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Original Research

The Relationship Between Food Appearance, Taste, and Meal Serving Timeliness and Plate Waste Among Patients at Dr. Abdoer Rahem Regional Hospital, Situbondo

Hubungan penampilan, cita rasa, dan ketepatan waktu penyajian makanan terhadap sisa makanan pasien di RSUD dr. Abdoer Rahem Situbondo

Galih Purnasari[1*], Safin Ratna Andriyani[1]
[1] Health Faculty, Politeknik Negeri Jember, Jember, Indonesia

* Email corresponding author: galih_purnasari@polije.ac.id

Abstract: *The acceptability of hospital food is reflected by the amount of food waste. Food waste represents the percentage of food that remains uneaten during one or more mealtimes. The amount of food waste can be influenced by food appearance, taste, and the timeliness of service. The purpose of this study was to determine the relationship between food appearance, taste, and timeliness of service with patient food waste at Dr. Abdoer Rahem Regional Hospital, Situbondo. This research employed an observational analytic design with a cross-sectional approach. A total of 50 respondents were selected using purposive sampling. The instruments used in this study included a food appearance assessment questionnaire, a food taste assessment questionnaire, a serving timeliness questionnaire, and a Comstock form. Data analysis was conducted using Fisher's exact test with SPSS version 25. The results showed p = 0.00 for food appearance, p = 0.04 for food taste, and p = 1.00 for timeliness of service. It can be concluded that there is a significant relationship among food appearance, food taste, and food waste. At the same time, there is no significant relationship between serving timeliness and food waste. Efforts are needed to improve the taste and appearance of hospital food to reduce the high level of patient food waste.*

Keywords: *food appearance, food waste, serving timeliness, taste*

1. INTRODUCTION

Patients expect high-quality food services in hospitals, particularly regarding the presentation and quality of meals served. Although hospital nutrition services have improved alongside advances in nutrition science and healthcare technology, problems related to patient food acceptance remain common. One indicator of the quality of hospital nutrition services is the amount of food waste generated by patients. High levels of food waste indicate poor food acceptability and may reduce patients' nutritional intake during hospitalization (1). In Indonesia, the percentage of food waste in hospitals remains relatively high. A study by Lestari and Marlina (2021) at Petala Bumi Regional Hospital in Riau reported food waste of 30.6% for breakfast, 39.8% for lunch, and 35.6% for dinner (2). Similarly, a study by Fadilla et al. (2020) at Sidoarjo Regional Hospital reported food waste rates of 29% for breakfast, 33% for lunch, and 38% for dinner. These figures exceed the hospital's minimum service standard for food waste, which is ≤20% (3). In many hospitals, food waste remains a significant issue. Studies in hospital settings have reported that the proportion of uneaten food often exceeds the recommended standard of ≤20%. High food waste not only indicates low patient acceptance of hospital meals but may also lead to inadequate nutrient intake,

delayed recovery, and increased hospital operational costs (4). Several factors contribute to the occurrence of food waste among hospitalized patients. These factors can generally be categorized into internal, external, and environmental factors. Internal factors include patients' physical condition, psychological state, and eating habits. External factors are primarily related to sensory attributes of the food, such as appearance and taste. Food appearance includes attributes such as color, texture, shape, portion size, and presentation, while taste includes aroma, level of doneness, seasoning, and food temperature. Environmental factors include hygiene and sanitation, timeliness of food service, friendliness of food service staff, and the consumption of food brought from outside the hospital (5).

Food appearance plays an important role in stimulating patients' appetite. Visually appealing meals can increase patients' willingness to consume the food served, which may contribute to improved nutritional intake and faster recovery. Conversely, unattractive food presentation may reduce appetite and lead to increased food waste (6). This is consistent with the findings of Rachmawati and Afifah (2021), who reported that food appearance was perceived as less attractive because the texture of the side dishes served by the hospital was difficult to chew and not suitable for the patient's disease condition. As a result, patients experienced a decreased appetite and left a considerable amount of food uneaten (7). Taste is also considered one of the most influential determinants of food consumption among hospitalized patients. Studies have shown that patients who perceive hospital meals as having poor taste tend to leave more food uneaten, whereas patients who consider the food tasty are more likely to finish their meals (4). These findings are also supported by research conducted by Putri et al. (2025), which reported that the lower the satisfaction with food taste, the higher the amount of patients' food waste (8). In addition to sensory attributes, environmental factors such as the timeliness of meal service also influence food consumption. Serving meals according to the scheduled meal times is important because delays in food service may reduce appetite and lead to increased food waste among patients. A preliminary study conducted among 20 patients in the Internal Medicine Ward of dr. Abdoer Rahem Regional Hospital reported an average food-waste rate of 27.8%, exceeding the hospital's minimum service standard of ≤20%. Interviews with ward staff indicated that food waste frequently occurs in this ward. Therefore, further research is needed to analyze the relationship between food appearance, taste, and the timeliness of meal service with patient food waste in dr. Abdoer Rahem Regional Hospital Situbondo. This study aimed to determine the relationship between food appearance, taste, and the timeliness of meal service with patient food waste in the hospital.

2. METHODS

This study employed an observational analytic design with a cross-sectional approach. The research was conducted for seven days at dr. Abdoer Rahem Regional Hospital, Situbondo, from February 13 to February 19, 2023. The population of this study consisted of all hospitalized patients in the Internal Medicine Ward of dr. Abdoer Rahem Regional Hospital, Situbondo, in February 2023 who received any hospital diet, totaling 50 patients. The study subjects were inpatients in Class I, II, and III wards in the Internal Medicine Unit (Arjuna Ward) who met the inclusion criteria. The inclusion criteria were adult patients aged 18–60 years, patients who had been hospitalized for at least two days and had received three daily meals (breakfast, lunch, and dinner), patients receiving regular or soft diet forms (regular rice, soft rice/porridge, and rice porridge), patients receiving any type of therapeutic diet, patients who were able to

communicate well, patients with full consciousness (*compos mentis*), and patients who were willing to participate in the study by signing an informed consent form. The exclusion criteria included patients who were transferred from dr. Abdoer Rahem Regional Hospital to another healthcare facility, patients who were discharged, patients who died, patients whose diet was changed to clear liquid, full liquid, or filtered diet, and patients whose meals were consumed by their family members. The sample size in this study was calculated using the binomial proportion formula, given the known population size, yielding a minimum sample size of 45 subjects. To account for potential dropouts, the researchers added a 10% non-response rate to the minimum sample size. Therefore, the final sample size in this study was 50 subjects.

The sampling technique used in this study was purposive sampling. Purposive sampling is a sampling technique in which subjects are selected based on specific considerations. This technique was used because the selection of respondents was focused on patients who met the inclusion and exclusion criteria determined by the researchers, ensuring that the selected subjects were appropriate for achieving the objectives of the study. Data were collected through direct interviews with patients, accompanied by family members who assisted them. The interviews were conducted using a questionnaire covering the following data: (1) patients' general identity data, including name, age, sex, address, date of admission, diagnosis, type of diet, length of stay, ward/class of care, education, and occupation; (2) food appearance data, including color, texture, shape, portion size, and food presentation; (3) food taste data, including aroma, level of doneness, and food temperature; and (4) timeliness of food service, obtained from patient interviews. Meanwhile, data on food waste were obtained by measuring patients' leftover food using the Comstock visual estimation method.

3. RESULTS

Univariate

The characteristics of the study subjects are presented in **Table 1** below.

Table 1. Frequency distribution of the subjects' characteristics.

Category	Frequency (n)	Persentage (%)
Age (years)		
16-18	3	6
19-29	9	18
30-49	16	32
50-64	22	44
Sex		
Man	19	38
Woman	31	62
Occupation		
Laborer	12	24
Employee	8	16
Self-employed	4	8
Pelajar	6	12
Housewife	20	40
Education level		
College/University	4	8
Senior high school or equivalent	18	36

Junior high school or equivalent	7	14
Elementary school or equivalent	11	22
Did not complete elementary school	10	2
Total	50	100

The frequency distribution of subjects' assessments of food appearance, taste, and the timeliness of food service is presented in **Figure** 1.

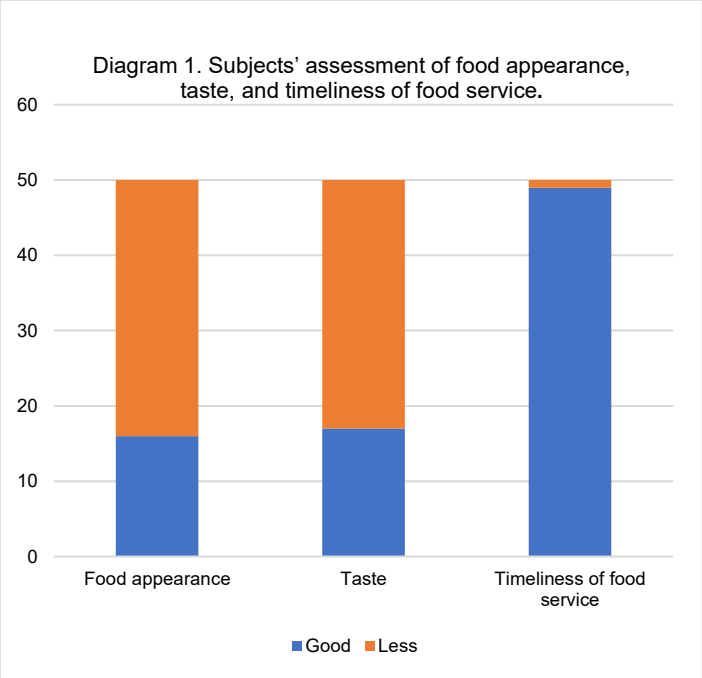

Figure 1. The frequency distribution of subjects' assessments of food appearance, taste, and the timeliness of food service

The frequency distribution of the subjects' food waste is presented in **Table 2** below.

Tabel 2. Distribusi frekuensi sisa makanan subjek

Food waste category	Frequency (n)	Persentage (%)
High	41	82
Low	9	18
Total	50	100

Bivariate

The results of the statistical test between food appearance and food waste are presented in Table 3 below.

Table 3. The relationship between food appearance and patient food waste

Food Appearance	Food Waste				Total		*Fisher's Exact Test P value*
	Low		High				
	n	%	n	%	n	%	

Less appealing	0	0	31	100	31	100	0,00*
Appealing	9	47,4	10	52,6	19	100	
Total	9	18	41	82	50	100	

* **Note:** Fisher's Exact Test correlation analysis. *Statistically significant (p < 0.05)*

Table 4. The relationship between taste and patient food waste

Taste	Food Waste				Total		*Fisher's Exact Test P value*
	Low		High				
	n	%	n	%	n	%	
Poor	3	9,1	30	90,9	33	100	0,04*
Good	6	35,3	11	64,7	17	100	
Total	9	18	41	82	50	100	

* **Note:** Fisher's Exact Test correlation analysis. *Statistically significant (p < 0.05)*

Table 5. The relationship between serving timeliness and patient food waste

Serving timeliness	Food Waste				Total		*Fisher's Exact Test P value*
	Low		High				
	n	%	n	%	n	%	
Not timely	0	0	1	100	1	100	1,00
Timely	9	18,4	40	81,6	49	100	
Total	9	18	41	82	50	100	

* **Note:** Fisher's Exact Test correlation analysis. *Statistically significant (p < 0.05)*

4. DISCUSSION

Based on Table 1, it was found that patients aged 50–64 years constituted the largest proportion of inpatients in the Internal Medicine ward, totaling 22 individuals (44%) out of 50 patients. The majority of subjects (62%) were female, and 40% were housewives. The highest level of education among subjects was senior high school or equivalent (36%). The frequency distribution of subjects' assessments of food appearance, taste, and meal service timeliness is presented in Figure 1. In terms of food appearance, most subjects (34 individuals or 68%) rated it as less appealing. Regarding taste, the majority of subjects (33 individuals or 66%) rated the food taste as poor. However, almost all subjects (49 individuals or 98%) considered the timeliness of meal service to be good or timely. After the study was conducted, the average food waste among 50 patients in the Internal Medicine ward was 49.8%. The highest amount of food waste occurred on the third day of the study. This finding does not meet the Hospital Minimum Service Standard for food waste, which is ≤20%. Based on Table 2, 41 subjects (82%) left a large amount of food waste compared to those who left only a small amount. This may be attributed to the less appealing food appearance and poor taste of hospital meals, particularly in the first cycle menu, leading to reduced patient appetite.

Relationship between Food Appearance and Food Waste

Data analysis was conducted using Fisher's Exact Test due to expected counts of <5 (≥20%). Based on Table 9, the percentage of patients who rated food appearance as less appealing was higher than that of those who rated it as appealing. Statistical analysis yielded a p-value of 0.00 ($p < 0.05$), indicating that H_0 was rejected and there

was a significant relationship between food appearance and food waste. These findings suggest that the less appealing the food's appearance, the greater the amount of food waste, and vice versa. Similar findings were reported by Ansari et al. (2024), who found that food appearance significantly influenced the amount of food waste among inpatients (9). This result is consistent with a study by A'yun et al. (2025), which reported a significant relationship between food appearance (including color, shape, and presentation) and food waste among hospitalized patients (6). According to Trisilawati (2021), food appearance can influence patients' willingness to consume the meals provided; therefore, meals should be presented in a way that enhances appetite. Improved appetite may accelerate patient recovery (10). Based on Głuchowski et al. (2024), the perception of food appearance is influenced by visual factors such as shape, size, color, and presentation (plating/design) (11).

Based on patient interviews, those who rated food appearance as less appealing and left more food waste reported that the food lacked color variety. This was observed in the first cycle menu, particularly lunch (clear spinach and pumpkin soup, meat roulade, and fried tofu), where color variation was limited. Additionally, the texture of animal-based side dishes was considered insufficiently tender, as seen in the breakfast menu (beef soup) of the first cycle. The portion of staple food (rice) in the third cycle was perceived as too large. Furthermore, the shape of food in the first cycle menu (brongkos) appeared inconsistent, with uneven cutting of long beans, carrots, and pumpkin. Poor food presentation was also noted in the third cycle menu (long bean and carrot coconut milk soup), where some spillage affected the arrangement. This occurred because food servers distributed meals in a hurry, causing slight spillage.

Relationship between Food Taste and Food Waste

Based on Table 4, the proportion of patients who rated food taste as poor and left a large amount of food waste was higher compared to those who rated taste as poor but left little waste, as well as those who rated taste as good. Statistical analysis showed a p-value of 0.04 ($p < 0.05$), indicating that H_0 was rejected and there was a significant relationship between food taste and food waste. These findings indicate that poorer taste is associated with higher food waste, while better taste is associated with lower food waste. This result is consistent with recent studies reporting a significant relationship between food taste and food waste among hospitalized patients (5,6). Patients who perceived the taste of meals as good tended to leave less food, whereas those who perceived it as poor left more food. Patient satisfaction with food, particularly taste, has also been shown to significantly influence food waste, with higher satisfaction associated with lower waste (12). Furthermore, taste perception is influenced by several components, including aroma, seasoning, level of doneness, temperature, and texture of food (6) Based on interview results, patients rated food taste as poor due to unappealing aroma, particularly in the first cycle menu (clear spinach and pumpkin soup and brongkos), which reduced their appetite. Additionally, the temperature of the food was often cold, especially during breakfast. This occurred because of the long interval between portioning and distribution, causing the food to cool before reaching patients.

Relationship between Meal Service Timeliness and Food Waste

Based on Table 5, only one patient who perceived meal service as untimely left a large amount of food waste. This number was smaller compared to patients who perceived the service as timely, totaling 49 individuals who left either large or small amounts of food waste. Statistical analysis showed a p-value of 1.00 ($p > 0.05$), indicating that H_0 was accepted and there was no relationship between meal service timeliness and food

waste. These findings suggest that meal service timeliness does not influence food waste. This finding is consistent with a recent study by Pebrina et al. (2025), which reported no significant relationship between meal service timeliness and food waste among hospitalized patients (13). However, other studies have shown contrasting results. A study published in the Journal of Global Nutrition (2023) reported a significant relationship between meal service timeliness and plate waste, indicating that patients who received meals on time tended to leave less food (14). Similarly, Kusumawati (2024) found that timely food distribution influences food waste through its effect on food temperature and overall acceptability (15). According to the Indonesian Ministry of Health Decree No. 129 of 2008, the standard for timely meal service is ≥90%. At RSUD dr. Abdoer Rahem Situbondo, meal service timeliness reached 100%, meeting the minimum service standard. However, some patients still left food waste. This may be due to differences in patients' habitual meal times at home compared to the hospital. Patients who are accustomed to eating late at home may not immediately consume meals when served in the hospital and may perceive the meal distribution time as too early.

5. CONCLUSION

The average food waste among subjects in the Internal Medicine ward, assessed visually using the Comstock form, was 49.8%. This finding does not meet the Hospital Minimum Service Standard for food waste, which is ≤20%. A total of 32% of patients rated the appearance of food as appealing, whereas 68% rated it as less appealing. Furthermore, 34% of patients rated the taste of the food as good, whereas 66% rated it as poor. Regarding meal service timeliness, 98% of patients rated it timely, whereas 2% rated it untimely. There were significant relationships between food appearance ($p = 0.00$), food taste ($p = 0.04$), and food waste. However, no relationship was found between meal service timeliness ($p = 1.00$) and food waste. Efforts are needed to improve the taste and appearance of hospital food to reduce the high level of patient food waste. Future research should consider other factors influencing food waste, such as internal factors (physical condition, psychological condition, and patients' eating habits) and environmental factors (food hygiene and sanitation, food service staff friendliness, and the frequency of food consumption from outside the hospital).

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