Effectiveness of Healthy Menu Changes in a Nontrainee Military Dining Facility

MAJ Bethany A. Belanger, SP USA*; Junehee Kwon, PhD†

ABSTRACT The purpose of this study was to evaluate the impact of implementing the Initial Military Training (IMT) menu standards in nontrainee dining facilities (DFAC) on food selection, nutrient intake, and satisfaction of soldiers. Participants were recruited during lunch before and 3 weeks after the menu changes. Direct observations, digital photography, and plate waste methods were used to assess soldiers' food selection and consumption, along with a survey assessing soldiers' meal satisfaction under the two menu standards. Descriptive statistics and independent sample *t*-tests were used to summarize and compare the data. A total of 172 and 140 soldiers participated before and after menu changes, respectively. Soldiers consumed 886 kcals (38.6% from total fat and 11.2% from saturated fat) and 1,784 mg of sodium before the menu change. Three weeks after the change, all figures improved ($p < 0.01$). The percentage of healthier food selections mirrored food items served at the DFAC and improved after the intervention ($p < 0.001$). There were no differences observed in overall satisfaction and meal acceptability after the intervention. Our findings suggest implementing the Initial Military Training menu standards in nontrainee Army DFACs is feasible and has the potential to improve the overall healthfulness of soldiers' food selection and consumption.

INTRODUCTION

Obesity continues to be a serious health problem in the United States and is linked to several comorbidities, rising health care costs and over 100,000 preventable deaths each year.[1–3] According to the Centers for Disease Control and Prevention (CDC), 35.7% of adults and 16.9% of children and adolescents were considered obese in 2010.[4] In 2013, CDC reported 17 states with obesity prevalence of 30% to 35% and 2 states with prevalence greater than 35%.[5]

The nation's obesity problem has negatively impacted the U.S. military, jeopardizing the strength of our nation's defense. From 1995 to 2008, obesity rates among service members increased from 5% to 13%.[6] Rising obesity rates among current and potential service members have attributed to higher attrition rates and weight control program enrollments, and an overall decrease in the number of the potential military recruits.[7–9]

In an effort to address the influx of weight-related problems occurring within military populations, several nutrition programs have been developed for use in military dining facilities (DFACs). DFACs have become ideal locations for such programs because of the large number of service members consuming one or more meals in these facilities each day.[6] A majority of nutrition programs, such as point of purchase and color-coded nutrition labeling systems, have focused on helping patrons make informed meal selections. Research evaluating these programs is limited; however, similar studies evaluating the effectiveness of comparable interventions in university and worksite cafeterias found that these programs failed to influence the healthfulness of diners' meal selections.[10,11] Researchers also found using point-of-purchase calorie labels in Army DFACs had no influence on soldiers' meal selections.[12] In contrast, Crombie et al[13] observed improvements in nutrient intakes after improving the nutrition quality of select menu items in addition to applying a color-coded nutrition labeling system.

In 2010, the Army implemented the Soldier Fueling Initiative (SFI), a program developed to help improve the nutrition and weight status of soldiers in their initial military training (IMT).[14] The main component of the SFI is the IMT menu standards including standardized recipes and preparation methods. These standards increase lower-calorie, nutrient-dense selections, limit choices with poor nutrient qualities at each meal, and eliminate sweetened carbonated beverages. Currently, only IMT DFACs use the IMT menu standards, whereas all other DFACs follow less rigid menu standards.[15]

Because of its initial success with improving the overall health status and physical performance within the IMT soldiers,[16] the Army leadership may consider implementing IMT menu standards in all DFACs. Although this change could provide nutritional benefits to all soldiers, the Army leadership must be cautious about making such a decision. First, the difference in training versus nontraining diners must be addressed. IMT soldiers are captive audiences and are required to consume all of their meals in the DFAC, whereas non-IMT soldiers dine in DFACs voluntarily. If dissatisfied, nontrainee diners may choose to find an alternative dining location and negatively influence DFAC utilization.[17,18] With alternative dining options, it is unknown if this change would positively impact the nutrition quality of meals served in nontrainee DFACs. Therefore, the purpose of this study

*Office of the Surgeon General, Defense Health Headquarters, 7100 Arlington Boulevard, Falls Church, VA 22042.

†Department of Hospitality Management and Dietetics, Kansas State University, 152 Justin Hall, Manhattan, KS 66506-1404.

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was to evaluate the impact of partial implementation of the IMT menu standards in a nontrainee DFAC on food selection, nutrient intake, and satisfaction of soldiers. Based on the results of this investigation, authors aimed to determine the feasibility of partially implementing IMT menu standards in nontrainee DFACs.

METHODS

Subjects

The target population of this study was soldiers in a nontraining status who dine regularly in Army DFACs. The location for the research was a DFAC on a large Army installation in the Midwestern region of the United States. Although only one location was chosen, soldiers on this Army installation are considered a good representative sample of the target population because they are soldiers from all areas of the United States who are not in training. Participants were recruited during two weekday lunch meal periods and were first notified of the study a week before each data collection day using flyers and posters, which were placed in highly visible locations within the DFAC. On each selected data collection day, which was chosen because of their projected high census, participants were recruited at each of the two main entrances to the DFAC throughout the 90-minute meal period. Each soldier interested in participating in the study was provided a consent form and a laminated tray card with brief instructions on one side and a place for them to write a personalized 4-digit code on the other. Soldiers not planning to eat their meals in the DFAC (e.g., utilizing the take-out option), diners other than service members (e.g., Department of the Army civilian employees, civilian family members), and DFAC staff members were excluded from participating in the study. The study was approved by the Institutional Review Boards of a university and Madigan Army Medical Center, Fort Lewis, WA.

Instrument and Study Protocol Development

There were two components for the data collection protocol for this study. The first component involved methods used to determine food selection and consumption, and the second component was a survey to assess soldiers' demographic information, overall satisfaction, and meal acceptability at a nontrainee DFAC.

Food Selection and Consumption Assessment

The following methods were used to determine participants' food selection and intake. Digital photography methods, which have been used previously in food service settings to estimate intake,[13,19,20] were used to estimate participants' food selections. Direct observation methods[21,22] were used to determine selection of self-service items, and plate waste methods[23,24] were used to estimate leftover food quantities so that the amount of food consumed can be calculated by subtracting the leftover quantity from the reference portion size. Even though previous studies[13,19,20] used digital photography methods to estimate the amount of food consumed, preliminary data collection and analyses failed to show reliability of the data collection methods used in this study.

Food selection was assessed by evaluating photographs of participants' food trays after they completed their food and beverage selections. There were two identical digital photography stations, and each was equipped with a digital camera (e.g., Nikon D3100) positioned on a tripod and set at a 45° angle approximately 20 inches above the food. Tray mats were used for consistent tray placement, and rulers were placed horizontally and vertically next to each tray as photograph reference points. In addition, research assistants observed participants' food selections at each self-service area (e.g., salad bar), annotated tray numbers (self-assigned by participants), and recorded the type and amount of each food item selected on an observation form. Data collected from observations were used to assist with assessing participants' food selections and estimating amount of food served.

To estimate food consumption, plate wastes were weighed after participants completed their meals. At the end of their meals, participants placed their food tray and tray card with the self-assigned numbers on the dish room tray return. Once trays reached the dish room, research assistants collected them from the tray return and photographed trays with leftover food items before weighing each food to the nearest gram using a calibrated digital scale. Food item weights and tray numbers were annotated on a plate-waste recording form and used for analysis.

The nutrition quality of participants' food selections was determined using the Army's "Go for Green" nutrition labeling system,[25] a program available for all Army-operated DFACs that encourages patrons to make nutritious food choices for improved performance and health. The "Go for Green" program establishes a color code system based on a food or beverage's total calories and nutrient content. Items high in calories, sugar and/or fat, and low in nutrients are labeled red, and items labeled yellow are moderate in calories, sugar and/or fat, and nutrients. Items with green labels are considered optimal choices and are lower in calories, total fat and/or sugar, and highest in nutrient quality.

Food consumption was determined by taking the food's reference portion minus weights of plate waste. The reference portion size for each item was established before the start of the lunch meal by determining the mean weight of 10 typical portions served by foodservice personnel. For self-service items, research assistants established reference portion sizes using utensils provided. Weights of 10 portions for each item were determined using a calibrated digital scale, and the mean weight of each food item was calculated and later used for analysis.

For nutrient intake analyses, total kilocalories, the amounts of total fat, saturated fat, dietary cholesterol, protein, total carbohydrates, dietary fiber, iron, vitamin A, vitamin C, and sodium were calculated. Nutrients for individual food items

served were determined based on standardized recipes and the reference portion sizes (not the portion sizes indicated on the standardized recipes because of discrepancies between standardized portion sizes and actual amount served) using the U.S. Department of Agriculture (USDA) Nutrient Database for Standard Reference, release 26.[26]

Food intake and consumption methods were pilot-tested with 50 patrons during lunch at the selected DFAC one menu cycle before the data collection day. All noted improvements and suggested changes were made to the established methods before data collection.

Survey of Customer Satisfaction and Meal Acceptability

To evaluate customer satisfaction and meal acceptability, a 24-item survey was developed including participants' demographic characteristics and variables of interest. Nine demographic questions included age, gender, education level, rank, years of military service completed, current height and weight, meal card status, and active duty weight control program enrollment. Six and nine items were included to evaluate service and food quality, respectively. These items were measured using a 5-point Likert scale.

A panel of military and university foodservice experts and foodservice researchers reviewed the survey instrument for face validity and clarity of directions and provided feedback for revisions. The final survey was pilot tested during lunch at another DFAC on the Army installation with 30 soldiers, 1 month before the first data collection day.

The Intervention

The researchers altered the selected DFAC's lunch and dinner menu and meal offerings to be consistent with food items offered with the IMT menu standards. The breakfast menu and beverage selections were not changed to be consistent with IMT standards because of logistic issues and DFAC managers' concerns with customer dissatisfaction and DFAC utilization rates. Because of the experimental nature of the study, menu changes occurred only for one menu cycle (3 weeks). DFAC facility managers were provided with a 21-day meal plan for IMT mainline, short order and dessert menu, as well as a list of standard offerings for salad bar 2 months before implementation.

Staff members were trained on the IMT menu standards, and appropriate substitutions were made to meal offerings and menus if items could not be ordered or recipes that could not be prepared. The Army "Go for Green" Food Labeling System, a mandatory component of the IMT menu standards, was already established at the selected DFAC and was continued through the partial implementation period. A summary of the major changes made in the DFAC during the partial IMT implementation is illustrated in Figure 1.

Data Collection

Data collection occurred in the selected DFAC twice: once during the baseline period when the current menu standards were in place, and again at the conclusion of a 3-week partial implementation of the IMT menu standards. On each selected data collection day, eligible soldiers who were interested in participating in the study were provided a brief explanation of the study and a blank, brightly colored laminated tray card with instructions on the back. Participants were asked to write a self-created, 4-digit code on the front of their laminated card and place it number-side up on their tray. After leaving the recruitment area, participants made their food and beverage selections and proceeded to one of two digital photography stations set up near the main seating areas. At the photography station, research assistants provided participants with a consent form and survey and took pictures of trays. The self-created 4-digit code was also used on the survey, and soldiers filled out the questionnaire while eating their meal. After completing their meal, soldiers were asked to leave the laminated card on their trays, which were placed on the tray return. Before leaving the building, research assistants collected completed surveys and signed consent forms. Soldiers who completed the study were offered a small token of appreciation (e.g., keychain flashlight). Returned trays were photographed and plate wastes were weighed using the protocol explained earlier. Food consumption was determined based on the reference portion sizes and plate waste.

Data Analyses

Nutrient Quality

The two outcome variables for this study measuring soldiers' nutrition quality were food selection quality and nutrient intake. Food selection quality was defined as the percentage of green-labeled food items selected and calculated using the following equation:

$$\text{Food selection quality} = \text{total number of green items selected} \div \text{total number of items selected}$$

Nutrient intake was defined as the energy, macro and micronutrients consumed, and was evaluated based on a percentage of the established macronutrient meal guidelines, when applicable, outlined in Army Regulation (AR) 40-25, "Nutrition Standards and Education."[27] For statistical analysis, the groups' actual nutrient intakes were compared with the established nutrition guidelines.

Customer Satisfaction

The primary dependent variables were customer satisfaction and menu acceptability. Customer satisfaction was defined as the mean response to the six items related to service quality, and meal acceptability was defined as the mean response to the nine items related to meal quality.

Mainline:
- At least two main entrees offered (at least one being non-pork); fish served at least three times per week; only lean ground beef and turkey (fat content no more than 10%) used in recipes; all entrees prepared using low-fat methods (no frying) and served without added fat
- Gravies or sauces served on the side whenever possible
- All potato and starch choices prepared using low-fat methods (no frying); pastas either multigrain or nutrient enriched; at least one or all starch/pasta/rice options were not prepared or served in a cream sauce
- All meals included at least two hot vegetables, with no more than one being a starchy vegetable
- Beans and legumes were served at least three times per week

Every day items (offered at every meal):
- One cream or broth-based reduced sodium soup
- At least two choices of fresh fruit
- At least three bread types (whole grain/whole wheat only) along with one selection of hot bread (e.g., hot rolls)
- Trans fat free (zero grams trans fat per serving) spread, jelly/jam, and peanut butter
- At least two flavors of low fat individual yogurt
- Baked potato chips and/or pretzels only

Desserts (four different choices offered daily):
- Four days a week all dessert choices were lower in fat
- Three days a week two choices were regular desserts and two were low-fat

Short Order (offered no more than four times per week):
- Meat patties for grilled hamburgers and cheeseburger no more than 15% fat
- Grilled cheese made with whole grain bread
- All specialty sandwiches grilled using nonstick cooking spray
- Link-type meats (e.g., frankfurters) were not served
- All side items (e.g., French Fries) prepared using low-fat cooking methods (no frying)
- Two hot vegetables (at least one non-starchy) included as part of the short order menu

Deli Bar (offered daily):
- At least three lean deli meat and whole grain/whole wheat bread choices; two sliced cheese choices (no imitation), a variety of fresh vegetables, mustard and mayonnaise

Salad Bar (offered daily):
- Leafy green salad made with green leafy vegetables and hard vegetables (e.g., carrots) along with at least 10 different toppings
- Five different salad dressings (at least three low-fat); oil and vinegar offered
- All mayonnaise-based salads made with low-fat mayonnaise or salad dressing

"Go for Green" Labeling:
- All food items were properly labeled for each meal service

FIGURE 1. Summary of changes made to the selected DFAC during the IMT menu standards implementation period.

All analyses were performed using IBM SPSS software, version 21.0 (IBM Corporation, Armonk, NY) with $p < 0.05$ for statistical significance. Descriptive statistics were used to summarize the participants' demographic characteristics and survey responses. Independent samples *t*-tests were conducted to evaluate differences in food selection, nutrient intake, customer satisfaction, and meal acceptability.

RESULTS

A total of 332 soldiers expressed interest in participating in the study: 172 during the baseline data collection day and 160 3 weeks after the intervention. Of those recruited for baseline, 154 surveys were returned and 135 matched photographs were obtained. During the intervention data collection, 131 surveys were returned and 124 matched photographs were attained.

Demographic characteristics of two participant groups (i.e., before and after the intervention) were not significantly different. Similar to previous studies conducted on military populations in foodservice settings,[12,13] most participants were male (93 before and 96% after the intervention), 25 years of age (mean age 25.4 versus 24.9), had a BMI of 26.3 (mean BMI 25.9 versus 26.6), were at the rank of E-4 or below (80% versus 72%) with less than 4 years of service (79% versus 70%) and possessed a high school diploma/GED (68% versus 63%). Also, a majority of participants were meal card holders (80% versus 70%) not enrolled in the active duty weight control program (96% versus 96%).

TABLE I. Difference in Nutrient Intake Before and After Implementation of the IMT Menu Standards

Variable	Baseline (n = 136) M ± SD	Intervention (n = 124) M ± SD	t	p^a	95% CI LL	95% CI UL
Kilocalories	886 ± 326	705 ± 226	5.26	<0.001	113.5	249.5
Carbohydrate (g)	91 ± 39	79 ± 29	2.92	0.004	4.04	20.86
Carbohydrate (%)	42 ± 10	45 ± 13	−2.41	0.02	−0.06	−0.01
Protein (g)	38 ± 15	42 ± 12	−1.96	0.05	−6.60	0.02
Protein (%)	18 ± 6	25 ± 8	−8.30	<0.001	−0.09	−0.05
Total Fat (g)	39 ± 19	25 ± 15	6.38	<0.001	9.24	17.50
Total Fat (%)	38 ± 19	31 ± 10	6.11	<0.001	0.05	0.10
Cholesterol (mg)	133 ± 68	133 ± 85	0.01	1.00	−18.65	18.78
Sodium (mg)	1,784 ± 872	1,339 ± 650	4.70	<0.001	258.9	632.7
Dietary Fiber (g)	9 ± 5	8 ± 3	1.10	0.28	−0.47	1.61
Iron (mg)	6 ± 3	5 ± 2	1.92	0.06	−0.01	1.21
Vitamin C (mg)	45 ± 44	31 ± 31	2.93	0.004	4.53	23.15
Vitamin A (IU)	2,430 ± 3,156	1,887 ± 2,377	1.58	0.12	−135.6	1,222.0
Saturated Fat (g)	11 ± 6	7 ± 5	4.93	<0.001	2.08	4.85
Saturated Fat (%)	11 ± 5	9 ± 4	3.25	0.001	0.01	0.03
Red Items (%)	45 ± 23	18 ± 14	11.84	<0.001	0.23	0.32
Yellow Items (%)	19 ± 17	25 ± 13	−3.18	0.001	−0.10	−0.02
Green Items (%)	36 ± 24	58 ± 19	−8.26	<0.001	−0.27	−0.17

LL, lower limit; UL, upper limit. [a]Based on independent sample t-test.

The DFAC meal offerings were significantly different from baseline to intervention, with 39% offerings being red labeled and 41% green labeled at baseline and 17% red labeled and 61% green labeled during the intervention. Table I provides a summary of the meal offerings on each data collection day.

Food selection behaviors mirrored the food offering at DFAC. Several differences were identified in food selection and intakes before and after the intervention. On average, both groups selected the same number of items for their meal (6.5 versus 6.8); however, the percentage of red-labeled items selected was significantly lower (45% versus 18%, $p < 0.001$) and green-labeled items significantly higher (36% versus 58%, $p < 0.001$) after the intervention compared to baseline.

Soldiers' total energy intakes in the intervention group were significantly lower (886 versus 705 kcals), with less kilocalories coming from total fat (38% versus 31%) and saturated fat (11% versus 9%), and a greater percentage coming from carbohydrates (42% versus 45%). Sodium intakes were also significantly lower (1,784 versus 1,339 mg), as were intakes of vitamin C (45 versus 31 mg). No differences in intakes were observed between the two groups for total cholesterol, iron, fiber, and Vitamin A. Differences in food selection and nutrient intake between the baseline and after the intervention are shown in Table II.

Table III presents a summary of the results comparing responses to service and food quality survey items at baseline and after the intervention. Higher scores represent a greater level of agreement with specific topics addressed in survey items. Soldiers' overall service quality rating at baseline and after the intervention remained unchanged, with mean scores being 3.6 and 3.6, respectively. Ratings for overall food quality were similar (3.5 versus 3.6). Differences in individual survey items were not significant with the exception of food appeal, which was slightly higher after the intervention ($p < 0.05$).

DISCUSSION

Very limited research exists regarding the effectiveness of nutrition strategies and interventions in military DFACs. To date, only two studies have focused on this area of research[12,13] and no studies have been published evaluating the IMT Menu Standards Initiative. Our study not only contributes to an important and highly under-researched area but is also the first to evaluate the effectiveness of these menu standards on the food selection and nutrient intakes of soldiers' in a nontraining status. This study also addressed

TABLE II. Summary of Nontrainee DFAC Meal Offerings Based on "Go for Green" Labeling Criteria Before and After 3-Week IMT Implementation Period

	Baseline			Intervention		
	Red	Yellow	Green	Red	Yellow	Green
Meal Category						
Entrée	1	1	0	0	1	2
Side Dishes	4	1	3	2	4	6
Salad Bar	7	4	13	3	2	15
Sandwich Bar	2	2	9	2	1	9
Short Order	5	3	0	2	3	3
Desserts	4	1	1	0	2	3
Miscellaneous	4	4	6	3	4	11
Percent Totals[a]	36%	21%	43%	15%	22%	63%

[a]Calculated based on total number of meal items offered at baseline (n = 75) and after the intervention (n = 78).

TABLE III. Summary of Mean Differences in Satisfaction Scores for Baseline and Intervention Menu Groups

Variable	Baseline (n = 136) M ± SD	Intervention (n = 124) M ± SD
Friendliness of Staff	4.1 ± 0.9	4.2 ± 0.8
Food Order Accuracy	4.2 ± 0.9	4.1 ± 0.9
Promptness of Service	4.2 ± 0.8	4.1 ± 0.9
Timeliness of Food Delivery	4.2 ± 0.8	4.1 ± 1.0
Accommodation of Special Requests	3.7 ± 1.3	3.45 ± 1.4
Overall Service	4.0 ± 0.9	3.9 ± 1.0
Food Freshness	3.8 ± 1.1	3.8 ± 1.1
Food Appeal*	3.6 ± 1.1	3.8 ± 1.0
Food Flavor	3.7 ± 1.0	3.8 ± 1.1
Food Temperature	3.9 ± 0.9	4.0 ± 0.9
Food Accessibility	4.0 ± 0.9	4.0 ± 1.0
Food Variety	3.2 ± 1.3	3.3 ± 1.3
Portion Sizes Served	3.7 ± 1.1	3.7 ± 1.2
Quantity of Healthy Choice Items	3.6 ± 1.1	3.8 ± 1.1
Return Intentions	3.9 ± 1.0	3.9 ± 1.1

*$p < 0.05$.

the feasibility of implementing these standards in a nontraining environment.

We found that partial implementation of the IMT menu standards had a significant impact on soldiers' food selection and nutrient intake. Partial implementation of the IMT menu standards involved several changes to the current meal offerings and food preparation methods, which resulted in a greater selection of lower-calorie, higher-nutrient food choices and a decreased number of high-energy, low-nutrition quality selections. As with previous studies evaluating meal choices in foodservice settings,[10,28] food items available to patrons significantly influenced actual food selections. At baseline, nearly 40% of items offered were red labeled, and 45% of patrons' actual selections were red-labeled items; following the intervention, over 60% of available food choices were green labeled and patrons' actual meal selections comprised of nearly 60% green-labeled items. Changes to menu standards also resulted in a significant decline in soldiers' intakes of kilocalories, total fat, saturated fat, and sodium. Percentage of calories from fat was slightly above established meal recommendations of ≤30% yet greatly improved from the baseline, and saturated fat intake met the standard of ≤10%. Despite its emphasis on increased offerings of whole grain items and fruits/vegetables and decreased amount of cholesterols, the IMT menu standards did not have a significant impact on dietary fiber and cholesterol. Dietary fiber remained unchanged, and even though total carbohydrates decreased after the intervention, only 10% of the total carbohydrates were composed of dietary fiber in both groups. Total cholesterol intakes for both groups were similar and exceeded one-third of the daily recommendation of 300 mg. Although the IMT menu standards required lower-fat cooking methods and recipe ingredients, meat entrees and salad bar toppings such as shredded cheese and chopped egg were still offered, all of which were popular among both baseline and intervention groups.

Vitamin C intake decreased significantly after the intervention, although the amount consumed met the vitamin C requirement for the meal. Lower vitamin C intakes may have been due to main line vegetable choices, which were higher in vitamin C content on the baseline data collection day compared to those offered on the intervention data collection day. It is unlikely salad bar offerings influenced vitamin C intake since all selections, with the exception of prepared salads, salad dressings, and bacon bits, remained unchanged throughout both baseline and intervention periods.

Although an improvement in the nutrition quality of food selections and intake was observed, we found no changes in participants' satisfaction with service and meal quality, and overall satisfaction scores remained high. These findings are consistent with previous studies conducted in military DFACs,[13] and nonmilitary foodservice environments[29,30] that also found improving the healthfulness of meal options had a positive influence on customer satisfaction. Participants not only remained satisfied with food quality but also found the IMT menu choices to be more appealing than those offered during baseline. These findings are a clear indication that the changes made to the current menu standards are accepted by diners and may even be preferred.

There are several limitations to this study. First, it is possible that participants may have altered their typical food selections because of the presence of researchers and not because of the menu standard changes. Second, although the IMT menu standards were also implemented at dinner meals, data collection for this study occurred over the lunch meal period only. Patrons' food selections and nutrient intakes in the DFAC may be different at the dinner meal, which were not reflected in this study. Because of time and financial constraints the IMT menu was implemented only for a period of 3 weeks in one DFAC, and participants' food selections and consumption were assessed only on one occasion. Analyzing selections and intake over several lunch meals may provide a more accurate assessment of their actual intake and the impact of menu standard change. Also, a longer implementation period may have yielded different results. Future studies may explore the impact of partially implementing IMT menu standards for a longer period of time and assess patrons' choices on more than one occasion for a comprehensive analysis of food selection and intake.

Because of the logistical challenges of making changes for a short term only and the DFAC management staff's concern with the potential negative impact on customer satisfaction, beverage choices were not changed to meet IMT standards. To meet the rigid IMT standards, the nontrainee DFAC would have removed all the carbonated beverage dispensers, which could have been a major dissatisfier for those who were used to having carbonated beverages with their meals. In addition, DFAC management staff was concerned about changing breakfast items, the most popular meal

choice for soldiers, to meet the IMT menu standards as they expected negative consequences on DFAC census. For example, to comply with the IMT menu standards, staple breakfast items, such as pastries or omelet bar, could not be offered or at least not offered daily. Therefore, only lunch and dinner food choices were modified to comply with IMT menu standards. Full implementation of IMT menu standards at all meals would reveal true impact of these changes. Future studies may explore full implementation of IMT menu standards, keeping in mind that these nontraining soldiers have other options for their meals. If DFAC utilization rates fall below unsustainable levels, the effectiveness of such intervention will be minimized and more DFACs may face the challenge of closure.[31]

Although beverage consumption has a large impact on total nutrient intake, because of the complexity of data collection in an "all-you-can-eat" DFAC where soldiers are allowed to continue refilling their beverages, this study did not address nutrient quality related to beverage consumption. In addition, as listed above, beverage offering did not changed; and therefore, researchers did not anticipate any changes in beverage selection and consumption behaviors before and after the implementation of IMT menu standards. Future studies may include beverage selection and consumption behaviors to assess nutrient intakes of nontraining soldiers more accurately.

CONCLUSION

This study assessed the impact of the partial implementation of IMT menu standards on nontraining soldiers' food selection and nutrient intake, as well as their overall dining satisfaction and meal acceptability. The results of the study indicated the IMT menu standards improved the nutrition quality of soldiers' food selections and food consumption as total kilocalories, total fat, saturated fat, and sodium were decreased. The solders' food selection patterns mirrored what were offered under two menu standards. Furthermore, we found the overall high ratings of service and food quality remained unchanged after the intervention, and soldiers found the IMT menu selections more appealing. The results of this study provide evidence the IMT menu standards have a potential to (a) influence on the nutrition quality of patrons' meals, (b) be accepted by soldiers' in a nontraining status, and (c) be implemented in DFACs servicing the nontraining soldiers without influencing participation rates. Military dining and nutrition service leaders as well as registered dietitians/registered dietitian nutritionists and public health professions may use these results when developing and implementing strategies to improve the healthfulness of diners' meals in away from home settings for nontraining soldiers or a similar population.

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