



Investigation of Consumer Satisfaction and Leftover in Terms of Sustainable Nutrition: An Example of a University Cafeteria
Sürdürülebilir Beslenme Açısından Tüketici Memnuniyeti ve Yemek Artıklarının İncelenmesi: Bir Üniversite Kafeteryası Örneği

Nida Nur ADIYAN^{1*}, Yasemin BEYHAN¹

¹Hasan Kalyoncu Üniversitesi Sağlık Bilimleri Fakültesi Beslenme ve Diyetetik Bölümü, Gaziantep Türkiye

*Corresponding author: nursonmez@gmail.com

ABSTRACT

This study was carried out to determine the satisfaction of the students within the scope of sustainable nutrition from the mass catering offered in the university cafeteria, and to determine the amount of leftovers in various meals consumed in the university cafeteria in a week (five days) by two methods, subjective and objective. In the first part of the research (declarative/subjective part), the satisfaction/liking of the students about the catering service provided was scored with a 5-point Likert-type scaling in the questionnaire directed to the students. In the second part of the study, the leftover amounts formed by the objective method were calculated by the weighing method. It was determined that female students were more satisfied with the service style of the service offered in the cafeteria than the male students, and the difference between the gender of the students and their satisfaction with the service was found to be significant ($p<0.05$). In both methods of the study, it was found that female left more leftover in meals compared to male, and the difference between the gender of the students and the amount of leftover they left in main courses, rice and pasta was also significant ($p<0.05$). The amount of food left over in direct proportion to the dissatisfaction with the service provided by the students benefiting from the cafeteria where the research was conducted is at a size that cannot be ignored.

Keywords: Food service, satisfaction, leftover, sustainable nutrition

ÖZ

Bu çalışma, üniversite yemekhanesinde sunulan toplu beslenme hizmetinden sürdürülebilir beslenme kapsamındaki öğrencilerin memnuniyetlerini belirlemek ve bir haftada (beş gün) üniversite yemekhanesinde tüketilen çeşitli öğünlerde kalan yemek miktarını öznel ve nesnel olmak üzere iki yöntemle belirlemek amacıyla yapılmıştır. Araştırmanın birinci bölümünde (beyan edici/öznel bölüm) öğrencilere yöneltilen ankette, öğrencilerin sunulan toplu beslenme hizmetine ilişkin memnuniyetleri/beğenmeleri 5'li Likert tipi ölçekleme ile puanlanmıştır. Çalışmanın ikinci bölümünde ise nesnel yöntemle oluşturulan artık miktarlar tartım yöntemi ile hesaplanmıştır. Kadın öğrencilerin erkek öğrencilere göre yemekhanede sunulan hizmetin sunuluş biçiminden daha memnun oldukları belirlenmiş olup, öğrencilerin cinsiyeti ile hizmetten memnuniyetleri arasındaki farkın anlamlı olduğu ($p<0,05$) bulunmuştur. Çalışmanın her iki yönteminde de kadınların erkeklere kıyasla yemeklerde daha fazla kalıntı bıraktığı, öğrencilerin cinsiyetleri ile ana yemek, pilav ve makarnada bıraktıkları kalıntı miktarı arasındaki farkın da anlamlı olduğu ($p<0,05$) bulunmuştur. Araştırmanın yapıldığı kafeteryadan yararlanan öğrencilerin aldıkları hizmetten duydukları memnuniyetsizlikle doğru orantılı olarak kalan yemek miktarı göz ardı edilemeyecek boyuttadır.

Anahtar Kelimeler: Toplu beslenme hizmetleri, memnuniyet, yemek artığı, sürdürülebilir beslenme

INTRODUCTION

The concept of sustainable nutrition, created by quoting the concept of sustainable agriculture, deals with energy saving, reducing food waste/waste, limiting meat consumption and using local foods (1). In this context, the Food and Agriculture Organization (2) developed the concept of sustainable nutrition; defined sustainable diets as diets with low environmental impacts that contribute to food and nutritional security for a healthy life in present and future generations (2,3). Environmentally sustainable nutrition also includes criteria such as land use, waste/waste management, biodiversity and emissions (1). In the light of these data, the quality of the service provided and the number of portions served in the mass eating places/cafes where at least one meal is served to a large segment of the society is of great importance in this respect.

Organizations that design the nutritional needs of a particular group from a single centre, manage this operation and offer ready-to-eat food and beverages are called food service systems (4,5). These services have become widespread due to technological developments affecting our world and our country, the transition from agricultural society to industrial society, the increase in the number of people entering the business life, especially female, and the conditions brought by urbanization (4,6). Mass catering such as hospitals, schools, universities and restaurants play an important role in the supply and preparation of foods and serving large amounts of sustainably produced foods within the concept of sustainability. Especially in universities, the demand for mass catering is constantly increasing in direct proportion to the number of students. For university students to benefit from food services; many factors such as cultural differences, being away from home, income levels, eating habits, and service conditions affect satisfaction (7).

Ensuring quality in service; food losses and wastes are extremely important and should be considered for institutions that provide mass catering services such as university cafeterias, as well as the impact of such a large sector on the country's economy and providing a sustainable mass catering service that does not harm the ecosystem (8). Otherwise, food service cannot achieve its purpose and consumer needs cannot be adequately met, economic losses are "experienced, the sustainability principle is adversely affected, management fails, and personnel lack motivation (9).

The aim of this research is to determine the effect of the mass catering provided to the students in the institutions in the university where the food service is offered, on the satisfaction of the students who receive this service, to determine the amount of leftover and the reasons and to draw the attention of the relevant institutions/organizations.

MATERIAL and METHOD

Participants

In the part of the research related to satisfaction in service, the sample of the study consists of 273 volunteer students, 138 females and 135 males. A total of 300 students, 150 females and 150 males, different from the first part of the study, were included in this study in determining the amount of plate leftover of the study. The students in the first part of the study were not included in the second part.

Ethical Aspects of the Research

The research was accepted to be conducted by the Hasan Kalyoncu University Health Sciences Institute Board of Directors with the decision dated 19.03.2019 and numbered 2019/012.

Permission was obtained for the research from the Hasan Kalyoncu University Non-Interventional Research Ethics Board dated 14.06.2019 and numbered 2019/79, and for the institution where the study was conducted, from the Gaziantep University Rectorate with the number 87841438/606.01/E.23230 dated 30.10.2019.

Practice

The data for the first part of the study were collected by applying the 28-item "University Food Services Student Satisfaction and Menu Performance Questionnaire" with face-to-face interview method. Before starting the research, the participants were informed with the "Volunteer Information Form" and their consent was obtained. "Student Satisfaction and Menu Performance Questionnaire from University Food Services" was developed based on the studies and literature information on the subject of the questionnaire (6,10,11). The amount of leftover in the food was determined by the weighing method; The leftovers left in the student cafeteria where the study was conducted were determined by collecting and weighing the leftovers separately for each meal, the data obtained were processed into the "Food Leftover Amount and Percentages Form", and the total portion amounts left behind by gender for each meal served for five consecutive days were calculated.

In the first part of the "Student Satisfaction and Menu Performance Questionnaire from University Food Services", there were questions to determine the demographic characteristics of the participants (age, gender, marital status, department of education, frequency of using the cafeteria, reason for choosing the cafeteria). In the part of the questionnaire, where it is aimed to measure the menu performance, it is aimed to determine the reasons for the leftover meals of the students by offering various options. In addition, there are questions about the organoleptic, menu and service features of the meals served in the cafeteria, and the answers are rated as very bad, bad, moderate, good, very good with a 5-point Likert type scale. In the evaluation of the level of appreciation by scoring, they were accepted as very bad 1, bad 2, moderate 3, good 4 and very good 5 points, respectively. In making these calculations, empty and invalid answers in the questionnaires were not taken into account.

The "Plate Waste Amount and Percentages Form", which was prepared to process the data obtained because of the calculation of the leftovers by the weighing method of the study, was filled in by the researcher after the necessary measurements and calculations were made. This form includes the portion sizes of food served for lunch for a week (5 days a week) in a state university student cafeteria, the amount of food left on the plates of male and female students, the percentage of food left, and the total daily amount of food left for a group of 300 people. To calculate the plate leftovers of the students, the meals were weighed separately with precision scales before were served, and the average serving portion amounts were determined. Afterwards, the leftover discharge section on the lower and upper floors of the cafeteria was used. In order not to confuse the numbers of individuals, the leftovers of only females (n=150) individuals from the upper floor and only males (n=150) individuals from the lower floor were collected separately according to the type of food in the 1-week (5 days) menu. Then, the collected plate leftover was weighed one by one according to their types, and the net leftover amounts in each meal were found. At the beginning of the study, the weights of a portion of food measured were taken as reference and calculations were made by converting the total plate leftover amounts to portion amounts.

Procedures

The research data were collected by the principal researcher between November/December 2019 by applying questionnaires to the students studying at the university by face-to-face interview method and by weighing the plate leftovers of the students using the cafeteria in a 1-week period (from Monday to Friday).

Statistical Analysis

The data obtained because of the questionnaires applied by face-to-face interviews with individuals and the form in which the plate leftover amounts were calculated and processed were evaluated in the SPSS (Statistical Package for the Social Sciences) 22.0 software environment.

In the analysis of the data, the mean, standard deviation, median and less than the greatest values were calculated as descriptive statistics for quantitative (numerical) data. In qualitative (categorical) data, descriptive statistics were calculated as frequencies and percentages. Chi-square tests were used to compare qualitative data. Whether the data met the assumptions of normal distribution was tested with the Kolmogorov Smirnov test. The Test of Significance of Difference Between Two Ratios was used to compare two groups independent of a variable. For $p < 0.05$, the difference was considered statistically.

RESULTS

Of the 273 individuals included in the first part of our study, 50.5% were female, 49.5% were male, and a total of 300 students, 150 (50%) females and 150 (50%) males, were included in the second part. The average age of the 273 students in the first part of the study is 20.4 ± 1.98 . Out of 273 individuals, 266 (97.4%) were single. The average amount of pocket money they receive in a month is 573.0 ± 419.74 TL.

Considering the general satisfaction with the service provided in the cafeteria by gender in Table 1, it was seen that female were more satisfied with this service than male ($p < 0.05$). There was no significant difference between the ages of the students and their satisfaction with food service ($p = 0.391$). Although the service satisfaction of those with less monthly average allowance amount (546.86 ± 393.29) is higher than those with more pocket money (694.2 ± 439.33), this difference is not statistically significant ($p = 0.084$). It was determined that most of the students (31.5%) used this service 1-2 times a week; it was found that the frequency of using the cafeteria and satisfaction were not affected ($p = 0.436$). Likewise, the majority of the students (71.5%) preferred the cafeteria service because it was cheap/economical, but it was determined that the reasons for choosing the service did not affect their satisfaction with the service ($p = 0.545$).

Table 1. Students' satisfaction with food service according to their socio-demographic characteristics

Socio-demographic characteristics		Students who satisfied food service (n:273)	Students who don't satisfied food service (n:273)	p*
Gender, n(%)	Female	128 (%92.8)	10 (%7.2)	0.031
	Male	114 (%84.4)	21 (%15.6)	
Age (year)	$\bar{x} \pm SS$	20.42 ± 2.02	20.7 ± 1.89	0.391
Average monthly allowance	$\bar{x} \pm SS$	546.86 ± 393.29	694.2 ± 439.33	0.084
Frequency of using the cafeteria, n(%)	Every day	26 (%9.5)	4 (%1.5)	0.436
	3-4 per week	48 (%17.6)	8 (%2.9)	
	1-2 per week	77 (%28.2)	9 (%3.3)	
	1 in fifteen days	38 (%13.9)	4 (%1.5)	
	1 per month	26 (%9.5)	3 (%1.1)	
	1-2 per term	27 (%9.9)	3 (%1.1)	
Reason for choosing the cafeteria, n(%)	Cheap	170 (%62.3)	25 (%9.2)	0.545
	Hygienic	9 (%3.3)	0 (%0.0)	
	Quality	16 (%5.9)	0 (%0.0)	
	Easy to reach	47 (%17.2)	6 (%2.2)	
* $p < 0.001$				
Chi-square tests				

As can be seen in Table 2, the evaluations of most of the students on the taste of the food, the freshness of the salads/fruits, the appearance of the dishes, the level of cooking, cleanliness, portion size and temperature respectively (89.0%, 86.9%, 86.8%, 86.5%, 86.5%, 83.5%, 79.5%) are moderate and above middle. The temperature of the meals (20.5%) and portion sizes (16.5%) were evaluated as bad or very bad.

In Table 2, it is seen that the majority of the students liked the menus in terms of healthy nutrition principles (83.6%), compatibility of meals (77.7%), variety (77.3%) and frequency of recurrence (64.1%). The students evaluated the frequency of repetition of the dishes in the menus as 35.9%, the variety as 22.7% and the compatibility of the dishes with each other as bad or very bad at a rate of 22.3%.

Regarding the ministration characteristics of the service, the majority of the students stated that they liked the behaviour of the service personnel (93.4%), the cleanliness (89.0%), and the suitability of the service hours (87.9%). 39.2% of the students evaluated the cleaning of the food tray, 38.0% the cleanliness of the plates, 36.7% of the forks, spoons, knives and glasses, 19.5% of them evaluated the service style as bad and very bad.

Table 2. Students' liking for the menu properties of the food served in the cafeteria

Organoleptic Properties	Very Bad		Bad		Moderate		Good		Very good		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Flavour/ Taste	6	2.2	24	8.8	152	55.7	82	30.0	9	3.3	273	100.0
Appearance	5	1.8	31	11.4	149	54.6	83	30.4	5	1.8	273	100.0
Temperature of food	12	4.4	44	16.1	116	42.5	83	30.4	18	6.6	273	100.0
Portion size	11	4.0	34	12.5	103	37.7	100	36.6	25	9.2	273	100.0
Cooking level	10	3.7	27	9.9	113	41.4	104	38.1	19	7.0	273	100.0
Cleaning	12	4.4	25	9.2	101	37.0	107	39.2	28	10.3	273	100.0
Freshness of salad/fruit	12	4.4	24	8.8	108	39.6	95	34.8	34	12.5	273	100.0
Features related to the menu	Very Bad		Bad		Moderate		Good		Very good		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Compatibility of meals	20	7.3	41	15.0	114	41.8	88	32.2	10	3.7	273	100.0
Frequency of recurrence	38	13.9	60	22.0	107	39.2	60	22.0	8	2.9	273	100.0
Compliance with healthy eating principles	17	6.2	28	10.3	110	40.3	96	35.2	22	8.1	273	100.0
Service features	Very Bad		Bad		Moderate		Good		Very good		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Form of service	19	7.0	34	12.5	118	43.2	80	29.3	22	8.1	273	100.0
Food tray cleaning	48	17.6	59	21.6	87	31.9	63	23.1	16	5.9	273	100.0
Cleaning the plates	49	17.9	55	20.1	93	34.1	64	23.4	12	4.4	273	100.0
Cleaning forks, spoons, knives, glasses	43	15.8	57	20.9	97	35.5	63	23.1	13	4.8	273	100.0
Cleaning of service personnel	10	3.7	20	7.3	82	30.0	116	42.5	45	16.5	273	100.0
Behaviour of service personnel	11	4.0	7	2.6	71	26.0	112	41.0	72	26.4	273	100.0
Suitability of service hours	11	4.0	22	8.1	76	27.8	104	38.1	60	22.0	273	100.0

Figure 1 shows the distribution of the reasons for leaving leftovers according to the various characteristics of the meals served in the cafeteria and the nutritional habits of the students. The students indicated that the flavour and taste of the dishes were not good (28.9%) the most as the reason for leaving/not consuming leftovers in the meals served. This was followed by excess portion amount (25.3%), serving temperature of the food and not being used to the food served (15.8%) respectively.

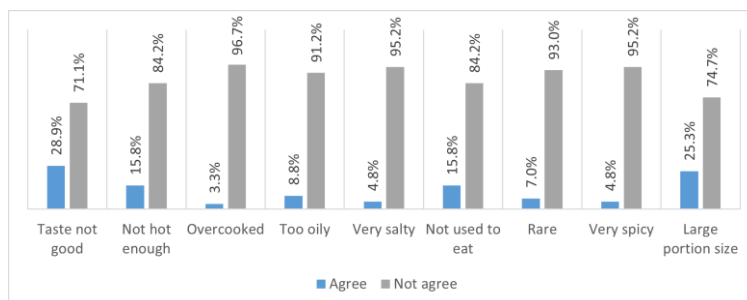


Figure 1. Distribution of students according to the reasons for leave plate leftover on their plates

As can be seen in Table 3, the most plate waste (F: 42.6%, M: 38.0%) was in the pickles in both genders. This was followed by pasta (31.2%), rice (29.8%) and main dishes (27.3%), with higher rates ($p<0.05$) in female than in male.

Table 3. Leftover rates determined by the weighing method in the food types of the students

	Female	Male	Total	
MEALS	(%)	(%)	(%)	p
Main Course	27.3	12.7	40.0	0.0016
Soup	12.9	6.5	19.4	0.0615
Rice	29.8	17.4	47.2	0.0116
Pasta	31.2	10.4	41.6	0.0001
Dessert	15.9	10.4	26.3	0.1594
Fruit	2.4	2.0	4.4	0.8136
Salad	16.8	11.4	28.2	0.1796
Pickle	42.6	38.0	80.6	0.4175

* $p<0.001$ ** $p<0.0001$
Difference test between two ratios

DISCUSSION AND CONCLUSION

In our country, university students make up 9.4% of our population. Generally, the age range of this group varies between 18-24 (12). University students are the groups that benefit from at least one meal from food services. Therefore, they have to provide at least one meal (2/3) of their daily energy and nutritional needs from the food services offered during their time at the university at a sufficient and high-quality level (9). In this study, the satisfaction with the service of the students who benefit from the mass catering at a state university was examined based on the declaration, and the amount of leftover by the students from the 4 cups/types of food offered by the weighing method was examined. The data obtained at the end of this research are discussed below.

In our study, the satisfaction levels of female (50.5%) and male (49.5%) individuals were compared in terms of general quality characteristics from the food service offered in the institution, and it was found that female liked these features more than male. According to the data obtained, the difference between the genders and their satisfaction with general quality characteristics was found to be significant ($p<0.05$) (Table 1). In a similar study conducted by Koçak (11) at Muğla University Sıtkı Koçman Student Palace in 2009, it was stated that there was no difference between the organoleptic and menu satisfaction of the meals served and the gender of the students, but female (55.6%) were more satisfied with the food service than male (43.7%) in terms of the way of serving. In a similar study conducted by Dokuyucu et al. (13) on ready-to-eat food factories in Kahramanmaraş in 2016, the demographic characteristics of the consumers and the quality characteristics of the food served in the establishment were compared and it was stated that there was a difference between their gender and satisfaction with the quality characteristics of the food. It has been shown that female (32.5%) are more satisfied with the quality characteristics of food than male (22.8%) (13).

The mean age of the students included in our study was 20.4 ± 1.98 , and the monthly average allowance amount was 573.0 ± 419.74 TL. The majority of these students (31.5%) benefit from this service 1-2 times a week and mostly (71.5%) prefer the cafeteria because it is economical/cheap.

The average age of the students, the monthly average amount of pocket money, the frequency of using the cafeteria (in terms of daily changing menus) and the reasons for their preference do not affect their liking for the cafeteria service, and the difference between their satisfaction was not significant ($p>0.05$, Table 1). In a study conducted by Bakır et al. (14) in 2016 on Marmara University students to determine the factors that create satisfaction in the university environment, it was stated that there was a difference between the satisfaction levels of students in different age groups and food service. In our research, although the majority of the students stated that the organoleptic characteristics of the meals served in food service, the taste-flavour (89.0%),

appearance (86.8%), freshness of the salads/fruits (86.9%), cooking level (86.5%), cleanliness (86.5%), portion quantity (83.5%) and temperature (79.5) were moderate or above medium; 20.5% of students rated the temperature of the food, and 16.5% of students the portion size as bad or very bad (Table 2.).

Taste perception is generally defined as a highly complex emotion consisting of taste and smell, but also including bitter and temperature stimuli (15, 16). Therefore, in order for the temperature, which has an important role in the perception of taste, to be at appropriate degrees in the meals served, the production planning should be appropriate for the food service, the processes should be started in accordance with the standard tariffs and taking into account the service hours, the hot meals should be served hot; cold dishes should be kept in cold counters (7,9). Planning healthy and balanced menus for the target group to which the service will be provided, determining the energy and preferably macronutrient values are very important in terms of ensuring the satisfaction of the consumer target group in food services (17, 18). In our study, the majority of the students liked the menu features of the meals offered, their compliance with the principles of healthy eating (83.6%), the harmony of the dishes (77.7%), the variety (77.3%) and the frequency of repetitions (64.1%) above medium and moderate. On the other hand, 35.9% of the students evaluated the frequency of repetition, 22.7% the diversity, and 22.3% the compatibility of the meals with each other as bad or very bad (Table 2). One of the basic principles to be considered while planning the menus offered in food services is to ensure diversity and harmony within the menu. If the food/drinks in the menus are repeated too often, menu monotony occurs. A menu that moves away from monotony and is harmonious can be more effective in meeting students' demands and increasing satisfaction.

Various food service methods are applied in mass catering (19). According to the service characteristics of food and beverage businesses; in fast service places (fast food, etc.), table service places (restaurants, restaurants, etc.) and corporate food services, it is mostly classified as self-service/self-service (9). Generally, meals are served to the table for academic staff working at the university, while students' queue for self-service within the limited time given to them and their meals are given by the staff (service personnel) in charge (7,9,20). In our study, the majority of students regarding the service characteristics of the service stated that they liked the behaviour of the service personnel (93.4%), the cleanliness (89.0%), and the convenience of the service hours (87.9%). However, 39.2% of the students evaluated the cleaning of the food tray, 38.0% the cleanliness of the plates, 36.7% of the forks, spoons, knives and glasses, 19.5% of the students evaluated the service style as bad and very bad (Table 2). In institutions where mass catering is provided, the main aim is to present the food to the consumer in a way that is free from health-impairing factors (9). Within the framework of this purpose, one of the most important factors in ensuring hygiene in food services is to ensure the cleanliness and hygiene of all kinds of equipment related to physical conditions and food/beverage. For this, it is imperative that the necessary infrastructure, education and materials are adequately provided (6,21). As a matter of fact, in a study conducted by Yanık et al. (22) in 2011 to evaluate the satisfaction of hospital personnel with the food services provided to them, nearly half of the personnel, such as 45%, stated that the cleaning of the dinnerware was not sufficient and that various diseases could spread in this way.

It is reported that one third (1.3 billion tons) of food produced in the world is lost and lost every year. In our country, every year, 4.2 tons of food and 2000 liters of beverages per enterprise are thrown away in the service sector, resulting in great losses. Factors such as the psychological and socio-economic conditions of the individual, food allergies, lack of awareness of quality nutrition, food habits and preferences, subjective characteristics of the food served, the number of servings, etc., play an important role in food losses and wastes in relation to the consumer (6,9,23). In our study, it was also emphasized that the students' leaving/not consuming leftovers may be related to various characteristics of the food (taste, portion, temperature, etc.) and the nutritional habits of the individuals (cultural changes, habits, etc.). Regarding this, when the reasons for the students to leave/not consume leftovers in the meals offered are evaluated in line with the students' statements;

It was found that reasons such as the tasteless food with 28.9%, the large portion amount with 25.3%, the lack of familiar tastes with 15.8%, and the food not being hot enough (Figure 1).

In our study, although the students who were asked the survey questions (n:273) and the students who collected the leftovers (n:300) were different individuals, when the reasons for leaving the leftovers were examined, the fact that the food was not hot enough and the amount of portions were high are among the service characteristics (and even considering flavor/taste dislike due to this) that 16.5%-20.5% of the students evaluated as bad or very bad (Table 2). Therefore, in order to minimize the amount of waste, the reasons why students leaving leftovers should be investigated, problems should be approached with a solution, and better-quality service should be provided to students by making improvements on the subject. In a study conducted by Abdelaal et al. (24), the reasons for students leaving leftovers were the taste of the food served, over or undercooked, not fresh vegetables and fruits, and portion size.

As a result of the comparison of the leftover amount rates calculated by the objective / weighing method according to the gender of the students; except for the amount of plate leftover in the main course, rice and pasta, there it was no difference between the calculated plate leftover amounts in the food types ($p>0.05$, Table 3). The first-course meals are the meal group with the highest cost because it contains meat (7). In order not to harm the business financially and to understand that the needs of the students are really met, it is necessary to determine the amount of waste, to investigate the reasons and to provide the necessary improvements. In addition to the financial concerns of the business, the waste and losses in first-course meals due to the fact that the greenhouse gas production of animal-derived foods is relatively higher than plant-based foods will also negatively affect the "low environmental impacts", which is the basic principle of a sustainable diet (1). Therefore, minimizing the waste and loss rates in these types of food is extremely important both in terms of finance and sustainability. Furthermore, although female students have higher satisfaction rates than male students, it is observed that they leave more leftovers, especially in main dishes, pasta and rice ($p<0.05$, Table 3). The reason for this may be that female cannot consume large portions due to their body image. In order to minimize the amount of leftovers, the portion sizes of female students should be reduced to meet their needs and training should be given to students with incorrect body image. Although leftovers are determined objectively by the weighing method, it can be suggested as a practical and accurate method to apply a satisfaction survey that questions the consumption amounts in the meals served and the reasons if leftovers are left.

This study was planned and carried out to determine the satisfaction of students using a state university student cafeteria with the food service provided and to determine the amount of plate leftovers in the meals and their reasons. The fact that the students in the first and second phases of the study were not the same and that the satisfaction status evaluated in the first phase was associated with the plate leftovers evaluated in the second phase were determined as limitations of the study. As a result of the research, it was determined that there was dissatisfaction with some applications of the food service offered to the students and accordingly, it has been determined that there are leftovers in sizes that cannot be ignored. In order to ensure consumer satisfaction in places where food service is provided, and in parallel, the absence and minimization of waste, the dimensions and causes of the problem must first be determined, solutions for the cause must be proposed; and mass catering management and employees must develop a realistic strategy in this direction. Thus, the measures taken regarding sustainable nutrition and healthy life, which should be emphasized today, will contribute not only to health, but also to the solution of health, environment and hunger problems in the world.

Acknowledgments

This study is produced from a master's thesis. We thank the management of Gazi Antep University for permission to conduct the study.

Declaration of Ethical Code

In this study, we undertake that all the rules required to be followed within the scope of the "Higher Education Institutions Scientific Research and Publication Ethics Directive" are complied with, and that none of the actions stated under the heading "Actions Against Scientific Research and Publication Ethics" are not carried out.

REFERENCES

- Gülsöz, S., Aksoydan, E. 2018. Sürdürülebilir Beslenme. ss195-212. Tayfur, M., ed. 2018. Beslenme ve Diyetetik, Güncel Konular-6. Hatipoğlu Yayıncılık, Ankara, 250s.
- Food and Agriculture Organization. 2012. Sustainable Diets and Bioersivity: Directions and Solutions for Policy, Research and Action. <https://www.fao.org/policy-support/tools-and-publications/resources-details/en/c/522860/> (Accessed 02.02.2022).
- Çakır, B. 2019. Dünya Geleceğinin Şekillenmesinde Sürdürülebilir Beslenme ve Diyetisyenlerin Rolü. ss.185-208. Tayfur, M., ed. 2018. Beslenme ve Diyetetik, Güncel Konular-2. Hatipoğlu Yayıncılık, Ankara, 430s.
- Sezgin, AC., Özkaya, FD. 2014. An Overview of Mass Feeding System. *Academic Food Journal*, 12(1), 124-28. <https://dergipark.org.tr/en/pub/akademik-gida/issue/55791/763721>
- Uğurlu, B., Beyhan, Y., Erkut E. 2019. Evaluation of Transported Food Services Provided in Gaziantep Public Hospitals. *Zeugma Health Res*, 1(1), 9-14. <https://sbf.hku.edu.tr/wp-content/uploads/2020/01/zeugma-health-dergi.pdf>
- Üstel, Ö. 2005. An evaluation of the level of satisfaction of staff Gazi hospital receiving the mass catering services, Hacettepe University, Health Sciences Institute, Published Master Thesis, 142s, Ankara.
- Merdol, MK. 2017. Toplu Beslenme Servisi: Sağlıklı Yönetim Rehberi. 3. Baskı. Tayfur, M., ed. 2017. Beslenme ve Diyetetik Dizisi. Hatipoğlu Yayıncılık, Ankara, 375s.
- Ellison, B., Savchenko, O., Nikolaus, CJ., et al. 2019. Evaluations of a Food Waste Reduction Campaign in a University Dining Hall. *Resources, Conservation and Recycling*, 114(9), 276-84. <https://doi.org/10.1016/j.resconrec.2019.01.046>
- Beyhan, Y. 2018. Toplu Beslenme Sistemlerinin Yönetim ve Organizasyonu. 2. Baskı. Beyhan, Y., ed. 2018. Ankara Nobel Tıp Kiyableri Dizgi Birimi, Ankara, 300s.
- Ercan, G., Ok, M. 2018. Validity and Reliability Study of Turkish Form of Hospital Food Services Patient Satisfaction Scale. *Türkiye Klinikleri J Health Sci.*, 3(3), 187-194. <http://dx.doi.org/10.5336/healthsci.2018-60053>
- Koçak, FÖ. 2009. Customer Satisfaction in Food Sector and Muğla University Sample, Graduation Project, Süleyman Demirel University, Isparta.
- Türkiye Statistical Institute-TÜİK. 2016. Adult Education Survey Micro Data Set. <https://www.tuik.gov.tr/media/microdata/pdf/yetiskin-egitim.pdf> (Accessed 02.03.2020).
- Dokuyucu, V., İnanç, AL., Paksoy, M. 2016. A Study Towards Determining Information Level of Customers Taking Service from Convenience Food Companies in the City of Kahramanmaraş about Convenience Food Sector. *Route Educational and Social Science Journal*, 3, 266-83. http://www.ressjournal.com/Makaleler/154313731_13%20Veysel%20Dokuyucu.pdf
- Bakır, NO., Arslan, FM., Gegez, AE. 2016. Factors Affecting Satisfaction Levels of University Students: A Research on Marmara University Business Administration Faculty Students. *Marmara Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 38(1), 93-125. <https://doi.org/10.14780/iibd.69451>
- Czaniecka- Skubina, E., Gorska-Warsewicz, H., Laskowski, W., et al. 2019. Consumer Choices and Service Quality in the University Canteens in Wasaw. Poland. *Int. J. Environ. Res. Public Health*, 16(19), 3699. <https://doi.org/10.3390/ijerph16193699>
- Takalkar, AA., Kumavat, AP. 2011. Assessment of Personal Hygiene of Canteen Workers of Government Medical College and Hospital, Solapur. *Natl. J. Community Med.*, 2(3), 448-51. <https://njcmindia.com/index.php/file/article/view/1941>
- Tayfur, M., Beyhan, Y. 1999. Study on Serving Temperature of the Hot Meals and Their Evaluation by the Patients. *J Nutr and Diet*, 28(2), 41-6. <https://beslenmevediyetdergisi.org/index.php/bdd/article/view/789>
- Lee, K. 2019. Students' Dietary Habits, Food Services Satisfaction, and Attitude Toward School Meals Enhance Meal Consumption in School Food Services. *J. Nutr Res Pract.*, 13(6), 555-63. <https://doi.org/10.4162/nrp.2019.13.6.555>.
- Rosenbaum, MS., Ward, J., Walker, BA., et al. 2007. A Cup of Coffee with a Dash of Love: An Investigation of Commercial Social Support and Third-place Attachment. *J. Serv. Res.*, 10(1), 43-59. <https://doi.org/10.1177/1094670507303011>.
- Ng, Y. 2005. Study of the impact of customer satisfaction on intention to return and return intention, and word-of-mouth endorsement in university dining operations, published master thesis, Oklahoma State University, Stillwater, OK.
- Kızıltan, G., Merdol, KT. 2000. Evaluation of the Equipment Used in Mass Feeding Institutions Serving Food to Five Hundred and more People per Day in Terms of Quality and Quantity. *J Nutr and Diet*. 29(1), 17-23. <https://beslenmevediyetdergisi.org/index.php/bdd/article/download/824/760/>
- Yanık, A, Yılmaz E. 2011, Evaluation of Food Service Personnel in an Education and Research Hospital Outsourcing Dining Services. *Electronic Journal of Vocational Collages*, 1(1), 126-139.

<https://dergipark.org.tr/tr/pub/ejovoc/issue/5395/73184>.

23. Lorenz, BA-S., Hartmann, M., Langen, N. 2017. What Makes People Leave Their Food? The Interaction of Personal and Situational Factors Leading to Plate Leftovers in Canteens. *Appetite*, 116, 45-56. <https://doi.org/10.1016/j.appet.2017.04.014>.
24. Abdelaal, A., McKay, G., Mackey, H. 2019. Food Waste from University Campus in the Middle East: Drivers, Composition, and Resource Recovery Potential. *Waste Management*, 98, 14-20. <https://doi.org/10.1016/j.wasman.2019.08.007>