rating were "work/class schedules" (0.71 ± 2.51), "weeks open" (0.27 ± 2.04), "hours open" (-0.02 ± 2.30), and "parking access" (-0.20 ± 1.30). Although "parking access" had the lowest mean score of all factors, only 12.7% of participants rated it in the "discourage" range while 82.6% rated it in the "neutral" range. "Hours open" (47.2%, n=179), "weeks open" (34.8%, n=132), "waiting in line" (30.3%, n=115), and "work/class schedules" (29.0%, n=110) had the highest percentages of participants who indicated that those factors "discouraged" dining at the SOR. Eleven of the 17 items had a mode of zero indicating that participants commonly had a neutral opinion to many factors. When surveying students about on campus dining services (non-SOR), Nee Ng (2005) also found convenience of parking to be an issue. Josiam et al. (2014) found that the greatest barriers to patronage at their university's SOR were "convenience," "parking," and "credit card/payment methods." Only concerns with parking overlapped as a leading barrier or factor that discouraged patronage between the present study and Josiam et al (2014) and in fact, payment options were considered primarily an encouraging factor for participants in the present study.

Differences in Encourage/Discourage Based on Demographic Factors

When comparing for differences between mean scores for factors that encourage/discourage patronage, significant differences were identified based on age, student status, and marital status (Table 2). For all three of these factors, there were significant differences in encouragement (mean scores) for the hours that the SOR was open and for the reward system. The hours that the SOR was open encouraged customers aged 46 and up more than those 18-25 ($p<0.000$); staff, faculty, and administrators more than students ($p<0.000$), and married customers more than single customers ($p<0.000$). In terms of the reward system used at the SOR – it encouraged customers aged 18-25 more than those 46 and up ($p=0.001$); students more than faculty, staff, and administrators ($p<0.000$); and single customers more than married customers ($p=0.002$). The nutritional value of menu items also encouraged customers aged 18-25 more than those 26-45 ($p=0.006$). Comparisons with other demographic variables were explored, however, they were not statistically significant. These results may reflect the life stages and financial situation of SOR customers. Most customers who are aged 46 and up are likely to be staff, faculty, or administrators and, therefore, may be more likely to be on campus and/or have a lunch break during the hours of SOR operation. The reward system may be most attractive to students with less disposable income and who are more familiar with the technology used (QR codes) to facilitate the reward system.

Factors Influencing Customer Choice of Where to Dine on Campus

Participants were asked to rate the importance of 10 factors that potentially influence their choice of where to dine on campus (1=not at all important, 5=extremely important; Table 3). The three factors that received the highest mean score of importance were "healthy choices" (4.03 ± 0.90) "speed of service" (3.98 ± 0.81), and "atmosphere" (2.97 ± 0.95). The factors with the lowest mean score of importance were: "labeled with allergy information" (1.97 ± 1.20), and "food allergy accommodations" (1.94 ± 1.22), and "vegetarian/ vegan options" (1.76 ± 1.13). The low importance of food allergy information labeling and accommodations may be an artifact of the sample size of this study and because those unaffected by food allergies are less likely to make dining choices based on these features. Food allergies are a serious and growing concern with prevalence in the general population being 4% of adults and 5% of children (National Institute of Allergy and Infectious Disease [NAID], 2017) and SORs should continue to monitor patrons' preferences and needs.

Student-Operated Restaurants and Nutrition

Most participants (77.6%, n=294) were aware the SOR was run by dietetics students as part of their major and believed that because of this, foods served at the SOR should "definitely" (41.2%, n=156) or "probably" (45.4%, n=172) meet specific nutritional guidelines. "Healthy choices" was rated as the most important factor amongst participants for choosing where to dine on-campus, but having the "food labeled with nutrition information" was rated as only slightly important. Additionally, nutritional value was as the second highest encouraging factor for dining at the SOR. Perhaps this information can support dietetics-sponsored SORs in showcasing and synthesizing dietetics students' nutrition *and* foodservice skills. Another study investigated customer satisfaction at a university food court service in Oklahoma and the authors encouraged management to attend to several attributes including the nutrition of the food to improve satisfaction (Kim, Moreo, & Yeh, 2006). Other research has identified environmental factors such as high cost of healthy foods, lack of tasty healthier foods, and the abundance of high-fat and calorie-rich choices as being barriers for university students to make healthy eating choices on-campus (Mongiello, Freduenberg, & Spark, 2015). Further, a national study assessed the dining environments on and near 15 university campuses throughout the USA and concluded that campus environments provide little support for eating healthy (Horacek et al., 2012). There is an opportunity for dietetics-sponsored SORs to model healthy eating environments at universities.

Quality of SOR

Participants were asked to rate the quality of food, quality of service, value for price, and overall experience of the SOR (1=terrible, 5=excellent; data not shown). Quality of food received the highest mean at 4.52 (SD= 0.58), followed by quality of service (4.43, SD=0.61), overall experience (4.32, SD=0.61) and value for price (4.12, SD=0.80). The mean of each factor was between "good" and "excellent" on the scale. Josiam et al. (2014) also found that customers indicated the food, service, and overall experience to be of good quality. This seems to indicate that SORs provide a positive customer experience even though they are working with students who are learning the principles and skills associated with quantity food production. Other research investigating on-campus university

Table 2: Differences in Mean Ratings of Factors that Encourage or Discourage Patronage of a Student-operated Restaurant Based on Age, Customer Type, and Marital Status (n=370-379)[a]

Demographic Factors		Age				Customer Type				Marital Status			
		18-25	26-45	46 and up		Student	Staff/Fac/ Admin	Other		Single	Married	Other	
Factors	Overall Mean[b]	Mean[c] ± SD			P-Value[d]	Mean[c] ± SD			P-Value[d]	Mean[c] ± SD			P-Value[d]
Quality of Food	3.36	3.56±1.48	2.82±1.65	3.27±1.57	0.022	3.53±1.49	3.15±1.63	3.00±1.25	0.051	3.51±1.47	3.27±1.64	3.00±1.00	0.203
Nutritional Value	2.73	**3.00±1.67[1]**	**2.20±1.62[2]**	2.58±1.74[1,2]	**0.006***	2.95±1.65	2.43±1.75	2.60±1.55	0.015	2.83±1.69	2.68±1.73	2.11±1.45	0.189
Location	2.59	2.52±1.97	2.38±2.66	2.81±2.42	0.617	2.57±1.93	2.68±2.59	1.93±2.63	0.464	2.69±1.97	2.58±2.40	1.47±2.88	0.081
Cleanliness	2.59	2.52±1.67	2.55±1.68	2.79±1.84	0.132	2.52±1.70	2.65±1.80	3.00±1.51	0.505	2.53±1.66	2.66±1.79	2.42±1.71	0.705
Temp of Food	2.20	2.16±1.80	2.11±1.88	2.33±1.92	0.833	2.16±1.81	2.23±1.90	2.53±1.85	0.738	2.12±1.84	2.37±1.85	1.68±1.50	0.187
Speed of Service	1.78	1.68±1.90	1.54±2.05	2.11±2.01	0.154	1.73±1.92	1.83±2.00	2.00±2.36	0.827	1.67±1.98	1.96±1.97	1.11±1.76	0.117
Price	1.55	1.23±2.60	1.43±2.22	2.15±2.04	0.010	1.23±2.57	1.97±2.15	1.53±1.51	0.015	2.58±2.25	1.36±2.56	1.71±2.24	0.252
Atmosphere	1.54	1.71±1.99	1.26±1.81	1.41±2.02	0.278	1.68±1.97	1.31±1.97	1.73±1.80	0.194	1.60±1.95	1.50±1.97	1.16±2.06	0.615
Reward System	1.48	**1.83±1.85[1]**	1.32±1.65[1,2]	**1.00±1.83[2]**	**0.001***	**1.81±1.77[1]**	**0.98±1.84[2]**	1.73±1.94[1,2]	**<0.000***	**1.81±1.80[1]**	**1.19±1.90[2]**	0.79±1.18[1,2]	**0.002***
Payment Options	1.48	1.53±1.94	1.55±1.86	1.39±1.87	0.503	1.53±1.93	1.32±1.81	2.40±2.10	0.091	1.52±1.98	1.44±1.81	1.11±1.94	0.653
Support Dietetics Program	1.46	1.15±2.11	1.86±2.08	1.78±2.05	0.022	1.21±2.13	1.79±2.04	1.73±1.98	0.033	1.32±2.16	1.55±2.07	1.42±1.77	0.569
Support Dietetics Students	1.36	1.05±2.18	1.75±2.27	1.63±2.22	0.043	1.17±2.21	1.62±2.27	1.40±1.89	0.170	1.22±2.20	1.40±2.28	1.84±1.83	0.462
Waiting in Line	0.77	0.57±2.06	0.72±2.32	1.14±2.15	0.149	0.64±2.10	0.91±2.18	1.13±2.39	0.406	0.54±2.10	1.03±2.20	0.21±1.93	0.055
Work/Class Schedules	0.71	0.71±2.56	0.32±2.57	0.97±2.41	0.345	0.73±2.58	0.65±2.44	1.13±2.26	0.773	0.65±2.44	0.83±2.63	-0.16±2.04	0.253
Weeks Open	0.27	0.17±2.03	0.15±2.14	0.53±2.03	0.476	0.20±1.96	0.37±2.13	0.47±2.39	0.680	0.21±1.90	0.25±2.18	0.53±1.47	0.805
Hours Open	-0.02	**-0.47±2.31[1]**	0.06±2.27[1,2]	**0.70±2.17[2]**	**<0.000***	**-0.048±2.29[1]**	**0.60±2.17[2]**	0.40±2.32[1,2]	**<0.000***	**-0.63±2.15[1]**	**0.45±2.33[2]**	0.32±1.73[1,2]	**<0.000***
Parking Access	-0.20	-0.18±1.25	-0.22±1.63	-0.25±1.19	0.965	-0.23±1.20	-0.20±1.27	0.13±2.53		-0.17±1.30	-0.17±1.29	-0.89±1.56	0.065

[a]The actual number of responses varied due to missing data

[b]Scale for factors that encourage/discourage patronage was: -5 to -1=discourage, 0=neutral, 1 to 5=encourage

[c]Likert-type scale was used as follows: 1= Strongly Disagree, 2= Disagree, 3=Neutral, 4= Agree, 5= Strongly Agree

[d]Results of the analysis of variance (ANOVA) were statistically significant; *(p< .01)

[1,2]Items with differing superscript numbers have significantly different mean scores

Table 3: Factors Influencing Where Customers Choose to Dine On-campus (n=373-378)[a]

Factor	Mean	SD
Healthy Choices	4.03	0.90
Speed of Service	3.98	0.81
Variety of Menu Choices	3.88	0.87
Atmosphere	2.97	0.95
Grab and Go Options	2.79	1.17
Labeled with Nutrition Information	2.58	1.24
Local Foods	2.52	1.20
Labeled with Allergy Information	1.97	1.20
Food Allergy Accommodations	1.94	1.22
Vegetarian/Vegan Options	1.76	1.13

[a] Actual number of responses varied due to missing data

dining (non-SOR) services found that consumers considered "food quality" and "sanitation" to be of high importance whereas "price," "service," and "environment" were all considered low importance (Joung, Lee, Kim & Huffman, 2014). Identifying the target population's perceptions of these attributes can inform the strategic planning of a SOR.

Likes and Dislikes of Customer Experience

Participants were given the opportunity to answer the following open-ended question: "Is there anything you have especially liked or disliked about the [SOR] customer experience?" Nine key themes emerged from analysis of the data (Table 4). Factors that customers liked the most included: food quality and taste (n=95); service (n=28); food variety and menu options (n=26); and price (n=23). Themes from factors most disliked by customers included: hours and days open (n=45); available seating (n=28); food variety and menu options (n=24); price (n=18); and waiting in line (n=17). Josiam et al. (2014) also found that customers were interested in improved menu variety and service time, two of the themes that were also identified by our participants. Price and variety/menu options emerged as both "liked" and "disliked" by participants in this study. This may be due to differences in income and expectations of SOR customers. Although less frequently mentioned, participants indicated they enjoy supporting students by visiting the SOR, and several were concerned about the perceived nutritional quality and information of food served.

CONCLUSIONS AND APPLICATIONS

Understanding the customer experience at a dietetics-sponsored SOR is essential to assuring customer satisfaction and improving management of the operation. Customers at a dietetics-sponsored SOR identified factors that encourage/discourage patronage, factors that influence where they choose to dine on campus, and specific items that they liked or disliked about the SOR customer experience. One of the most encouraging factors for patronage of the SOR was the "nutritional value" of items sold. Aligned with that, participants indicated that "healthy choices" was the most influential factor in deciding where to dine on campus. This warrants further investigation as to what cues customers to consider menu options as "healthy choices" and to identify if there is a gap between customers desiring "healthy choices" and purchasing "healthy choices" in the SOR setting. Dietetics-sponsored SORs have a unique advantage of having students exposed to both nutrition and foodservice didactic work which may help meet these customer needs.

Nutrition of menu options could also be used to better inform marketing practices of an SOR and attract additional patrons. Marketing efforts could also focus on enticing current customers to eat more frequently at the SOR due to the fact that when not dining at the SOR, customers typically eat a lunch from home rather than dining elsewhere on campus.

Table 4: Results from a Thematic Analysis of Open-ended Comments Regarding what Customers Most and Least Liked about Their SOR Experience

Most liked about SOR experience	Illustrative Quotes
Food Quality and Taste (n=95)	"The best food you can get on campus." "I think the food is excellent, well prepared and good tasting."
Service (n=28)	"The cashier is always very friendly, asks me about my day, and remembers who I am. The cooks/ servers inside politely answer any questions I have." "I especially like how careful and thoughtful your workers are--they are determined to serve well and get it right. They are very dedicated to the lab and are awesome!!"
Variety and Menu Options (n=26)	"I loved how the menu was different each week and how there were always multiple meal choices each day." "I really like the menu options; there's lots of variety."
Price (n=23)	"There's nothing like it on campus for the price." "Excellent value."
Most disliked about SOR experience	**Illustrative Quotes**
Hours and Days Open (n=45)	"I wish that it were open during spring and summer semesters, as well as opening earlier in the semester and closing later." "I would like it if the [SOR] was available on Fridays."
Seating (n=28)	"The only problem I had was that there never seemed to be enough seating. The seating area was very small and crowded, and often I felt uncomfortable or rushed while eating." "There is not enough space to sit with a group of people."
Variety and Menu Options (n=24)	"I would appreciate a more diverse menu. Every semester the menus seem the same." "One reason I don't dine more frequently at the [SOR] is because I have dined multiple times with the same entrees in a short period of time. If more new options were available, I would dine more frequently at the [SOR]."
Price (n=18)	"It is a little bit pricey." "I would eat at the [SOR] MUCH more often if it wasn't so expensive."
Waiting in Line (n=17)	"The lines tend to get a little long." "Sometimes the line completely stalls (waiting for food to be cooked, usually). That is frustrating."

A better understanding of the customer base and what encourages or discourages dining could be used to help identify strategies to increase patronage. Significant differences in mean scores for encouragement were identified for the hours the SOR is open and the reward system used based on age, customer type, and marital status. Strategies could include SORs ensuring that their loyalty program is not solely technology based in order to cater to customers of all ages. Promotions could also be developed to target those not regularly dining at the SOR.

Management of this SOR should consider how to maintain the strengths identified by customers and also attend to aspects of the SOR that were disliked. For example, they may choose to investigate opportunities to extend the hours and days the SOR is open each semester. Consideration may be given to extending and/or adjusting the current seating to increase occupancy. Also, "price" and "variety and menu options" emerged as both liked and disliked in this study. The pricing structure and menu could potentially be assessed to assure options exist for the different customers served by this SOR.

Exploring customer perceptions and experiences of dietetics-sponsored SORs using both quantitative and qualitative approaches can help a dietetics program assess its success in meeting customer expectations. Other dietetics-sponsored SORs may model this method for obtaining customer feedback and use findings to educate students about the customer experience and customer satisfaction.

This research has several limitations. Findings from this study may not be generalizable to other SORs due to variances in products, services, and populations served, but the methodology of investigating customer perceptions and experiences is something that could be useful to many programs. The response rate is a limitation of this study, future studies could identify new ways to access the population and assure the contact information is current. Further research should explore the prevalence of dietetics-sponsored SORs and how they are used in the curriculum to meet ACEND education standards. Best practices for teaching dietetics practice principles in SORs should also be identified.

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Research Contribution

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THE FUTURE OF REGISTERED DIETITIAN NUTRITIONISTS IN FOODSERVICE MANAGEMENT: MILLENNIAL STUDENTS' CAREER MOTIVATIONS AND ASPIRATIONS

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ABSTRACT
Food and nutrition management is the fastest growing non-clinical sector of dietetics. Existing research suggests little awareness among dietetic students of careers in this sector. The purpose of this qualitative study was to investigate career motivations and aspirations of millennial dietetic students. Four focus groups of dietetic students were conducted at two universities and analyzed using the constant comparative method. Six themes emerged: anticipated career path, factors driving career decision, appealing and unappealing aspects of foodservice management, image of a foodservice RDN, and ideas to elevate awareness. Educators and industry professionals may use these findings to recruit dietetic students into foodservice management careers.

Keywords: foodservice management, registered dietitian nutritionists, millennial

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INTRODUCTION

Food and nutrition management is the fastest growing non-clinical sector of dietetics and is expected to grow by 35% from 2010 to 2020. Factors driving this trend include an aging population, changes in health care law, the growing prevalence of diet-related conditions, and the growth of the food industry (Hooker, Williams, Papneja, Sen, & Hogan, 2012). At present, an estimated 10% of registered dietitian nutritionists (RDNs) are employed in food and nutrition management (Academy of Nutrition and Dietetics, 2018). These figures likely encompass multiple sectors of management, including foodservice management, clinical nutrition management, or management of community nutrition programs.

Despite employment statistics for RDNs working in this sector, existing research indicates very little awareness of this career path among dietetic students (Holsipple, 1994; Hughes & Desbrow, 2005). In past studies, dietetic students identified areas of interest as health, disease, and health care; teaching and health promotion; sports and fitness; counseling and behavior change; food and cooking; private practice counseling (Markley & Huyck, 1992). Factors influencing students' career paths were interesting work, a secure future, and advancement potential (Holsipple, 1994). Though these aims may be aligned with food and nutrition management, there appears to be little recognition among students that a career in this sector will satisfy these aims.

However, the existing data does not distinguish between foodservice management, clinical nutrition management, or community nutrition management. Also, the existing data is up to two decades old and does not account for the unique career aspirations and motivations of the millennial generation, or those born between 1980 and 1999 that will comprise nearly two decades of the future workforce (National Chamber Foundation, 2012).

Career Aspirations of the Millennial Generation

Current research on the millennial generation suggests that pay is the single most important motivating factor in pursuing a career path (Ng, Schweitzer & Lyons, 2010). Millennials hold high expectations for career advancement, promotions, and pay raises, though oftentimes without the requisite effort (Erickson, 2009).

While pay has been cited as a driving factor, millennials are also seeking careers that are meaningful and satisfying (Yang & Guy, 2006). The social aspect of work is highly valued, which may include collaborative projects, friendships with coworkers, and continuous feedback from supervisors (Ng, Schweitzer & Lyons, 2010). Lastly, work-life balance is highly valued, though personal life may often be prioritized over work (Zhang et al., 2007).

Purpose and Objectives

The purpose of this study was to investigate the career motivations and aspirations of millennial dietetic students. The objectives were to: 1) identify the factors influencing dietetic students' preferred career paths, 2) characterize dietetic students' feelings towards foodservice management as a career path and 3) generate discussion on ways to increase awareness and interest in foodservice management.

METHODS

This grounded theory study is organized and reported according to the American Psychological Association Journal Article Reporting Standards (2018). Institutional review board approval from the researchers' home institution was obtained prior to study initiation.

Data collection involved focus group interviews of three to six participants per group. Focus groups were chosen given that the solicited information was not highly sensitive and that participants were likely to know one another and generate rich dialogue (O'Reilly & Kiyimba, 2015). A total of four focus groups were conducted in the spring semester of 2016 at two private, Midwestern universities with nutrition programs accredited by the Accreditation Council for Education in Nutrition and Dietetics (ACEND, 2018). The focus groups ranged from 60 to 90 minutes with an average of 80 minutes and were conducted in an empty classroom at one of the study sites.

Participants were recruited by email invitation from their respective program directors. Random selection was used when more than six students expressed interest in the study. An online poll was deployed to schedule the focus group interview at a convenient time. Inclusion criteria were that students be 18-32 years of age at the time of data collection and enrolled in a program accredited by ACEND; students that were under 18 years of age, older than 32 years of age, or not

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enrolled in an accredited program were excluded. Verbal consent was obtained prior to participation. Participants received a $50 gift card as remuneration.

The research team consisted of two faculty members at one of the study sites; both had a foodservice and/or culinary nutrition background. Many of the students were known by the faculty members as students or dietetic interns. In order to communicate that participation was not viewed favorably by the faculty members, students were ensured that their interest in the study would in no way affect their academic progress. However, the pre-existing rapport did allow for rich dialogue during the focus group discussions. Several of the participants were unknown to the faculty members at the time of data collection given their home institution or level in the program.

The discussion guide was semi-structured in nature and allowed the interviewer to ask follow-up questions; this invited a degree of reflexivity where the researcher provided more probing questions based on her own experiences. Participants were also encouraged to ask one another follow-up questions if they wished. A series of seven open-ended discussion questions pertained to students' career path, what factors were important in a future career, their views on foodservice management as a career path, and ideas to increase awareness of careers in this sector; see Table 1.

The focus groups were audio recorded, transcribed verbatim to a word document, and analyzed using the constant comparative method (Creswell, 2003). Each researcher utilized inductive open coding by hand with frequency estimates expressed as percentages. The researches jointly grouped the codes into themes and justified each with verbatim quotes. Data were triangulated by recruiting participants from two different institutions and three different education levels: undergraduate bachelors of science, combined masters of science and dietetic internship, and masters of science with an existing RDN credential.

RESULTS AND DISCUSSION

Four focus groups were conducted; each group ranged from three to six participants with an average of five participants per group. Of the 19 focus group participants, 17 (89%) were female and two (11%) male. Regarding program level, nine (47%) were undergraduate students, six (32%) were in a combined masters of science and dietetic internship program, and four (21%) were masters of science students with an existing RDN credential. Most participants had previous foodservice experience in various settings such as a restaurant or bar (68%), during their dietetic internship (47%), a hospital or long-term care facility (26%), K-12 foodservice (21%), university foodservice (16%), children's summer camp (11%), grocery store (11%), hotel (5%), catering company (5%), or sports or athletic facility (5%). See Table 2 for details of the demographic information.

Six major themes emerged from the data analysis. These included: anticipated career path, factors driving career decision, appealing aspects of foodservice management, unappealing aspects of foodservice management, image of a foodservice dietitian, and ideas to elevate awareness.

Career Paths and Driving Factors of Dietetic Students

The first two themes characterized participants' anticipated career paths and the factors driving their decisions; the supporting subthemes are reported in Table 3. The vast majority of participants (79%) anticipated holding multiple jobs throughout their careers, and most (63%) planned to start their careers in clinical dietetics. Reasons to support this subtheme were to "build up that resume," to expand the "breadth of your knowledge" or "gain experience." Other participants cited the perceived ease of securing a clinical dietetics position as their rationale. One student described this as "an easy entrance into the career field."

Participants identified multiple sectors of desired employment, either as their first job or following a tenure in clinical dietetics. These included community dietetics (42%), private practice or entrepreneurship (26%), academia or research (21%), outpatient counseling (16%), sports nutrition (11%), school food (11%), culinary nutrition (11%), foodservice management (11%), maternal nutrition (5%), food media (5%) and global nutrition (5%).

These findings offer a different perspective on dietetic students' career perspectives. Existing research suggests that dietetic students had little knowledge of the profession itself, but generally identified a desire to pursue a career in science, biology, health care, or human health (Brady et al., 2012; Holsipple, 1994; Hughes & Desbrow, 2005; Lordly & MacLellan, 2012). In this study, participants not only identified broad sectors of dietetics (i.e. clinical dietetics, community nutrition, foodservice management), but had visions for more niche career opportunities, such as sports nutrition, culinary nutrition, maternal nutrition, food media, and global nutrition. This suggests awareness of unique career opportunities is increasing among dietetic students.

Next, participants cited multiple factors driving their career decisions. Flexibility was the most commonly cited factor (68%). Participants described this both as flexibility within a job, such as working part-time or "choosing your own hours," as well as flexibility throughout their careers by changing jobs. One participant describe this as "You don't have to be stuck in something. You have options to go somewhere else at any point."

Table 1: Focus Group Discussion Guide Pertaining to Millennial Dietetic Students' Career Aspirations, Career Motivations, and Perceptions of Careers in Foodservice Management.

Question Number	Question
1	In what sector of dietetics do you hope to be employed, and why? General sectors include: clinical dietetics; community dietetics; food and nutrition management; culinary arts; education and research; private practice; entrepreneurship.
2	What factors are most important to you when pursuing a future career?
3	Have you had any experience working in food service management? If so, how would you describe your experience?
4	When you picture a career as a nutrition professional working in food service management, what comes to mind?
5	What do you find appealing about working in food service management as a registered dietitian?
6	What do you find unappealing about working in food service management as a registered dietitian?
7	Research shows very little awareness of careers in food service management among nutrition and dietetics students. Why do you think this is? What do you think can be done to improve awareness of careers in this sector?

Table 2: Demographics and Foodservice Experience of Dietetics Students in Focus Groups. (n=19)

	Frequency	Percentage
Gender		
Female	17	89%
Male	2	11%
Level		
Undergraduate	9	47%
Dietetic Intern	6	32%
Graduate Assistant, with RD	4	21%
Institution		
Saint Louis University	16	84%
Fontbonne University	3	16%
Foodservice experience		
Restaurant/bar	13	68%
Dietetic internship	9	47%
Hospital/long-term care facility	5	26%
K-12 foodservice	4	21%
University foodservice	3	16%
Children's summer camp	2	11%
Grocery store	2	11%
Hotel	1	5%
Catering company	1	5%
Sports/athletic facility	1	5%

The second most commonly cited factor was making a difference or helping others (47%). This was described as "feeling like I would make an impact in some way" or simply "helping others." One participant described, "I wanted a job where I felt like I actually felt like I had a purpose and I was making a difference."

Other factors cited as influencing career decisions were the culture or work environment (47%), enjoyment and happiness (42%), money (42%), feeling challenged (26%), stability or security (21%), patient interaction (16%), location (16%), opportunity to advance (11%), work -life balance (11%), full-time status (11%), the opportunity to create a position (5%), benefits (5%), and power (5%).

These findings were somewhat consistent with related studies of the millennial student generation. Competitive pay, career advancement opportunities, and work-life balance were top motivators in the existing research on millennial students across various disciplines (Ng, Schweitzer & Lyons, 2010; Zhang et al., 2007). In this study, similar subthemes of "money," "opportunity to advance" and "work-life balance" arose, but were not the most commonly cited factors influencing career decisions. Other findings suggested that meaningful work is highly important to millennial students (Erickson, 2009; Ng, Schweitzer & Lyons, 2010; Yang & Guy, 2006); this was consistent with the finding in this study that "making a difference or helping others" was cited as important by nearly half the participants.

The most frequently cited factor among participants in this study was flexibility. This was consistent with the aforementioned theme of anticipated career path. Though dietetic students are committed to the profession overall, they anticipate changing positions and sectors of employment throughout their careers. This level of flexibility

Table 3: Career Paths and Driving Factors of Dietetics Students. (n=19)

Theme	Code	Frequency	Percentage
Anticipated career path	Multiple jobs	15	79%
	First job: clinical	12	63%
	Community dietetics	8	42%
	Private practice/entrepreneurship	5	26%
	Academia/research	4	21%
	Outpatient counseling	3	16%
	Sports nutrition	2	11%
	School food	2	11%
	Culinary nutrition	2	11%
	Foodservice management	2	11%
	Maternal nutrition	1	5%
	Food media	1	5%
	Global nutrition	1	5%
Factors driving career decision	Flexibility	13	68%
	Making a difference/helping others	10	53%
	Culture/work environment	9	47%
	Enjoyment/happiness	8	42%
	Money	8	42%
	Feeling challenged	5	26%
	Stability/security	4	21%
	Patient interaction	3	16%
	Location	3	16%
	Opportunity to advance	2	11%
	Work-life balance	2	11%
	Full-time status	2	11%
	Opportunity to create a position	1	5%
	Benefits	1	5%
	Power	1	5%

appears to be one of the most appealing aspects of the dietetics profession.

Dietetic Students' Perceptions of a Career in Foodservice Management

The next three themes that emerged captured dietetic students' perceptions of a career in foodservice management; see Table 4 for the supporting subthemes. Students identified both appealing and unappealing aspects of a career in this sector, as well as their overall image of a foodservice management dietitian.

Factors cited as appealing included high pay (32%) and multiple roles or multitasking (32%). The latter was described as the "jack of all trades" and "superwoman." One participant commented, "You have to know how to fix the printer. You have to know how to cook the food. You have to know how to write a menu." The other appealing aspects of foodservice management cited by participants were: working in unique settings (32%), direct involvement in nutrition delivery or working with food (32%), leadership or advancement opportunities (14%), menu planning (11%) and organization (5%).

On the flip side, the need for multitasking likely corresponded to the most commonly cited unappealing aspects of foodservice management: stress (21%) and long hours (21%). One student voiced the concern that "In a hospital, maybe your shift sometimes is like, not going to end...just because of things that might come up." The remaining unappealing aspects cited by participants were lack of patient interaction or gratitude (16%), rules and regulations (11%), grunt work (11%) and participation in food waste (5%).

The participants' image of a foodservice management dietitian was prompted by the discussion question, "When you picture a career as a nutrition professional working in foodservice management, what comes to mind?" The supporting subthemes somewhat reiterated the factors cited in the previous themes and were largely informed by participants' own experiences shadowing or working under a foodservice management dietitian. The most commonly cited characteristic was stress (74%). One student described her preceptor from her dietetic internship: "She [preceptor] was just so stressed all the time, dealing with all complaints and employees and just always running around. She never sat down." Another student reflected on her foodservice management rotation of her dietetic internship: "Sometimes I would just have these nightmares about it…something going wrong…I'd wake up and be like, 'Ahh!'"

The remaining subthemes that captured participants' image of a foodservice management dietitian included specific tasks, skills, or traits associated with a foodservice management dietitian. These included: managing employees (47%), a basement office (42%), long hours (42%), specific tasks such as managing Excel spreadsheets, budgeting, ordering, menu creation, paperwork, and tray testing (37%), responsibility (21%), being underappreciated (21%), high pay (16%), multitasking (16%), rules, limitations, or policies (11%), problem solving (11%), hairnets (11%), talking about food (5%), food waste (5%) and being dirty (5%).

These findings offer a new contribution to the existing literature. Whereas past studies have identified low awareness of foodservice management as a viable career option for dietitians (Holsipple, 1994; Hughes & Desbrow, 2005), the participants in this study were able to

Table 4: Dietetics Students' Perceptions of a Dietetics Career in Foodservice Management. (n=19)

Theme	Code	Frequency	Percentage
Appealing aspects of foodservice management	High pay	6	32%
	Multiple roles/multitasking	6	32%
	Working in unique settings	6	32%
	Direct involvement in nutrition delivery/working with food	4	21%
	Leadership/advancement opportunities	3	16%
	Menu planning	2	11%
	Organization	1	5%
Unappealing aspects of foodservice management	Stress	4	21%
	Long hours	4	21%
	Lack of patient interaction/gratitude	3	16%
	Rules/regulations	2	11%
	Grunt work	2	11%
	Food waste	1	5%
Image of a foodservice management dietitian	Stress	14	74%
	Managing employees	9	47%
	Basement office	8	42%
	Long hours	8	42%
	Tasks: Excel spreadsheets, budgeting, ordering, menu creation, paperwork, tray testing	7	37%
	Creativity	5	26%
	Responsibility	4	21%
	Strong personality	4	21%
	Underappreciated	4	21%
	High pay	3	16%
	Multitasking	3	16%
	Rules/limitations/policies	2	11%
	Problem solving	2	11%
	Hairnets	2	11%
	Talking about food	1	5%
	Food waste	1	5%
	Being dirty	1	5%

identify vivid traits associated with this employment sector. Regardless of whether the traits named were entirely accurate, dietetic students were not only aware of the career opportunities in foodservice management, but could free associate a myriad of both positive and negative traits.

These findings suggest that students are sensitive to the unique personalities or roles that a RDN would have in various employment sectors. A team of Australian researchers identified associations between RDNs' personality profiles and different areas of practice; those with a personality characterized by low harm avoidance and high self-directedness were four times more likely to have worked in foodservice management compared with RDNs characterized by high harm avoidance and low self-directedness (Ball, Eley, Desbrow, Lee & Ferguson, 2016). In this study, some students reported alignment with the perceived personality of a foodservice management dietitian ("That's probably why it appeals to me. My life is multitasking and stress. That's just what I am used to.") Others reported a sense of misalignment ("I just really didn't enjoy my day-to-day tasks in that [foodservice management] position.").

Dietetic Students' Ideas to Elevate Awareness of Careers in Foodservice Management

The final theme that emerged captured student ideas to elevate awareness of careers in foodservice management; see Table 5 for the supporting subthemes. Curricular suggestions included a career seminar class (42%), a cooking or foodservice class (37%), a foodservice practicum (16%) or a senior-level medical nutrition therapy culinary lab (11%). One student suggested "mandatory cooking classes that every single nutrition major has to take" while another suggested "incorporating it [foodservice management] into more than one class." Among college and university educators, heightened attention has focused on promoting culinary education within a traditional dietetics curriculum (Begley, 2010; Cooper, Mezzabotta, & Murphy, 2017). The findings of this study suggest that students see culinary arts and foodservice management as closely related.

Other suggestions included guest speakers (37%) and a faculty member with a foodservice management focus (26%). To support the latter, one participant recalled the impact of one of her professors, "[Faculty name] was a real influence on SLU students. She was…the only dietitian in our department that was super enthusiastic about foodservice. Those are the people you look up to." In contrast, another participant recalled the lack of faculty with a focus in foodservice management. He commented, "My undergraduate program was literally called Clinical Nutrition and Dietetics and we didn't have one faculty member that had a background in foodservice that I know of." A third participant commented, "I think that sends the message…if your professors aren't talking about, like, the fact that foodservice is an equally viable career path, then it's no surprise that people maybe see it as lesser than as like, a choice."

While colleges and universities accredited by ACEND are required to meet competencies specific to foodservice management, institutions are not necessarily required to employ faculty members with this specific expertise. As a best practice, academic departments may strive to hire faculty members with a diverse array of expertise that includes foodservice management.

Another suggestion was stronger collaboration between a university's nutrition department and business school (26%). Participants explained that nutrition students take required courses in the business school, but that business students are not encouraged to take food-related courses. Foodservice management was described as a career path between nutrition and business that "bridges the two" and served as a "middle point between those two careers."

Remaining suggestions included exposure to a strong foodservice management rotation in the dietetic internship (11%), participation in university operations (5%) and promoting relevant summer jobs (5%). These subthemes emerged from students' own experiences as dietetic interns or foodservice employees. For instance, students reported both positive and negative experiences with foodservice management during their dietetic internships. One student recalled, "My foodservice rotation as an intern was highly disappointing. I spent two whole days on the dish team, and to be honest, I called in sick one of those days because I was like, 'This is absolutely not beneficial to my learning experience. I have ran a dishwasher before.'" Meanwhile, a student recalled a positive memory of her preceptors: "They [preceptors] were all great, I will say that. They were all very invested in my experience and ensuring that I learned from the experience." Another participant reflected, "Your preceptor makes or breaks everything." The former finding is consistent with the existing understanding on the impact that preceptors play on dietetic students' confidence and professional socialization (MacLellan & Lordly, 2008). Program directors may play an important role in identifying sites that are committed to providing high quality foodservice experiences and by training preceptors on the ACEND competency requirements associated with foodservice rotations.

CONCLUSIONS AND APPLICATIONS

These study findings may be applicable to both industry professionals and educators. While only 11% of participants identified an interest in foodservice management as a career path within dietetics, this figure does reflect the estimated 10% of practicing RDNs employed in food and nutrition management (Academy of Nutrition and Dietetics, 2018). Whether or not the workforce will adapt to the projected growth of food and nutrition management and its multiple sectors is unknown, as is the projected growth over the next decade. It is also

Table 5: Dietetics Students' Ideas to Elevate Awareness of Careers in Foodservice Management. (n=19)

Theme	Code	Frequency	Percentage
Ideas to elevate awareness	Career seminar class	8	42%
	Cooking/foodservice class	7	37%
	Guest speakers	7	37%
	Faculty with foodservice management focus	5	26%
	Collaboration between nutrition department and business school	5	26%
	Foodservice practicum	3	16%
	Senior-level medical nutrition therapy culinary lab	2	11%
	Strong foodservice management rotation in dietetic internship	2	11%
	Participation in university operations	1	5%
	Summer jobs	1	5%

notable that foodservice management may not be considered an entry-level position, depending on the title or required years of experience. Future research may further explore the career path of RDNs practicing in this sector through their academic training, professional training, and career paths.

Educators may also pay close attention to the ideas generated by students on how to raise and sustain awareness of careers in foodservice management. It is notable that most participants did actually have an awareness of foodservice management of a career path, yet did not identify it as a preferred career path. However, this does suggest progress from earlier studies that identified little awareness of foodservice management as an employment opportunity for RDNs (Holsipple, 1994; Hughes & Desbrow, 2005). Many of the ideas suggested by students were curricular in nature, such as a career seminar class, while others related to the administration of dietetics programs, such as the makeup of faculty. Given that the most frequently cited subthemes included a career seminar class or cooking/foodservice class, program directors may ensure that didactic learning is providing adequate preparation for supervised practice placements and graduate coursework. Future research may explore the effectiveness and extent to which foodservice management is integrated into existing curriculums.

Demand for dietetics professionals in food and nutrition management was projected to grow by 35% from 2010 to 2020 (Hooker, Williams, Papneja, Sen, & Hogan, 2012). Industry professionals may consider both the perceived appealing and unappealing aspects of foodservice management when recruiting and retaining high quality employees. Emphasizing the appealing aspects, such as pay, having multiple roles or multitasking, or the opportunity to work in unique setting may capitalize in students pre-existing interests. On the other hand, employers may directly address the perceived unappealing aspects of foodservice management, such as stress and long hours. Employers may also consider that flexibility, making a difference or helping others, and the culture or work environment were identified as the greatest factors driving participants' career decisions; these may be considered when recruiting and retaining high quality employees.

One limitation to this study was that the researchers knew many of the participants and had held professional roles in foodservice or culinary nutrition; this may have biased participants' answers during the focus groups. A second limitation was the use of two somewhat similar institutions. Both study sites were private Midwestern universities. Therefore, the generalizability may be limited to similar institutions. Future research may include public institutions and those located throughout various geographic regions of the United States.

The need for RDNs in food and nutrition management is growing. While students are aware of foodservice management as a career path, most continue to show little interest. Educators and industry professionals may play an active role in guiding students towards this career path in order to support the demand for qualified and competent foodservice management RDNs.

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Research Contribution

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PLATE WASTE IN THE NATIONAL SCHOOL LUNCH PROGRAM: ROOT CAUSE ANALYSIS, REVIEW, AND EDUCATIONAL IMPLICATIONS

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ABSTRACT

Plate waste is a significant financial burden on a resource-limited National School Lunch Program (NSLP). Pilot programs and case studies have identified interventions that can reduce waste; however, the problem persists on a national scale. The purpose of this paper is to explore use of a new method of inquiry in addressing a long-standing problem, Root Cause Analysis (RCA). RCA was used to identify major factors causing NSLP plate waste. We review efforts made thus far in combating plate waste in NSLP and offer additional ideas for study. Educators can use this approach in teaching other concepts in foodservice management.

Keywords: plate waste, root cause analysis, National School Lunch Program, food waste, child nutrition

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INTRODUCTION

According to recent estimates by the United States Department of Agriculture (USDA) (2016a), approximately one-third of the world's post-harvest food supply is wasted annually. The field is bereft of explicit data, but the consequences of wasted food are significant in terms of economic, environmental, and broader ethical impacts (Gjerris & Gaiani, 2013). Nearly $161 billion worth of food is wasted annually in the United States (U.S.) (Buzby & Guthrie, 2002). Reliable estimates of costs associated with processing of this waste are lacking. It is estimated food-related waste accounts for 20% of solid municipal waste, with associated handling/dumping fees corresponding to more than $2 billion in 2010 U.S. dollars (Environmental Protection Agency [EPA], 2017) and over four gigatonnes or 16 billion joules of energy (United Nations, 2015).

Ironically, food insecurity is a concern in the U.S. with an estimated 1 in 5 children experiencing unreliable access to safe and nutritious food, and lack of adequate nutrition can lead to life- long health complications and affect students' readiness to learn (Bhattacharya, Currie, & Haider, 2004). To address these damaging consequences, USDA and the EPA have initiated Food Waste Challenge and Food Recovery Initiatives. These efforts have focused primarily on food waste. Yet a good portion of the food waste (USDA estimates 30%) can be defined as *plate waste*, which is edible food that is discarded. Reasons for plate waste are many, and the behavior is thought to be a manifestation of cultural ingraining (Birch & Marlin, 1982).

Waste within the National School Lunch Program (NSLP) is a subject of interest in the academic community and among practitioners, but has failed to gain traction as a national policy issue. Estimates suggest that between 11 to 45% of food placed in front of children participating in the NSLP is wasted (Byker, Farris, Marcenelle, Davis, & Serrano, 2014; Getlinger, Laughlin, Bell, Akre, & Arjmandi, 1996; Schwartz, Henderson, Read, Danna, & Ickovics, 2015; Strohbehn, et al., 2016). Studies have reported plate waste both before and after implementation of the Healthy and Hunger-Free Kids Act of 2010 (HHFKA, 2010), which updated nutrition guidelines for the NSLP effective 2012 (Adams, Pelletier, Zive, & Sallis, 2005; Baik & Lee, 2009; Cohen, Richardson, Austin, Economos, & Rimm, 2013; Cullen, Watson, & Konarik, 2009; Davis, Cullen, Watson, Konarik, & Radcliffe, 2009; Fenton et al., 2015; French & Wechsler, 2004; Knai, Pomerleau, Lock, & McKee, 2006; Neff, Spiker, & Truant, 2015; Parfitt, Barthel, & Macnaughton, 2010; Price & Just, 2015; Reger, Clesi, Nicklas, Shi, & Berenson, 1995; Schwartz et al., 2015; Smith & Cunningham-Sabo, 2014; Strohbehn et al., 2016; Templeton, Marlette, & Panemangalore, 2005). When 30% estimated plate waste is calculated in 2002 dollars, losses of over $600 million are seen (Buzby & Guthrie, 2002). This loss amount accounts for the purchased value of the food that is wasted, and costs of storing, preparing, and serving, but it does not capture costs such as lost health benefits or misdirected capital expenditures. Further, these estimates were calculated only for the NSLP, not all food programs offered in schools, such as the National School Breakfast Program. Thus, it is important future managers in foodservice settings understand the plate waste problem to ensure effective management of available resources.

There have been many reasons presented as to why food served in the NSLP is not consumed. Time allowed for lunch (Cohen et al., 2016; Price & Just, 2015), scheduling of recess (Getlinger et al., 1996; Hunsberger et al., 2014; Price & Just, 2015; Read, 1985; Strohbehn et al., 2016; Tanaka, Richards, Takeuchi, Otani, & Maddock, 2005), social influences (Neff et al., 2015; Qi & Roe, 2016), types of service and food preferences (Cohen et al., 2012; Ohri-Vachaspati, Turner, & Chaloupka, 2012; Smith & Cunningham-Sabo, 2014) have all been identified previously as reasons for plate waste. Yet, studies have not addressed multiple, integrative dimensions of the plate waste problem.

This suggests that a complete conceptual understanding of plate waste in NSLP is needed. To date, there have been no published *systematic* analyses of the reasons for plate waste in the NSLP, only survey-based methods of identifying proximate causes. One potential approach to improving understanding of the multi-dimensional plate waste problem is Root Cause Analysis. Root Cause Analysis (RCA) is a rigorous problem-solving method that aims to identify root causes of disadvantageous processes or events, traditionally *ex post facto,* through the systematic and documented asking of the question "Why?" of a carefully crafted problem statement (Bagian et al., 2002). The "Why?" question is asked until repeat appearances of themes emerge. Identification and addressing root causes can lead to a substantive decrease in incidence of the disadvantageous process and result in lasting change (Bagian et al., 2002; Rooney & Vanden Heuvel, 2004). RCA's adoption as a formalized technique within the realm of education has been limited to health care settings, but there is potential usefulness of the tool to fully illustrate the complexity of a

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question and lead to enhanced levels of inquiry among students in other fields, as well as potential for policy intervention.

In this paper, we utilized RCA, a method novel to the field of foodservice management and child nutrition research, to initiate an in -depth exploration of plate waste in the NSLP. Our goals in this work were: 1) to more comprehensively describe the plate waste problem as presented in the literature from multiple perspectives, 2) review current initiatives to address plate waste, 3) provide recommendations for action steps to combat this problem using a holistic approach, and 4) employ new methodology in child nutrition research and foodservice management education. Findings contribute to the body of knowledge about plate waste in NSLP and effective educational strategies.

METHODS

Root Cause Analysis

RCA process involves 5 key steps: 1) identify problem, 2) identify target population, 3) develop problem statement, 4) perform hypothesis-free "brainstorming" by asking sequential "Why" questions, and 5) validating sampling of findings with experts, either through a "blue ribbon" expert panel or literature search. The problem of plate waste as it impacts those participating in the NSLP focused on a targeted population of students of all ages. The problem statement developed was: "Students waste too much NSLP food". From this statement, identification of root causes was made following a flow chart approach through a series of "Why?" questions. "Why?" questions continued until ideological saturation had been reached, or until particular root causes began reappearing. Of note, branch points were not always mutually exclusive. The process also took into consideration food presented to the population and the environment (operational and social aspects) in which NSLP functions. Because of this, findings were validated by a combination of authors' expertise and review of literature.

Data Visualization

PowerPoint (Microsoft; Redmond, WA) flowchart development was initially used for documentation of root causes. Flowcharts were developed for each step of root cause analysis, with each linkage in a hierarchical flowchart representing the question "Why?". Data are presented at the level of initial "Why?" question. Space limitations and the overall cumbersome nature of full RCA hierarchy flowchart preclude its publication. Data file of source figure is available upon request.

Literature Review

Next, subjective evaluation of identified causes by the authors (with expertise in foodservice management and school nutrition) was performed and root causes re-clustered into searchable and reviewable domains by use of word cloud (also available upon request). Literature review commenced with individual searches of the format "(Root cause)" + various forms of "waste", "food waste", and "plate waste" + various forms of "school lunch", "school lunch program", "NSLP". Literature reviewed was not limited by discipline. For example, database searches included PubMed and ISI Web of Knowledge in addition to conventional foodservice management publications, such as this journal. There was no date cutoff or country of origin restriction for selected literature. One hundred thirteen references were identified in initial search efforts. Each reference was independently reviewed by authors for content applicability to root cause analysis. References that mentioned NSLP only in passing were not used. Forty-two references were found to have applicability to the results of root cause analysis. Of these, thirty were academic journal articles from the primary literature; three were laws and/or legal analysis; and nine were government reports.

RESULTS OF RCA

The first major branch point of RCA shows that plate waste is a result of insufficient demand, oversupply, and/or an insufficient re-use of food (Figure 1). Fundamentally these three branch points capture the mismatch of supply and demand and the lack of a diversion plan for prepared food that would otherwise be served.

Insufficient Demand

RCA and subsequent 'Why?' questioning identifies possible reasons for insufficient demand with further investigation listing associated root causes: 1) absence of hunger, 2) presence of hunger but *logistical inability* of the child to eat the food (e.g. lack of time), 3) presence of hunger but *lack of desire* to eat the food (e.g. bad taste), and/or 4) presence of hunger but *dietary inability* to eat the food (e.g. allergy) (Figure 2). Thus, these root causes can be managed into two clusters:

1. Unpopular or unsatisfactory food served
2. Structural or logistical issues that decrease ability to finish a meal

Oversupply

A similar process was used to investigate the branch labeled as "Oversupply" (Figure 3). Subsequent investigation identified poor procurement, preparation, inventory management, and service practices as possible proximate causes. RCA further delves into the limb of poor procurement to identify these root causes:

1. Absence of "smart" procurement practices leading to unnecessary purchases
2. Absence of accurate forecasting methods leading to inflated orders
3. Lack of feedback about plate waste and incorporation into procured amounts

Inappropriate service practices would include attempting to provide more food to a student who is perceived by staff member to need it or providing a serving that is larger than the recommended portion, either to every student, favored students (such as the student athlete), or to those who come through a serving line when a serving pan of an item is near completion.

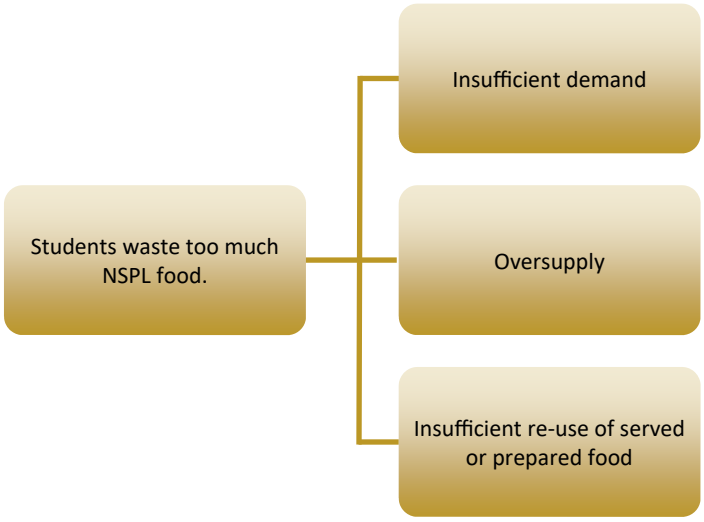

Figure 1. Root Cause Analysis of Plate Waste in the National School Lunch Program First branch point of root cause analysis beginning from problem statement. In all figures, branch points in the hierarchy represent the question 'Why?' and connect causes.

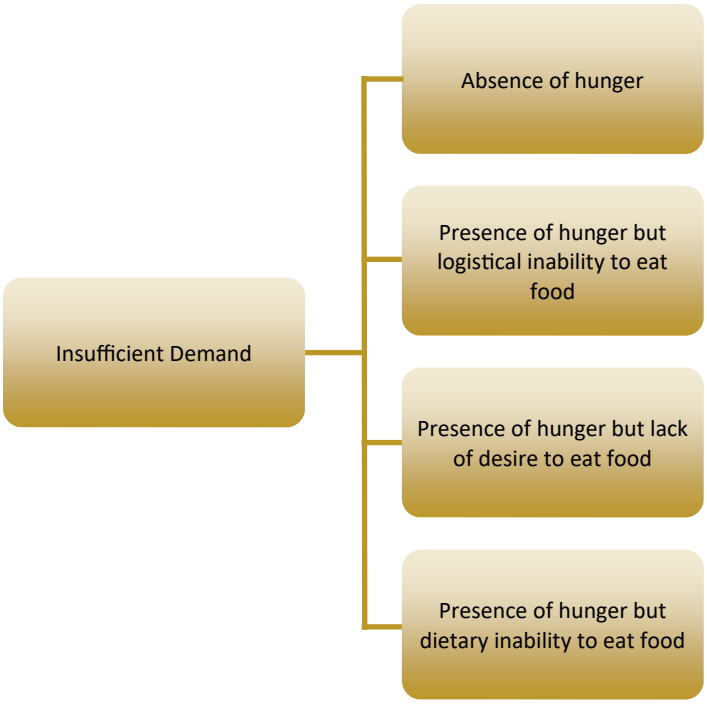

Figure 2. Insufficient demand and Associated Causes of Plate Waste in the National School Lunch Program. Identification of proximate causes of insufficient demand for NSLP food.

Insufficient Re-use

The third major branch of the RCA was insufficient re-use of NSLP food. RCA identified reasons such as insufficient knowledge or ability to re-use served food, unrecognized need for donation, insufficient incentives for donation or re-use, and/or absence of structural or logistical support for donation or re-use (Figure 4). Further analysis revealed root causes of:

1. Lack of education about food insecurity in the community
2. Local health agency restrictions regarding re-use of served foods
3. Costs associated with storage and security of reusable food
4. Lack of policy encouraging food donation/reuse

Results from this RCA of plate waste in NSLP show the complexity of the issue and how best foodservice management practices are important tools in reduction efforts. The RCA process provided a visual representation of the integrative aspects of plate waste. From these findings a discussion and review of current and proposed strategies to minimize plate waste evolves.

REVIEW AND DISCUSSION

The visual representation of the RCA process can be a useful tool in presenting complex problems. The RCA approach can encourage students' critical thinking and analytical skills with investigation of a particular problem. Findings from this RCA showed plate waste is a result of insufficient demand, oversupply, and/or an insufficient re-use of food. From these findings a discussion and review of current and proposed strategies to minimize plate waste evolves.

Addressing Insufficient Demand

RCA investigation revealed that effective strategies could include changing the food that ends up on plates. Potential strategies include use of offer versus serve; increased exposure of students to food items; implementation of fruit and vegetable programs; and changing structure of the meal program, such as meal time scheduling to promote increased appetite.

Offer versus Serve: Root cause analysis revealed, as above, that one cause of plate waste is students literally having too much on their plates (USDA, 2015). Offer versus serve (OVS) and serve only (SO) are approaches used in many schools through salad bars and other self-service food bars. The literature is mixed on impact of these on reducing plate waste, perhaps due to variations in data collection procedures and difficulty in comparing amongst different portion sizes. In a case study investigating plate waste associated with recess scheduling (Strohbehn et al., 2016) found selection time was lengthened at self-service food bars, thus contributing to plate waste due to *logistical inability* to consume food in remainder of lunch period. Other work in this area has failed to show a statistically significant increase in fruit and vegetable consumption when served

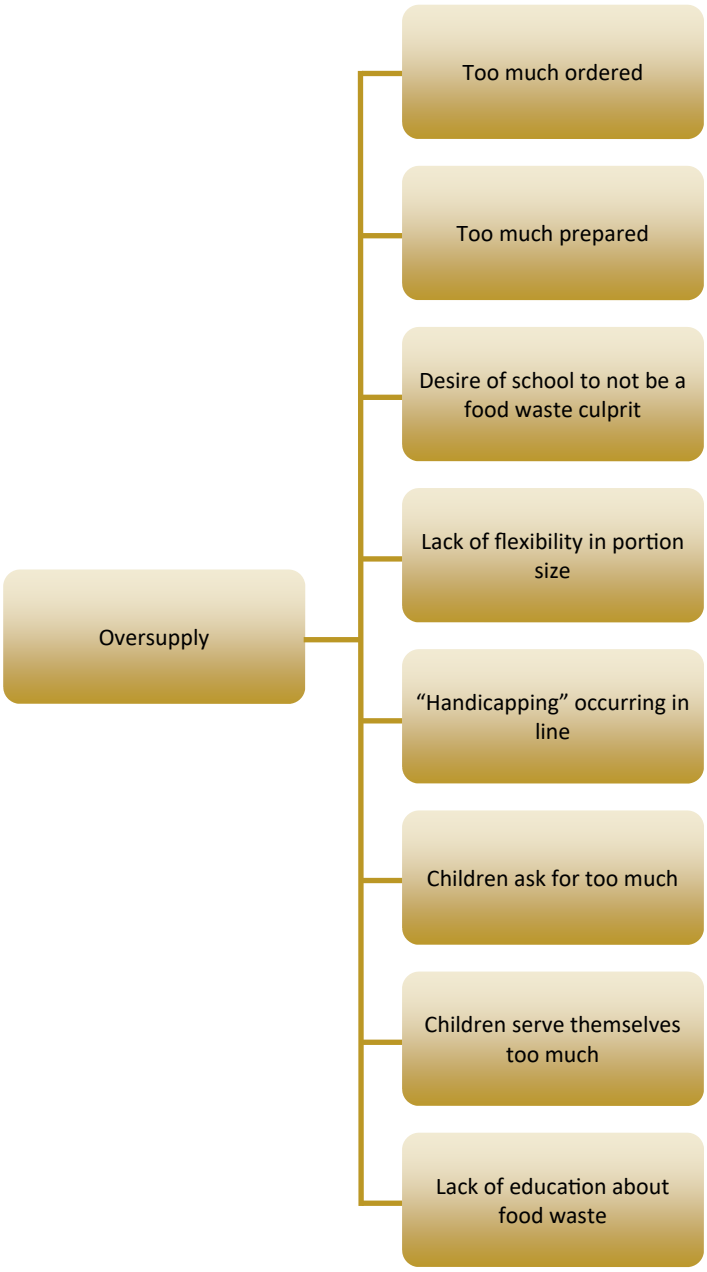

Figure 3. Oversupply and Associated Causes of Plate Waste in the National School Lunch Program. Identification of proximate causes of oversupply of NSLP food.

via salad bar (Adams et al., 2005). While findings from published research may show mixed results of plate waste, it has been noted that increased choices, and subsequently greater exposure of foods to students, may have positive impacts on customer satisfaction and students' nutrition education.

Increased exposure: While results have been mixed regarding *consumption* of fruits and vegetables with OVS, researchers have hypothesized that SO could actually reduce waste because of more frequent exposure (Birch & Marlin, 1982). More recently, school garden literature shows greater engagement by students with fruits and vegetables leads to increased consumption (Heim, Stang, & Ireland, 2009). While anecdotal evidence from practitioners clearly communicates the need to be patient with new menu offerings to allow students time to recognize and accept new foods, published research was not found in a review of the literature.

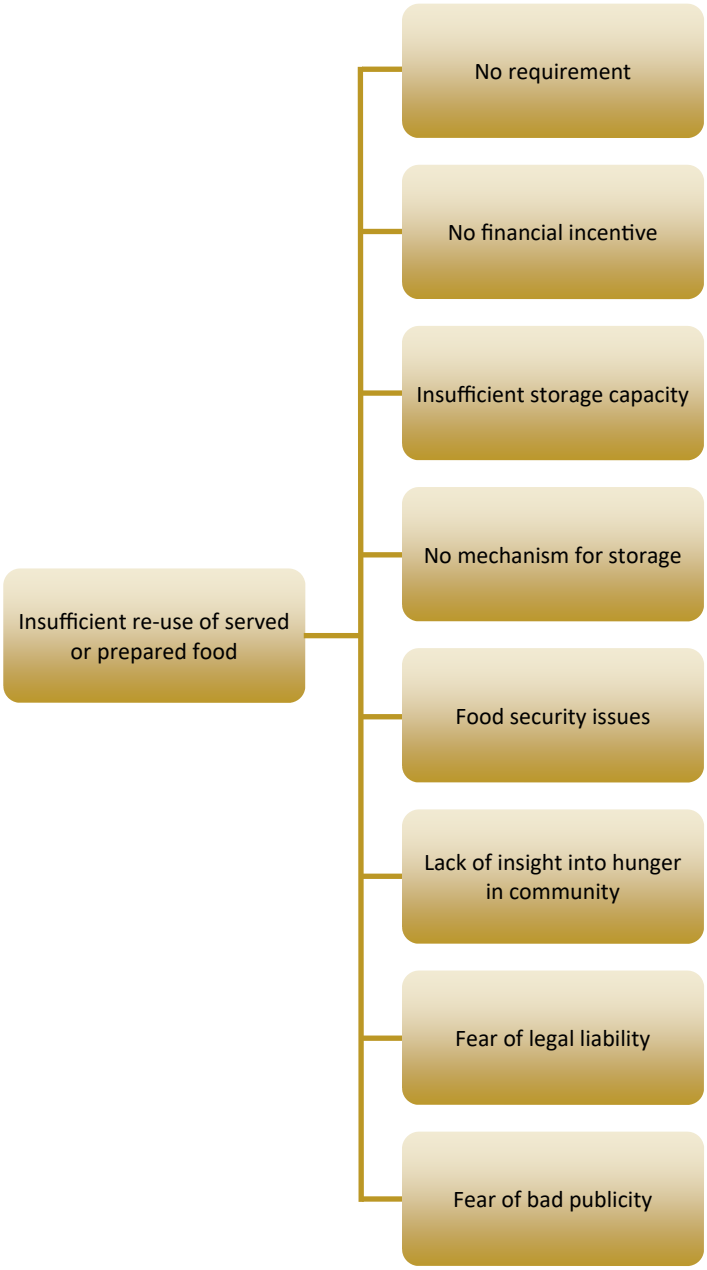

Figure 4. Insufficient Re-use of Plated and Served Food and Associated Causes of Plate Waste in the National School Lunch Program. Identification of proximate causes of insufficient re-use of plated and served NSLP food.

Fresh Fruits and Vegetables Program: The Fresh Fruit and Vegetable Pilot Program (FFVP) of 2002 was meant to encourage consumption of fresh fruits and vegetables through improved availability by subsidizing costs incurred by schools to purchase these foods. With a FFVP, fresh fruits and vegetables are served outside of normal NSLP and SBP service times. Reported availability of fresh fruits and vegetables to elementary schools through FFVP has been a success (Ohri-Vachaspati et al., 2012) but no plate waste statistics have been published. The increased availability and reported increased consumption have no known bearing on NSLP plate waste, although arguments could be made that it increases lunchtime plate waste (as expected availability of fresher fruits/vegetables later in the day results in less consumption at lunch) or that FFVP decreases plate waste (because increased exposure may improve kids' intake of fruits and vegetables in the NSLP context) (Birch & Marlin, 1982; Cullen et al., 2009; Heim et al., 2009).

Logistical Reforms: Infrastructure considerations, including but not limited to the amount of time children have to eat, time of day that lunch is served, and placement of recess in relation to the lunch period are thought to influence student consumption of NSLP food. Often, building administrators who may not be aware of resultant impact on plate waste make scheduling decisions regarding lunch periods.

Recess Before Lunch (RBL): Given the possibility that it *could potentially* decrease plate waste – and owing to prior data showing positive feedback from school teachers and administrators – recess before lunch (RBL) is considered best practice for its ability to decrease plate waste, increase consumption of school lunch, and calm lunchroom and afternoon classroom environments. However, it is important to note that different approaches to plate waste collection and measurement were used in these studies, which may explain variations in specific findings. Further, studies occurred in different geographic locations in which weather conditions may have affected appetites of students. The impact of environmental factors may also have affected results, as previously noted (Strohbehn et al., 2016).

Increasing Length of Lunch Period: No federal standards exist as to the length of time available to students for lunch although each state agency that administers the NSLP recommends suitable time periods. Findings from the School Nutrition Association's (SNA) *State of School Nutrition 2016* survey (School Nutrition Association, 2016), which included responses from nearly 1,000 SNA member school districts nationwide, showed a median lunch period of 25 minutes for elementary schools and 30 minutes for middle and high schools. Lunch periods also included travel time from the classroom to the cafeteria, handwashing stops, time spent in line to get a meal, and service or selection of meal items. Thus, actual times available for food and beverage consumption varied (Cohen et al., 2016). "Grab and go" options, meal bundles, vending machine dispensing, and a scramble system (component stations) rather than a single line of service have all been used successfully by innovative programs. Anecdotally, some school nutrition program directors have calculated the cost of food wasted due in part to limited time available to eat and provided building administrators with this information as they make their case for scheduling changes. Other logistical issues may relate to number of students and classes served in the building cafeteria, which in many schools is also used for other educational purposes such as gym class or music lessons. All of these issues require further study to measure their impact on plate waste.

Addressing Oversupply

In our literature search, we found no academic journal articles objectively measuring the effect of supply-sided changes to NSLP on plate waste. Control of amount of prepared product preparation through use of batch cooking or cooking to the line not only avoids overproduction of food items, but can lead to quality improvements. Thus, this is considered a best practice as forecasted production amounts are typically based on historical records and do not always account for scheduling changes (e.g. class field trips) or weather changes that might affect student selections.

Plate waste findings post-HHFKA have been mixed. One study (Schwartz et al., 2015) found no increases in plate waste whereas another (Byker, Pinard, Yaroch, & Serrano, 2013) showed increases in plate waste of vegetables, entrees, and milk. The increase in plate waste may be due to a required serving of either fruit or vegetable in order for the meal to be considered reimbursable. As noted, findings from plate waste studies can be influenced by a number of factors such as menu, weather, and other logistical considerations.

Addressing Insufficient Re-use

With concerns of plate waste in our society coupled with increasing numbers of individuals considered food insecure, there is attention to re-use of food that has been served (typically because of requirements to meet standards for a reimbursable meal), but uneaten. Food Code regulations specify which types of food and package forms can be re-served after first presented to customers; generally shelf stable packaged foods, such as individual packed condiments or snacks are allowed. Other considerations for NSLP pertain to social impacts on students; is there pressure to donate foods they have been served?

Donation Policy: The Federal Food Donation Act of 2008 required Federal Agencies with > $25,000 in total purchases to make provisions encouraging contractors to donate excess apparently wholesome foods in all contracts ("Federal Food Donation Act 2008," 2008). While the Federal Food Donation Act of 2008 at present time does not apply to NSLP participants and does not occur at the State level, the existence of this policy demonstrates the role of government intervention. Reimbursement in the NSLP occurs on the basis of reimbursable meals *served*, not reimbursable meals (or reimbursable nutrients) *consumed*. Districts may be concerned regarding safety and resultant liability risk with food donations. Both perishable and non-perishable served items may be eligible for donations depending on local regulations. Donor liability is limited through the Bill Emerson Good Samaritan Food Donation Act of 1996 ("Conversion to Permanent Law of Model Good Samaritan Food Donation Act and Transfer of that Act to Child Nutrition Act of 1966," 1996). In short, the Act eliminates the civil and criminal liability arising from the nature, age, packaging, or condition of apparently wholesome food donated in good faith by a School Lunch Program to a nonprofit organization. Further efforts put in place by the EPA aim to reduce waste through the creation of non-financial awards for sustainable food management with its Food Recovery Challenge launched recently (2017).

Sharing Tables: The concept behind the Sharing Table is to have a dedicated cart or table on which students can place selected but unconsumed food or beverage items for use by other students at no charge. Concerns exist about the use of Sharing Tables including proper food handling and storage (addressing cross-contamination and temperature abuse concerns), over-selection from OVS arrangements for the purpose of donation, and allergen exposure (though limiting donation to prepackaged foods mitigates this risk). No academic studies addressing effects of Sharing Tables on plate waste or total food waste were found in the literature. A recent USDA Child Nutrition Program memo released in June 2016 noted Sharing Tables was an innovative strategy to reduce plate waste but implementation was under jurisdiction of state and local health codes (USDA, 2016d). The memo stressed Sharing Table use was for purposes of addressing plate waste and reinforced for program administrators that frequent issues of plate waste should be addressed through better management practices of menu planning and production controls. The U.S. Food and Drug Administration issues a set of recommendations regarding safe food handling practices in the biannual Food Code. State and local health agencies use Food Code as guidance in establishing regulations. Food Code 2013 (and previous versions) allows re-service of shelf stable, unopened packaged foods and re-service of unopened Temperature Control for Safety foods, such as milk cartons, if product is kept at safe temperatures and time controls are monitored (FDA, 2013). Multiple handlings of food packages may present risks of viral illnesses. Thus, it is recommended health inspectors be involved in discussions about starting a Sharing Table at a school and clear guidance be provided at each building. In addition to food safety, other concerns have been noted related to students' motivations to donate. Students may over-purchase or over-self-serve foods in order to achieve a "feel good" return or be perceived as doing something good by a respected teacher or other role model, thus potentially increasing total food waste. Or, there may be subtle social pressure placed on students to share; if they do not students may feel at risk of being labeled selfish. USDA Food and Nutrition Service has many resources to assist district child nutrition program administrators and local school boards in policy development (USDA, 2017).

CONCLUSIONS AND APPLICATIONS

Plate waste in NSLP is a multifaceted problem. Use of an exploratory data collection approach called Root Cause Analysis provides an integrated view of the factors associated with the problem. In this paper, a wide array of strategies and potential policy interventions aimed at reducing NSLP plate waste has been presented. Most of plate waste research to date has focused on impacts of interventions aimed at increasing consumption, while those interventions aimed at promoting the re-use of prepared food have not been studied. As a result of this RCA, identification of potential pilot projects are presented in Table 1. Potential pilots could assess effectiveness of pre-ordering and/or pre-serving reimbursable components of meals to increase the amount of time available for consumption. Another pilot might abandon the traditional 'check out' line in favor of mobile checkout that occurs at the table while students eat.

Oversupply may continue to be problematic, as operators want to ensure customer satisfaction with availability of choices. Accurate record keeping is essential. Production records should include amounts forecasted, prepared, and served along with contextual data

Table 1. Potential Pilot Projects to Address Secondary Causes Associated with Root Cause of Oversupply.

Secondary Cause	Potential Pilot Project
Too much food ordered	• Smart ordering systems • Staff training
Too much food prepared	• Forecasting analysis • Batch cooking • Staff training
Over portioning at self-service	• Classroom education about plate waste • Point of sale models • Adjustment of serving utensils • Classroom problem solving cost of waste

such as weather conditions, scheduled field trips or other information that may have affected supply and demand. Care should also be taken by school nutrition program administrators to incorporate ordering and forecasting methods that reflect local popularity indexes of menu choices that might result in less waste, recognizing other variables also affect consumption. A recent USDA Food and Nutrition Service (FNS) webinar offering guidance on the topic provided continuing education to program administrators (USDA, 2016c). Further, experimentation with smart ordering systems, real-time inventory analysis, and improved seasonally adjusted data collection and analysis methods aimed at reducing oversupply and freeing up physical space in the kitchen should be considered. Incorporation of batch cooking, or "just in time" preparation will result in higher quality products and capability to "cook to the line".

With respect to re-use of food, the impact of Sharing Tables on plate waste and incorporation of donation policies into procurement processes are potential avenues forward. USDA (2016d) has begun the step of formalizing donation policy with the June 2016 memo about Sharing Tables; additional resources to educate all relevant stakeholders, including parents/guardians and students, into the benefits and proper processes of donations of prepared food as well as relief from legal liability may be helpful. The challenges with published studies on plate waste indicate the value of local data. To avoid some of difficulties noted such as labor-intensive weight-and volume-based collections of plate waste, less logistically disruptive technologies such as digital photography and analysis might be considered (Connors & Bednar, 2015). Research investigating actual costs of plate waste would be helpful information for nutrition program and school building administrators as this data may influence decisions related to meal timing or menus.

The problem of plate waste is complicated as it encompasses environmental and social issues. Is the problem of plate waste within the NSLP large enough to justify the costs of solving it, given that some degree of food waste is to be expected (Buzby & Guthrie, 2002)? Given the mission of NSLP is to provide safe and nutritious food to children and that the program operates within an educational setting preparing students of today to become productive members of society, the argument could be made that addressing the problem of plate waste is justified. This analysis of plate waste in the NSLP identified multiple root causes of the problem, some of which have previously been studied as well as others that have not.

In this study, we show that RCA is a useful tool for educators and practitioners (current and future) in addressing issues of concern, in this case the problem of plate waste. Instructors in foodservice management programs may consider use of RCA to explore other multi-faceted problems, such as employee turnover, or gaps between employee training and practices. Small groups of students could conduct an RCA, develop flow charts, discuss identified clusters based on class lectures and review of literature, and propose action steps or policy interventions, similar to the pilot projects identified in Table 1. The use of RCA in the classroom can challenge students' critical thinking and evaluation skills and lead to creation of original work.

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