

The Relationship Between Food Handlers' Personal Hygiene, Meal Serving Time, and Patient Preferences with Food Waste in the Nutrition Department of K.R.M.T. Wongsonegoro Regional Hospital, Semarang

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ABSTRACT

Background: Hospital foodservice plays a strategic role in supporting patient recovery, and plate waste is commonly used as an indicator of the quality of nutrition services. High levels of plate waste may reflect problems related to food handling practices, meal distribution, and patient acceptance of the meals provided.

Objective: This study aimed to analyze the association between food handlers' personal hygiene, meal service timing, and patient preferences with solid food plate waste at the Nutrition Department of K.R.M.T. Wongsonegoro Regional Hospital, Semarang.

Materials and Methods: An analytical observational study with a quantitative cross-sectional design was conducted at the Nutrition Department of K.R.M.T. Wongsonegoro Regional Hospital, Semarang. Data were collected from 45 nutrition staff members directly involved in food handling before meal distribution to patients. Observations were also carried out on 45 hospitalized patients receiving solid-texture diets during three main meal periods: breakfast, lunch, and dinner. Food handlers' personal hygiene, meal service timing, patient preferences, and solid food plate waste were assessed using observation and questionnaire methods. Data were analyzed using the Chi-square test to determine the association between food handlers' personal hygiene and plate waste, Fisher's Exact Test to examine the association between meal service timing and plate waste, and the Mann–Whitney U test to analyze the association between patient preferences and plate waste. Statistical significance was set at $p < 0.05$.

Results: Food handlers' personal hygiene was significantly associated with solid food plate waste ($p = 0.014$). Meal service timing also showed a significant association with solid food plate waste ($p = 0.015$). In addition, patient preferences were significantly associated with solid food plate waste ($p < 0.001$).

Conclusion: Food handlers' personal hygiene, meal service timing, and patient preferences were significantly associated with solid food plate waste. Improving food hygiene practices, ensuring timely meal distribution, and considering patient preferences may contribute to reducing plate waste and enhancing the quality of hospital nutrition services.

Keywords: food handlers; meal service timing; patient preferences; personal hygiene; plate waste

BACKGROUND

Hospital foodservice is an integrated healthcare system that includes menu planning, food procurement, preparation, and distribution to patients. In addition to meeting basic nutritional requirements, hospital meals are tailored to patients' clinical conditions to support recovery and therapeutic outcomes.¹ Therefore, high-quality nutrition services are essential to ensure adequate nutrient intake, improve patient satisfaction, and support medical treatment.² However, inadequate food consumption among hospitalized patients remains a common challenge, resulting in plate waste that reflects suboptimal foodservice quality and patient acceptance.³

Plate waste is widely recognized as an important indicator of hospital nutrition service quality. Previous studies have reported that plate waste frequently exceeds the recommended maximum standard

of 20%, with proportions ranging from 17% to more than 60% in different hospital settings.^{4,5} These variations indicate differences in food quality, service performance, and patient acceptance. A study conducted at Sidoarjo Regional Hospital found that plant-based side dishes generated higher plate waste than animal-based side dishes, suggesting that food characteristics and patient preferences may influence food consumption.⁶ Excessive plate waste not only reflects inadequate nutritional intake but also contributes to increased operational costs and food wastage.⁷ Furthermore, a preliminary report from K.R.M.T. Wongsonegoro Regional Hospital, Semarang, revealed that plate waste from vegetable dishes and plant-based side dishes exceeded 50% in 2023, indicating substantial challenges in patient food acceptance.⁸

Several factors have been identified as determinants of plate waste in hospital settings. Food safety and hygiene practices are fundamental aspects of foodservice management because food handlers are directly involved in food preparation and distribution.⁹ Inadequate personal hygiene practices may compromise food quality through contamination and negatively affect patients' perceptions of meals, potentially increasing plate waste.¹⁰ Meal service timing has also been associated with patients' food consumption. Delayed meal distribution or inappropriate meal schedules may reduce appetite and increase the likelihood of plate waste.¹¹ Timely meal delivery is important for maintaining the sensory quality of food and enhancing patient acceptance.^{12,13}

Patient preference is another key factor influencing food acceptance. Attributes such as taste, aroma, texture, and appearance have been shown to affect food consumption and the amount of plate waste generated by hospitalized patients.¹⁴ Although previous studies have primarily focused on organoleptic characteristics, limited evidence has simultaneously examined the roles of food handlers' personal hygiene, meal service timing, and patient preferences as determinants of plate waste.¹⁰ This research gap highlights the need for a more comprehensive evaluation of factors influencing food consumption in hospital settings.

Therefore, this study aimed to analyze the association between food handlers' personal hygiene, meal service timing, and patient preferences with solid food plate waste at the Nutrition Department of K.R.M.T. Wongsonegoro Regional Hospital, Semarang. The findings are expected to provide evidence for improving the quality of hospital nutrition services and reducing plate waste among hospitalized patients.

MATERIALS AND METHODS

This analytical observational study employed a quantitative cross-sectional design to examine the association between food handlers' personal hygiene, meal service timing, and patient preferences with solid food plate waste. The study was conducted at the Nutrition Department of K.R.M.T. Wongsonegoro Regional Hospital, Semarang, Indonesia, on January 30, 2026. Data collection was carried out over one day and covered the three main meal periods, namely breakfast, lunch, and dinner.

The study population consisted of food handlers and hospitalized patients in Class II and Class III wards. Food handlers were selected using purposive sampling, resulting in a total of 45 respondents directly involved in food preparation and distribution. Patient participants were recruited using quota sampling, with 45 respondents distributed equally across breakfast, lunch, and dinner meal periods (15 patients per meal period). Inclusion and exclusion criteria were established according to the characteristics of each respondent group.

Primary data were collected through direct observation and questionnaires. Food handlers' personal hygiene was assessed using an observation checklist covering compliance with hygiene and sanitation practices during food handling. Meal service timing was evaluated by observing the distribution schedule and recording the timeliness of meal delivery. Patient preferences were assessed using a hedonic questionnaire evaluating sensory attributes of the meals. Solid food plate waste was measured using the Comstock visual estimation method. Secondary data were obtained from the Nutrition Department records, including patient information, meal distribution schedules, and menu cycle documentation.

Data were processed through editing, coding, data entry, and cleaning procedures using Statistical Package for the Social Sciences (SPSS) software. Descriptive statistics were used to summarize respondent characteristics and study variables. Bivariate analyses were performed to determine associations between variables. The Chi-square test was used to analyze the association between food handlers' personal hygiene and solid food plate waste, Fisher's Exact Test was applied to assess the association between meal service timing and plate waste, and the Mann–Whitney U test was used to examine the association between patient preferences and plate waste. Statistical significance was established at $p < 0.05$.

DISCUSSION

Univariate analysis in this study was conducted to describe the frequency distribution of each variable investigated, including plate waste, food handlers' personal hygiene, meal service timing, and patient preferences. This approach was used to provide an initial overview of the actual conditions in the Nutrition Department as a basis for interpreting the study findings. Plate waste was classified into two categories: low and high. The results showed that the majority of patients were categorized as having low plate waste, accounting for 25 individuals (55.6%), while 20 patients (44.4%) were classified as having high plate waste.

These findings indicate that the level of plate waste was relatively low among most patients. However, the presence of nearly half of the respondents in the high plate waste category suggests that this issue remains substantial and may negatively affect the efficiency of nutrition services. Food handlers' personal hygiene was categorized as poor and adequate. The observations revealed that the majority of food handlers demonstrated adequate compliance with personal hygiene practices, comprising 32 individuals (71.1%), whereas 13 individuals (28.9%) were categorized as having poor compliance. These data were collected across three work shifts.

The findings indicate that food handlers generally complied with basic hygiene standards, although a proportion of food handlers still demonstrated suboptimal practices. This condition may pose risks to food quality and safety if continuous monitoring and supervision are not implemented. Meal service timing was classified as timely and delayed based on compliance with the established meal distribution schedule. The analysis showed that most meals were delivered on time, accounting for 37 observations (82.2%), whereas delays occurred in 8 observations (17.8%) across the three main meal periods.

The predominance of timely meal delivery indicates that the food distribution system in the Nutrition Department has been functioning effectively. Nevertheless, the occurrence of delays in a small proportion of observations suggests the need for improved operational coordination to maintain service consistency. Patient preference was categorized into low, moderate, and good levels. The analysis demonstrated that the majority of patients had a moderate level of preference, accounting for 26 individuals (57.8%), followed by good preference in 10 individuals (22.2%) and low preference in 9 individuals (20.0%). These data were obtained from observations during one menu cycle over a single day.

This distribution indicates that patients' acceptance of hospital meals was generally moderate and had not yet reached an optimal level among all respondents. The variation in patient preferences suggests the need for further evaluation of sensory quality and menu suitability to improve overall patient acceptance.

Table 1. Association of food handlers' personal hygiene, meal service timing, and patient preferences with patient food waste

Variable	Category	Solid Food Plate Waste		Total n (%)	p-value
		Low n (%)	High n (%)		
Food Handlers' Personal Hygiene	Poor	3 (6,7)	10 (22,2)	13 (28,9)	0,014 ^a
	Adequate	22 (48,9)	10 (22,2)	32 (71,1)	
Meal Service Timing	Timely	24 (53,3)	13 (28,9)	37 (82,2)	0,015 ^b
	Delayed	1 (2,2)	7 (15,6)	8 (17,8)	
Patient Preferences	Low	1 (2,2)	8 (17,8)	9 (20,0)	<0,001 ^c
	Moderate	14 (31,1)	12 (26,7)	26 (57,8)	
	Good	10 (22,2)	0 (0)	10 (22,2)	
Total		25 (55,6)	20 (44,4)	45 (100)	

Notes: ^a Chi-square test; ^b Fisher's Exact Test; ^c Mann-Whitney U test

Table 1 presents the associations between food handlers' personal hygiene, meal service timing, patient preferences, and patient solid food plate waste. The results of the bivariate analysis showed that all independent variables, namely food handlers' personal hygiene, meal service timing, and patient preferences, were significantly associated with patient plate waste. This was indicated by p-values of less than 0.05 for each variable, demonstrating that these factors statistically contributed to the occurrence of plate waste in the Nutrition Department.

Regarding food handlers' personal hygiene, respondents with poor compliance tended to be associated with a higher proportion of plate waste compared with those in the adequate category. This finding suggests that suboptimal hygiene practices may affect food quality, both in terms of food safety and patients' perceptions of the meals served. Conversely, better compliance with personal hygiene practices was associated with improved food acceptance and consequently lower plate waste.

Meal service timing also demonstrated a consistent pattern, whereby timely meal delivery was predominantly associated with lower plate waste, whereas delayed meal service was associated with increased plate waste. This finding may be explained by the fact that delayed meal delivery can adversely affect the sensory quality of food, such as temperature and texture, which ultimately influences patients' appetite. Therefore, effective meal distribution management is an important factor in maintaining patient acceptance of hospital meals.

Patient preference showed the strongest association with plate waste, as indicated by the lowest significance value ($p < 0.001$). Patients with low preference levels tended to leave larger amounts of food, whereas all patients in the good preference category consumed the meals provided completely. This finding emphasizes that sensory attributes, including taste, aroma, texture, and appearance, play a dominant role in determining patients' food consumption.

Overall, these findings suggest that plate waste is a multifactorial phenomenon influenced by the interaction among food handlers' practices, meal service processes, and patients' responses to the meals provided. Therefore, efforts to reduce plate waste should be implemented comprehensively through improving compliance with personal hygiene practices, optimizing meal distribution timing, and adapting menus to patients' preferences.

CONCLUSIONS

Based on the findings of this study, it can be concluded that food handlers' personal hygiene, meal service timing, and patient preferences were significantly associated with solid food plate waste in the Nutrition Department of K.R.M.T. Wongsonegoro Regional Hospital, Semarang. Food handlers with better compliance with personal hygiene practices tended to be associated with lower levels of plate waste. In addition, timely meal service contributed to increased patient food consumption, whereas delays in meal delivery were associated with higher levels of plate waste. Patient preference emerged as the most influential factor, with higher levels of food acceptance being associated with lower plate waste.

Overall, plate waste was influenced by the interaction among food handlers' practices, meal distribution processes, and patients' acceptance of hospital meals.

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