



Patient Satisfaction With Hospital Foodservice and its Impact on Plate Waste in Public Hospitals in East Malaysia

Nur Farhana Aminuddin¹, Reena Kumari Vijayakumaran^{1*}, Shariza Abdul Razak¹

¹Nutrition & Dietetics Department, School of Health Sciences, Health Campus, University Sains Malaysia, Kelantan, Malaysia

*Corresponding Author: Reena Kumari Vijayakumaran, Ph.D., Assistant Professor, Nutrition & Dietetics Department, School of Health Sciences, Health Campus, University Sains Malaysia, 16150 Kubang Kerian, Kelantan, Malaysia. Tel: +60-7677833, Email: reena@usm.my

Received January 31, 2018; Accepted March 12, 2018; Online Published May 20, 2018

Abstract

Background: Foodservice is an important issue in hospital settings, and patients' levels of satisfaction are often indicated by consumption and plate waste.

Objective: The current study compared patient satisfaction in hospital areas and other factors and determined the relationship between patient satisfaction and plate waste.

Methods: This quantitative research was performed in four East Malaysian public hospitals. Patients at these hospitals were asked to complete a questionnaire which had three parts: A) general information, B) patient satisfaction questionnaire (Acute Care Hospital Foodservice Patient Satisfaction Questionnaire), and C) plate waste scale (Comstock 6-point scale).

Results: A total of 189 patients participated. The results indicated that overall, 53.3%, 29.3%, 14.1%, 2.7%, and 0.5% of respondents rated the hospital foodservice as okay, good, poor, very good, and very poor, respectively. Average plate waste was 35% for all hospitals, and only 11% of patients finished all the food served. Satisfaction with hospital food differed according to the catering system (in-house and outsourced). However, the results also indicated that satisfaction with hospital foodservice was not significantly related to food wastage ($r = -0.018$, $n = 189$, $P = 0.809$).

Conclusion: Various factors in hospital foodservice, especially food quality, should be improved to motivate patients to consume hospital food.

Keywords: Patient Satisfaction, Food Services, Hospitals

1. Background

Foodservice has become an important issue in hospital settings,¹ because to recover, patients need a balanced diet in addition to medical supplies and treatments. Hospital food is also an example of healthy and nutritious meals that are tailored to patients' health conditions.² Hospital foodservice is known to be an important element in determining a patient's overall perception of the hospital experience.^{3,4} The provision of hospital foodservice should not only meet, but, if possible, also exceed patients' expectations so as to gain the patients' confidence in hospital food.⁵

One way often used to determine whether a patient's expectation of hospital food has been met is to measure the patient's level of satisfaction with the hospital food or foodservice. To date, many types of research have been done around the world using different methods and

different populations to investigate patient satisfaction.⁶⁻¹² Researchers in many countries, including Malaysia, have identified the level of satisfaction to be between 35.85%-85%.^{9,10,12-15}

Although satisfaction has been rated as high in many of these studies, plate waste often remains common in hospitals, indicating that further research is necessary to understand the issue. Research has also indicated that there is need to find innovative ways to reduce plate waste without compromising patient satisfaction or nutritional intake.¹⁶ Measuring plate waste is one of the effective measures of meal provision¹⁷ and has been used to provide feedback on food acceptability and to help plan menu changes¹⁸ and adequacy of food intake.¹⁹ One review of 32 studies from countries such as the United States, the United Kingdom, Denmark, Australia, Saudi Arabia, the Netherlands, Switzerland, Brazil, and Korea showed that

the range of plate waste was 6%-65%.¹⁷ It is understood that plate waste can be low or extremely high, depending on various factors. Since data on hospital plate waste in Malaysian hospitals is limited, this study was conducted.

Hospital food is the sole source of nutrition for more than 75% of hospital patients.¹ It is critical, as the consumption of less food than the required amounts can lead to malnutrition among patients. Hospital malnutrition was associated with immune system distress, impaired wound healing, muscle atrophy, longer length of stay, higher treatment cost, and increased mortality.^{5,9,20,21} Food quality, meal service, staff issues, and the physical eating environment contribute to patient satisfaction.^{9,20-25} One study found that almost half of the food served in hospitals is wasted because of the taste, portion size, patient's appetite, or staff service.⁴ Thus, it can be concluded that similar factors affect both satisfaction and plate wastage.

A study focusing on satisfaction with hospital foodservice and plate waste was necessary for Malaysia. Different catering systems and sociodemographic backgrounds could impact the level of satisfaction and plate waste. This study was conducted East Malaysia, because few studies conducted in this area and on this issue were found.

2. Objective

The main objective of this study was to investigate patient satisfaction with foodservice and plate waste at East Malaysian public hospitals. Various factors such as age, gender, ethnicity, length of stay, academic background, and type of catering system were also tested to determine which factors, if any, had a significant effect on patient satisfaction with hospital foodservice. Relationships between patient satisfaction and plate wastage in hospitals were also investigated.

3. Methods

3.1. Type of Study

The quantitative research method was selected for this study as it focused on demonstrating the relationships between variables; hence hypothesis testing was required. The design of this study was non-experimental, and a survey questionnaire was used because of the lack of a control group of respondents. Moreover, this study did not manipulate independent variables in order to demonstrate a relationship between an independent and dependent variable.

The survey method was used primarily to obtain quickly a large number of responses with minimal disturbance to the patients who were recuperating in the wards.

3.2. Sample Size and Sampling Method

This study was carried out in the 2 states of Sabah and Sarawak (also known as East Malaysia). The rural and urban hospitals had bed counts of 400 and 589, respectively, in Sabah, and 68 and 756, respectively, in Sarawak. Information on the occupation rate was unavailable; hence, the number of beds was used to determine sample size. The

hospitals in each state were located in the same district but differed in whether they were rural or urban hospitals. Rural hospitals were smaller in size compared to urban hospitals. The rural hospitals used a decentralized plating system with an in-house catering system. Conversely, the urban hospitals used a centralized plating system with an outsourced catering system. Such selection allowed comparisons of the number of patients served, type of catering system used, and its impact on patient satisfaction and food wastage.

The current study had a sample size of 189 patients (92 in rural hospitals, 97 in urban hospitals). calculated based on the Raosoft, Inc. sample size calculator to determine the total number of patients admitted. Convenience sampling was used, because the number of patients who met the study's inclusion criteria, especially in rural hospitals, was very limited. The inclusion criteria comprised being 18-65 years in age (adults), on a normal diet, and able to complete the questionnaire. Exclusion criteria were being illiterate, too sick to participate, on a therapeutic diet, or nil by mouth.

Early in the year 2017, approximately one week was spent in each hospital to collect data. On the first day of data collection, the researcher reported to the Hospital Director's office before heading to the general wards to distribute questionnaires and observe food wastage. When an insufficient number of respondents was found in the general wards, data collection was extended to the medical, gynecology, and pathology wards, as patients from these wards were more likely to meet the inclusion criteria.

In each ward, the sister, or staff nurse, assisted the researcher in identifying patients who fit the survey criteria. Data was collected at either before or after meals and usually at lunchtime. Next, the researcher approached the patients, provided them with information on the research, and obtained consent from each patient before giving the questionnaire to them to complete voluntarily.

3.3. Questionnaire

Both Malay and English versions of a survey questionnaire were used. The Acute Care Hospital Foodservice Patient Satisfaction (ACHFPSQ) questionnaire was translated back-to-back from English to Malay. The translated questionnaires were sent to the Language Center of the Universiti Sains Malaysia. Experts and 10 patients checked and answered the questionnaire to provide feedback on the content and clarification of terms before the actual data collection commenced. The questionnaire comprised 3 parts: (A) general information, (B) patient satisfaction (using the Acute Care Hospital Foodservice Patient Satisfaction Questionnaire - ACHFPSQ), and (C) food wastage scale (Comstock 6-point scale). Patients completed parts A and B, and part C was completed by the researcher after observation. In part C, the researcher observed the patient's plate before and after meal consumption to evaluate food wastage for one meal of the day (usually lunch). Questionnaires were collected after 30 minutes.

3.3.1. Part A: General Information

Part A included questions on the type of hospital, ward information, patient age, height, weight, gender, race, academic background, length of stay in hospital, and reasons for leaving food leftovers.

3.3.2. Part B: The Acute Care Hospital Foodservice Patient Satisfaction Questionnaire

The ACHFPSQ was designed and developed by Capra et al in 2005 to measure satisfaction with acute care hospital foodservice in the four dimensions of food quality, meal service quality, staff/service issues, and physical environment.^{4,5} The ACHFPSQ is widely used to understand patient satisfaction with food services, and it provides an accurate, reliable measure of patient satisfaction with foodservice, which allows for quality improvement^{2,9,10,12}; however, prior to this study, it had not yet been used in public hospitals in Malaysia. Hence, the ACHFPSQ was used in this study as a reliable and valid tool to reflect patients' levels of satisfaction with Malaysian hospital foodservice.

The ACHFPSQ uses a 5-point Likert scale with scores of Always = 5, Often = 4, Sometimes = 3, Rarely = 2, and Never = 1. Statements that were worded negatively were scored using the reverse scoring method. The higher the mean score, the better the results were.

3.3.3. Part C: Comstock 6-Point Scale

The Comstock 6-point scale was developed by Comstock in 1980 to measure the extent of food wastage.²⁶ This scale has been adapted and modified into studies in the United States, Canada, Indonesia, and Israel.²⁷⁻³⁰ The researcher observed the leftovers before recording the data into the scale. The scale comprises levels of all not eaten = 100%, one bite eaten = 80%, 3/4 left = 60%, 1/2 left = 40%, 1/4 left = 20%, and none left = 0%. Visual estimations were made using the Comstock 6-point scale in a hospital setting in Malaysia in this study; hence, the results reflect the current rates of food wastage in Malaysian public hospitals. Researchers investigated the validity of visual estimation in a clinical setting over 15 non-consecutive days with the help of nursing assistants and dietitians.³¹ Calculations were made to determine if the raters over- or underestimated the wastage. Both raters' estimations were highly correlated with the weighting method. The validity of visual estimation was also evaluated by another researcher, and the results showed that visual estimation is a useful and valid method for measuring food intake, and, indirectly, food waste.³²

3.4. Statistical Analysis

Data was managed and analyzed using SPSS (Statistical Package for Social Sciences, version 24, Chicago, IL, USA). Descriptive analysis (means and percentages) was used to describe general information. The *t* test was conducted to highlight any significant differences ($P < 0.05$) in terms of patient satisfaction within gender groups and catering

systems. Meanwhile, for groups of more than two levels (length of stay, ethnicity, and academic background), ANOVA was conducted to measure the means. Spearman correlation was used to determine the correlation between patient satisfaction and plate wastage, as the variable was ranked.

4. Results

4.1. General Information

Fifty questionnaires were distributed in each studied hospital. In all, 189 of the 200 distributed questionnaires were collected (94.5% response rate). All 189 responses were included in all analyses conducted in this study. The mean age of the respondents was 44 years, and ages ranged from 18 to 65 years. Overall, more females ($n=101$, 54.4%) than males ($n=88$, 46.6%) participated in this study. The majority of respondents were of 'Other' ethnicity ($n=96$, 51%), followed by Malay ($n=57$, 30%), Chinese ($n=33$, 17.5%), and Indian ($n=3$, 1.5%). Most participants listed secondary school as their highest level of education ($n=79$, 42%), followed by college/university ($n=45$, 23.8%), primary school ($n=38$, 20%), and no formal education ($n=27$, 14.2%). The majority of participants stayed 2-3 days ($n=68$, 36%) in the hospital, followed by more than 7 days ($n=49$, 26%), 4-5 days ($n=31$, 16.4%), 1 day ($n=21$, 11.1%), and 6-7 days ($n=19$, 10.5%) (Table 1).

4.2. Overall Patient Satisfaction

The results of overall satisfaction (asked as a separate question) indicated that the majority of patients rated hospital foodservice as okay (53.3%), followed by good

Table 1. General information

Variables	No. (%)
Age	
18-35	78 (41.3)
36-55	65 (34.4)
56-65	46 (24.3)
Gender	
Male	88 (46.6)
Female	101 (54.4)
Ethnicity	
Malay	57 (30)
Chinese	33 (17.5)
Indian	3 (1.5)
Others	96 (51)
Academic background	
No formal education	27 (14.2)
Primary and secondary	38 (20)
College/university	45 (23.8)
Length of stay (days)	
1-3	28 (14.8)
4-7	115 (60.8)
>7	46 (24.3)
Catering system	
In-House	97 (51.3)
Outsource	92 (48.7)

(29.3%), poor (14.2%), very good (2.7%), and very poor (0.5%). Combining the scores of very good and good indicated that 32% of respondents were pleased with the hospital foodservice, while poor and very poor combined indicated 14.7% of patients were not satisfied.

In Table 2, statements from ACHFPSQ and the mean score of each statement are presented. The statements were grouped into four main dimensions: food quality, meal service quality, staff/service issues, and physical environment in order to know the factor scores of the dimensions. This grouping was introduced by Capra et al and has been used by other researchers to measure highest and lowest score factors affecting satisfaction with hospital foodservices.^{10,12} The most positively rated factors were “Staff members who deliver my meals are neat and clean,” “I am disturbed by the noise of finished meal trays being removed,” and “Staff members who take away my finished meal tray are friendly and polite” (4.4, 4.1, and 4.0, respectively). “The menu has enough variety for me to choose meals that I want to eat” and “Staff members who deliver my menus are helpful” were rated 2.63 and 2.6, respectively, putting these two lowest on the list. In terms of the four dimensions, patients were most satisfied with the physical environment (3.75), followed by staff/service issues (3.7), meal service quality (3.51), and food quality (3.15). A higher score indicated better satisfaction; thus, the results indicated that food quality was the aspect of hospital foodservices with which patients were least satisfied.

4.3. Patient Satisfaction According to Various Factors

The relationship between patient satisfaction and age was measured using the Pearson product-moment correlation coefficient. The results identified a weak negative correlation between the 2 variables ($r = -0.16$, $n = 189$, $P = 0.03$), with higher age being associated with

lower satisfaction with the hospital foodservice. Subjects were divided into 3 age groups (18-35, 36-55, and 56-65 years). The independent sample *t* test results indicated no significant difference in scores for males ($M = 2.62$, $SD = 0.74$) and females ($M = 2.65$, $SD = 0.77$); $t(187) = 0.27$, $P = 0.79$ (two-tailed). The magnitude of the differences in the means (mean difference = -0.03 , 95% CI: -2.5 to 0.19) was very small ($\eta^2 = 0.0004$). Only 0.04% of the variance in patient satisfaction was explained by gender. Thus, gender was found not to be a significant factor affecting patient satisfaction using ACHFPSQ.

One-way ANOVA was used to determine differences in satisfaction with foodservices across factors such as ethnicity (Malay, Chinese, Indian, and Other), length of stay (1 to 3 days, 4 to 6 days, more than 7 days), and academic background (no formal education, primary and secondary, college/university). The results indicated that neither ethnicity ($P = 0.19$) nor length of stay ($P = 0.51$) was significantly different in terms of patient satisfaction with the foodservice.

For academic background, however, there was a significant difference between the group means at $P = 0.004$. One-way ANOVA was used, and since the variance was violated (significant value from Levene test of homogeneity was smaller than 0.05), the Welch test was used instead. The post-hoc test conducted using the Games-Howell test for unequal variance showed that the group with no formal education ($M = 2.4$, $SD = 0.14$) and the group with a college education ($M = 2.91$, $SD = 0.11$) were significantly different ($P = 0.006$). The group of primary and secondary education ($M = 2.6$, $SD = 0.07$) was also significantly different when compared with the college group ($M = 2.91$, $SD = 0.11$, $P = 0.02$). This test showed that the group with no formal education was significantly different from the group of college education, and the group with primary and secondary levels of

Table 2. Patient’s Satisfaction Level according to ACHFPSQ

Foodservice Dimension	Statement (Item)	Mean score	Factor Score
Food quality	The hospital food has been as good as I expected.	3.1	3.15
	I am able to choose a healthy meal in the hospital.	3.4	
	I like the way the vegetables are cooked.	3.1	
	The meals taste good.	3	
	The menu has enough variety for me to choose meals that I want to eat.	2.6	
	The meals have excellent and distinct flavors.	3.1	
	The meat is tough and dry.	3.7	
Meal service quality	The drinks are served at the right temperature.	3.4	3.5
	The hot drinks are just the right temperature.	3.6	
	The cold foods are the right temperature.	3.4	
Staff/service issues	Staff members who deliver my meals are neat and clean.	4.4	3.7
	Staff members who take away my finished meal tray are friendly and polite.	2	
	Staff members who deliver my menus are helpful.	2.6	
Physical environment	The dishes and utensils are chipped and/or stained.	3.9	3.75
	Hospital smells stop me from enjoying my meals.	3.3	
	I am disturbed by the noise of finished meal trays being removed.	4	

education was also significantly different from the college group when ranking satisfaction in hospital foodservice. It was established that patient satisfaction differed across different academic backgrounds.

Independent sample *t* test was used to compare the patient satisfaction scores for in-house and outsourced catering systems. There was a significant difference in scores for in-house ($M=2.9$, $SD=0.72$) and outsourced ($M=2.4$, $SD=0.72$) systems; $t(187) = 4.69$, $P < 0.05$ (two-tailed). The magnitude of the differences in the means (mean difference = 0.50, 95% CI: 0.28 to 0.70) was moderate (eta-squared = 0.11), and 11% of the variance in patient satisfaction could be explained by the catering system. Thus, catering system is a moderately significant factor affecting patient satisfaction using ACHFPSQ.

4.4. Plate Wastage and Patient Satisfaction

Average plate wastage was 36% for all four hospitals, and only 11% of respondents managed to finish the food they were served without leaving any waste behind. The Comstock 6-point scale was recorded as a percentage to find the mean plate wastage. Table 3 shows that these percentages were higher in the state of Sabah (41.2% and 42.2%) than the state of Sarawak (36.7% and 24%).

Patients were also asked one question about their reasons for leaving food uneaten (if there was any left in the meal observed by the researcher) to better understand why the food was not eaten. The results, shown in Table 4, indicate that, regardless of the hospital's location and catering system, patients explained that the main reason for not finishing their meals was that they had different food preferences (ranging from 47%-55%), and this was followed by no appetite (ranging from 23%-37%) and timing of the meal service for 3 out of 4 hospitals (ranging from 15%-20%). There was no significant correlation between patient satisfaction and plate wastage ($P > 0.05$) when Spearman's correlation was used ($r = -0.018$, $n = 189$, $P = 0.809$). The results indicated that patient satisfaction

did not reflect plate waste, although this could be due to the small number of subjects.

5. Discussion

Overall, 32% of participants rated hospital foodservice as either very good or good. This was similar with studies carried out in other countries that indicated a moderate level of overall satisfaction,^{13,33} but it must be acknowledged that 14.7% of patients rated hospital foodservice as very poor or poor. Moreover, the level of satisfaction found in this study was much lower than that of another study in Malaysia, which also took into account supplemented food intake¹⁵ and was not conducted in East Malaysia. As such, improvement in hospital foodservice is certainly necessary, as the ultimate goal of hospital foodservice is to eliminate dissatisfaction.

When patient satisfaction was analyzed using the ACHFPSQ, it became clear that the food quality dimension scored the lowest compared to the other dimensions (score=3.15). Being dissatisfied with food quality is not something new; it has been widely reported, and recommendations have been made to improve foodservice.^{10,12,22,34-38} Patients were not satisfied specifically with the food quality, because there was less variety in the menu. This can be explained by the fact that in most Malaysian public hospitals, no menus were distributed; hence, patients do not know beforehand what will be served. Another explanation is the repetition of menu practiced in hospitals. Menu-related issues have been identified as influential factors on patients' food consumption,³ and therefore, they should be improved. Apart from that, taste, flavors, and how the meat and vegetables were cooked also affected patient satisfaction with the dimension of food quality (as referred to in the questionnaire statements).

Patients gave scores of 3.00, 3.01, 3.01 (lowest range of satisfaction as >3.00 mean satisfied) to aspects such as "The meals taste good," "I like the way the vegetables were cooked," and "The hospital food was good as expected," respectively. This indicated that specific aspects should be improved in hospitals, as they have been previously reported to affect patients' food consumption.^{9,34} Meal service quality (score=3.50), staff/service issue (score=3.70), and physical environment (score=3.75) had higher satisfaction levels compared to food quality, but every aspect within each dimension should be analyzed specifically. For example, within the staff/service issue dimension, patients were least satisfied with the aspect "Staff members who deliver my menus are helpful," (score=2.60). These dimensions have been mentioned in other studies as being compromised and affecting patients' food consumption.^{20,22,24} Hence, these dimensions should be improved to gain higher patient confidence in hospital foodservice in the future.

Patient satisfaction was found to have a negative correlation with age; older patients reported lower satisfaction levels with hospital foodservice systems. This is similar to a patients' satisfaction study conducted in

Table 3. Mean Wastage (Percentage) in Each Hospital

State	Area	Mean Wastage (%)
Sabah	Urban	41.2
	Rural	42.2
Sarawak	Urban	36.7
	Rural	24

Table 4. Reasons for not Finishing Meals

Reasons	Sabah (%)		Sarawak (%)	
	Urban	Rural	Urban	Rural
Portion size	6	10	4	2
Timing of the meal service	15	15	20	2
Different food preferences	53	52	47	55
Unfamiliar surroundings (environment)	-	-	2	4
No appetite	26	23	27	37
Total	100	100	100	100

hospitals in which satisfaction was significantly higher in younger subjects and lower in older subjects.¹³ Older patients might have reduced taste sensitivity compared to younger patients, because different age groups taste flavors differently.³⁹ However, studies have also reported that age does not affect patient satisfaction.^{10,14} Nevertheless, the age of the patients being admitted should be taken into account when providing hospital food, because patients' preferences, food palatability, and expectations tend to differ.

Patient satisfaction with hospital foodservice did not differ across genders, which was similar with another study.¹⁴ However, there are also findings which indicated that females were more satisfied with hospital food than males.¹³ In terms of length of hospital stay, the findings were similar to those of another study in which the length of hospital stay did not affect patient satisfaction.¹⁰ Perhaps length of stay did not affect patient satisfaction in this study because the majority of participants (60.8%) stayed for not more than a week (4-7 days). This made determining the differences in satisfaction between newly admitted patients and those who stayed longer than 3 days difficult. The levels of 1-3 days, 4-7 days, and more than 7 days were used in order to simplify the grouping analysis by having more subjects in one group in hopes of finding any significant differences. Originally, the levels were 1 day, 2-3 days, 4-5 days, 6-7 days, and more than 7 days. Other studies have reported that patients who stayed longer were more dissatisfied with the hospital foodservice.^{9,40} Repetition of menu contributed to the dissatisfaction as most hospitals repeated the menu after a week.

In terms of academic background, 2 pairs of groups showed a significant difference: patients with no academic background and patients with a college education as well as primary and secondary school education and college background. Patients who had a tertiary education were shown to have a lower level of satisfaction compared to patients with no formal education or a primary and secondary school level. Less educated patients were generally more satisfied. Although it is evident that education level determined the level of patient satisfaction,⁴¹ some studies have reported contradicting findings as well.^{14,24} Nonetheless, the influences of academic background on the level of satisfaction should be acknowledged, as those patients with a higher education level tend to be more knowledgeable, have higher expectations, and not easily satisfied.

It should also be acknowledged that in this study, satisfaction differed according to the type of catering system. It is known that rural hospitals employ an in-house catering system and a decentralized plating system, while in urban hospitals, an outsourced catering system and a centralized plating system is used. Type of foodservice system used (in-house, outsourced) also indicated the type of plating system used (centralized in outsourced hospitals and decentralized in in-house hospitals). Both foodservice and plating systems certainly had an effect on patient

satisfaction.^{8,42-45} For example, patients were satisfied with the service aspect when the hospitals used an outsourced and centralized system, but they were not satisfied with the food quality, especially the taste.^{8,40,45} It was also noted that rural hospitals are smaller in size than urban hospitals. This could explain why patients were satisfied with the food quality when the hospital was smaller in size and used the in-house and decentralized system in other studies.^{40,44-45} It can be concluded that patients were generally more satisfied when food was prepared in a smaller hospital using the in-house and decentralized systems and vice versa.

Food wastage ranged from 24%-42.2% across the hospitals. Wastage was recorded to be greater in Sabah than in Sarawak. The wastage range indicated moderate to high wastage and reached almost 50%. Food wastage in the hospital setting is economically constraining to hospital operations^{16,34}; hence, steps must be taken to reduce it. When patients were asked why the food served was not finished, the majority of them indicated their reasons to be different food preferences, followed by no appetite and timing of meal service. More than half (52%) of the respondents said they preferred to have something else for their meal than what was served. Many studies have indicated that the food served in hospitals is unfamiliar to the patients, or it is not something that the patients usually consume at home.^{8,34} Furthermore, meal times were usually too early for the patients.^{20,44} "No appetite" is a common statement given by patients when they do not eat well, and researchers have indicated that patient food consumption can be improved by improving the food quality, the staff/service element, and by providing an environment more conducive to food consumption.^{34,46} These aspects, especially food quality, should certainly be taken into account when improving the hospital foodservice in East Malaysian public hospitals.

6. Conclusion

The findings of this study are extremely valuable in highlighting both patient satisfaction and level of food wastage at public hospitals in East Malaysia. The dimension of food quality had the lowest score, affecting overall satisfaction through preferences and expectation of hospital food, which warrants improvement. As the results indicated, there are differences in satisfaction levels between various factors. The impact of practices such as catering and plating systems must be investigated and improved to ensure that patients are satisfied and will consume hospital food. Plate wastage reached almost 50% overall and was largely affected by patients' preferences. Addressing patients' preferences will surely reduce food wastage and lead to more efficient utilization of the budget allocated for hospital food. Since the findings was focused on public hospitals in East Malaysia, a nationwide research will be more reflective of the overall situation in Malaysia and instrumental in improving Malaysia's hospital food.

Authors' Contributions

All authors contributed equally to this research.

Research Highlights

What Is Already Known?

Patient satisfaction is an indicator of a hospital's foodservice system, and the factors affecting satisfaction have also been introduced. Food quality, meal service quality, staff or service issues, and environment are four recognized factors. Plate waste is another worrying issue in this sector, as it indicates low food consumption among patients. To date, very little data has been gathered in East Malaysia on overall patient satisfaction and plate wastage because of the lack of research in this area.

What This Study Adds?

This study shows the current ratings of hospital foodservices, identifies satisfaction factors that need attention, and presents the percentage of plate waste among patients. Hospital management can review their performance, and researchers can make recommendations based on this information.

Conflict of Interest Disclosures

The authors declare that they have no conflicts of interest.

Ethical Approval

This study obtained ethical approval from the National Medical Registry for Research of Malaysia (NMRR) and the Research and Ethical Committee of Universiti Sains Malaysia. Data collection was commenced only upon receiving approval from each hospital.

Acknowledgments

The authors would like to acknowledge Universiti Sains Malaysia for granting the short-term grant making this research possible. We thank the staff and patients at the hospitals who made the data collection smooth. Special thanks go to the matrons who took time out of their busy schedules to help.

References

- Andersson AC, Elg M, Perseus KI, Idvall E. Evaluating a questionnaire to measure improvement initiatives in Swedish healthcare. *BMC Health Serv Res*. 2013;13:48. doi:10.1186/1472-6963-13-48.
- Dall'Oglio I, Nicolo R, Di Ciommo V, et al. A systematic review of hospital foodservice patient satisfaction studies. *J Acad Nutr Diet*. 2015;115(4):567-584. doi:10.1016/j.jand.2014.11.013.
- Gregoire MB. Quality of patient meal service in hospitals: delivery of meals by dietary employees vs delivery by nursing employees. *J Am Diet Assoc*. 1994;94(10):1129-1134. doi:10.1016/0002-8223(94)91132-0.
- Wright OR, Connelly LB, Capra S. Consumer evaluation of hospital foodservice quality: an empirical investigation. *Int J Health Care Qual Assur Inc Leadersh Health Serv*. 2006;19(2-3):181-194. doi:10.1108/09526860610651708.
- Capra S, Wright O, Sardie M, Bauer J, Askew D. The acute hospital foodservice patient satisfaction questionnaire: The development of a valid and reliable tool to measure patient satisfaction with acute care hospital foodservices. *Journal of Foodservice*. 2005;16(1-2):1-14. doi:10.1111/j.1745-4506.2005.00006.x.
- O'Hara P A, Harper DW, Kangas M, Dubeau J, Borsutzky C, Lemire N. Taste, temperature, and presentation predict satisfaction with foodservices in a Canadian continuing-care hospital. *J Am Diet Assoc*. 1997;97(4):401-405. doi:10.1016/S0002-8223(97)00100-4.
- Williams R, Virtue K, Adkins A. Room service improves patient food intake and satisfaction with hospital food. *J Pediatr Oncol Nurs*. 1998;15(3):183-189. doi:10.1177/104345429801500307.
- Edwards JS, Nash AH. The nutritional implications of food wastage in hospital food service management. *Nutr Food Sci*. 1999;99(2):89-98. doi:10.1108/00346659910254394
- Stanga Z, Zurfluh Y, Roselli M, Sterchi AB, Tanner B, Knecht G. Hospital food: a survey of patients' perceptions. *Clin Nutr*. 2003;22(3):241-246. doi:10.1016/S0261-5614(02)00205-4.
- Fallon A, Gurr S, Hannan-Jones M, Bauer JD. Use of the Acute Care Hospital Foodservice Patient Satisfaction Questionnaire to monitor trends in patient satisfaction with foodservice at an acute care private hospital. *Nutr Diet*. 2008;65(1):41-46. doi:10.1111/j.1747-0080.2007.00219.x.
- Wong EL, Coulter A, Cheung AW, Yam CH, Yeoh EK, Griffiths SM. Patient experiences with public hospital care: first benchmark survey in Hong Kong. *Hong Kong Med J*. 2012;18(5):371-380.
- Messina G, Fenucci R, Vencia F, Niccolini F, Quercioli C, Nante N. Patients' evaluation of hospital foodservice quality in Italy: what do patients really value? *Public Health Nutr*. 2013;16(4):730-737. doi:10.1017/s1368980012003333.
- El Sherbiny NA, Ibrahim E, Hewedi M. Patients' satisfaction with delivered food services in Fayoum hospitals. *EC Nutrition*. 2017;9(2):94-104.
- Abdelhafez AM, Al Qurashi L, Al Ziyadi R, Kuwair A, Shobki M, Mograbi H. Analysis of factors affecting the satisfaction levels of patients toward food services at General Hospitals in Makkah, Saudi Arabia. *Am J Med Med Sci*. 2012;2(6):123-130. doi:10.5923/j.ajmms.20120206.03.
- Teng SC, Bahaman E, Teng WY. Are Patients Satisfied with Hospital Food. *Malaysian Journal of Public Health Medicine*. 2003;3:52-56.
- Ofei KT, Holst M, Rasmussen HH, Mikkelsen BE. How practice contributes to trolley food waste. A qualitative study among staff involved in serving meals to hospital patients. *Appetite*. 2014;83:49-56. doi:10.1016/j.appet.2014.08.001.
- Williams P, Walton K. Plate waste in hospitals and strategies for change. *Eur J Clin Nutr Metab*. 2011;6(6):e235-e241. doi:10.1016/j.eclnm.2011.09.006
- Connors PL, Rozell SB. Using a visual plate waste study to monitor menu performance. *J Am Diet Assoc*. 2004;104(1):94-96. doi:10.1016/j.jada.2003.10.012.
- Huls A. Decreased plate waste: a sign of meeting resident needs. *J Am Diet Assoc*. 1997;97(8):882. doi:10.1016/S0002-8223(97)00214-9.
- Johns N, Hartwell H, Morgan M. Improving the provision of meals in hospital. The patients' viewpoint. *Appetite*. 2010;54(1):181-185. doi:10.1016/j.appet.2009.10.005.
- Young A, Allia A, Jolliffe L, et al. Assisted or Protected Mealtimes? Exploring the impact of hospital mealtime practices on meal intake. *J Adv Nurs*. 2016;72(7):1616-1625. doi:10.1111/jan.12940.
- Dube L, Trudeau E, Belanger MC. Determining the complexity of patient satisfaction with foodservices. *J Am Diet Assoc*. 1994;94(4):394-398. doi:10.1016/0002-8223(94)90093-0.
- Hwang LJ, Eves A, Desombre T. Gap analysis of patient meal service perceptions. *Int J Health Care Qual Assur Inc Leadersh Health Serv*. 2003;16(2-3):143-153. doi:10.1108/09526860310470874.
- Sahin B, Demir C, Celik Y, Teke AK. Factors affecting satisfaction level with the food services in a military hospital. *J Med Syst*.

- 2006;30(5):381-387. doi:[10.1007/s10916-006-9022-3](https://doi.org/10.1007/s10916-006-9022-3).
25. Lily Zakiah, Saimy I, Maimunah AH. Plate waste among hospital inpatients. *Malaysian Journal of Public Health Medicine*. 2005;5(2):19-24.
 26. Comstock EM, St Pierre RG, Mackiernan YD. Measuring individual plate waste in school lunches. Visual estimation and children's ratings vs. actual weighing of plate waste. *J Am Diet Assoc*. 1981;79(3):290-296.
 27. Andrews YN, Castellanos VH. Development of a method for estimation of food and fluid intakes by nursing assistants in long-term care facilities: a pilot study. *J Am Diet Assoc*. 2003;103(7):873-877. doi:[10.1053/jada.2003.50168](https://doi.org/10.1053/jada.2003.50168).
 28. Paquet C, St-Arnaud-McKenzie D, Kergoat MJ, Ferland G, Dube L. Direct and indirect effects of everyday emotions on food intake of elderly patients in institutions. *J Gerontol A Biol Sci Med Sci*. 2003;58(2):153-158. doi:[10.1093/gerona/58.2.M153](https://doi.org/10.1093/gerona/58.2.M153).
 29. Budiningsari D, Shahar S, Manaf ZA, Susetyowati S. A simple dietary assessment tool to monitor food intake of hospitalized adult patients. *J Multidiscip Healthc*. 2016;9:311-322. doi:[10.2147/jmdh.s105000](https://doi.org/10.2147/jmdh.s105000).
 30. Navarro DA, Boaz M, Krause I, et al. Improved meal presentation increases food intake and decreases readmission rate in hospitalized patients. *Clin Nutr*. 2016;35(5):1153-1158. doi:[10.1016/j.clnu.2015.09.012](https://doi.org/10.1016/j.clnu.2015.09.012).
 31. Kawasaki Y, Sakai M, Nishimura K, et al. Criterion validity of the visual estimation method for determining patients' meal intake in a community hospital. *Clin Nutr*. 2016;35(6):1543-1549. doi:[10.1016/j.clnu.2016.04.006](https://doi.org/10.1016/j.clnu.2016.04.006).
 32. Dhingra P, Sazawa S, Menon VP, Dhingra U, Black RE. Validation of visual estimation of portion size consumed as a method for estimating food intake by young Indian children. *J Health Popul Nutr*. 2007;25(1):112-115.
 33. Hartwell H, Johns N, Edwards JSA. E-menus—Managing choice options in hospital foodservice. *Int J Hosp Manag*. 2016;53:12-16. doi:[10.1016/j.ijhm.2015.11.007](https://doi.org/10.1016/j.ijhm.2015.11.007).
 34. Hartwell HJ, Edwards JSA, Symonds C. Foodservice in hospital: development of a theoretical model for patient experience and satisfaction using one hospital in the UK National Health Service as a case study. *Journal of Foodservice*. 2006;17(5-6):226-238. doi:[10.1111/j.1745-4506.2006.00040.x](https://doi.org/10.1111/j.1745-4506.2006.00040.x).
 35. Dube L, LeBel JL, Lu J. Affect asymmetry and comfort food consumption. *Physiol Behav*. 2005;86(4):559-567. doi:[10.1016/j.physbeh.2005.08.023](https://doi.org/10.1016/j.physbeh.2005.08.023).
 36. Lau C, Gregoire MB. Quality ratings of a hospital foodservice department by inpatients and postdischarge patients. *J Am Diet Assoc*. 1998;98(11):1303-1307. doi:[10.1016/s0002-8223\(98\)00291-0](https://doi.org/10.1016/s0002-8223(98)00291-0).
 37. Huang JS, Chun S, Cheung C, Poon L, Terrones L. The nutritional value of food service meals ordered by hospitalized children. *Clin Nutr ESPEN*. 2016;15:122-125. doi:[10.1016/j.clnesp.2016.06.008](https://doi.org/10.1016/j.clnesp.2016.06.008).
 38. Agarwal E, Ferguson M, Banks M, et al. Malnutrition and poor food intake are associated with prolonged hospital stay, frequent readmissions, and greater in-hospital mortality: results from the Nutrition Care Day Survey 2010. *Clin Nutr*. 2013;32(5):737-745. doi:[10.1016/j.clnu.2012.11.021](https://doi.org/10.1016/j.clnu.2012.11.021).
 39. Neumann L, Schauren BC, Adami FS. Taste sensitivity of adults and elderly persons (Sensibilidade gustativa de adultos e idosos). *Rev Bras Geriatr Gerontol*. 2016;19(5):797-808. doi:[10.1590/1809-98232016019.150218](https://doi.org/10.1590/1809-98232016019.150218).
 40. Wright O, Capra S, Aliakbari J. A comparison of two measures of hospital foodservice satisfaction. *Aust Health Rev*. 2003;26(1):70-75. doi:[10.1071/AH030070](https://doi.org/10.1071/AH030070).
 41. Al-Hoqail IA, Abdalla AM, Saeed AA, Al-Hamdan NA, Bahnassy AA. Pilgrims satisfaction with ambulatory health services in Makkah, 2008. *J Family Community Med*. 2010;17(3):135-140. doi:[10.4103/1319-1683.74331](https://doi.org/10.4103/1319-1683.74331).
 42. Hartwell HJ, Edwards JS, Beavis J. Plate versus bulk trolley food service in a hospital: comparison of patients' satisfaction. *Nutrition*. 2007;23(3):211-218. doi:[10.1016/j.nut.2006.12.005](https://doi.org/10.1016/j.nut.2006.12.005).
 43. Englund EH, Lassen A, Mikkelsen BE. The modernization of hospital food service – findings from a longitudinal study of technology trends in Danish hospitals. *Nutr Food Sci*. 2007;37(2):90-99. doi:[10.1108/00346650710736354](https://doi.org/10.1108/00346650710736354).
 44. Naithani S, Whelan K, Thomas J, Gulliford MC, Morgan M. Hospital inpatients' experiences of access to food: a qualitative interview and observational study. *Health Expect*. 2008;11(3):294-303. doi:[10.1111/j.1369-7625.2008.00495.x](https://doi.org/10.1111/j.1369-7625.2008.00495.x).
 45. Vijayakumaran RK, Eves A, Lumbers M. Patients Emotions during Meal Experience: Understanding through Critical Incident Technique. *Int J Hosp Res*. 2016;5(4):113-121.
 46. Xia C, McCutcheon H. Mealtimes in hospital--who does what? *J Clin Nurs*. 2006;15(10):1221-1227. doi:[10.1111/j.1365-2702.2006.01425.x](https://doi.org/10.1111/j.1365-2702.2006.01425.x).