

Original Article

Hospital foodservice attributes associated with inpatient satisfaction: A cross-sectional study

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Abstract

Background: Hospital foodservice contributes to nutritional care and patient experience. Local complaints concerning food presentation, utensil cleanliness, menu variety, meal temperature, and staff interactions indicated a need to examine which service attributes were associated with inpatient satisfaction.

Objective: To examine associations between seven hospital foodservice attributes and inpatient satisfaction.

Methods: This analytical cross-sectional study was conducted from 6 to 13 April 2026. Ninety-nine inpatients who had been hospitalized for at least two days were recruited by quota sampling and interviewed using a structured SERVQUAL-informed questionnaire. Service-attribute scores and satisfaction scores were dichotomized at their respective sample medians. Dissatisfaction was the modeled outcome. Associations were estimated using chi-square tests, crude odds ratios (ORs), and multivariable logistic regression with adjusted odds ratios (AORs) and 95% confidence intervals (CIs).

Results: Sixty-eight participants (68.7%) were satisfied. All seven service attributes were associated with dissatisfaction in bivariable analyses ($p < 0.05$). In the final multivariable model, poor food presentation (AOR=35.159; 95% CI: 6.101-202.604), poor utensil cleanliness (AOR=48.325; 95% CI: 5.342-437.185), inadequate menu variety (AOR=9.500; 95% CI: 1.486-60.755), and poor food safety and hygiene (AOR=8.780; 95% CI: 1.599-48.224) remained associated with dissatisfaction. Utensil cleanliness had the largest AOR; however, the wide CIs indicate low precision.

Conclusion: Perceived foodservice attributes were associated with inpatient satisfaction, but the cross-sectional design does not establish causality. The magnitude of the adjusted estimates should be interpreted cautiously because the sample was small, quota sampling was used, and the model may be unstable/required.

Background

Hospital nutrition services support nutritional adequacy, recovery, patient safety, and the care experience. Contemporary hospital foodservice research emphasizes patient-centeredness, timeliness, meal safety, sensory quality, nutritional adequacy, and reduction of food waste (Hadjimbei et al., 2025; Osman et al., 2021; Steer et al., 2025). Food provision extends from menu planning and procurement to receiving, storage, preparation, distribution, documentation, and evaluation. Consistent management is necessary for meals to be nutritionally appropriate, safe, acceptable, and responsive to patients' clinical and cultural needs (Lam et al., 2025; Manimaran et al., 2025; Wilandh et al., 2024).

Patient satisfaction reflects the comparison between service expectations and actual experience. Recent applications of SERVQUAL in hospital settings conceptualize service quality through tangibles, reliability, responsiveness, assurance, and empathy (Hosseinizadeh et al., 2024; Rahmatia et al., 2025; Yadav et al., 2026). Within nutrition services, food appearance and

utensil cleanliness represent tangibles; meal timeliness and menu consistency reflect reliability; service speed reflects responsiveness; food safety and hygiene reflect assurance; and courteous staff behavior reflects empathy. Menu variety spans several dimensions because it concerns the tangible product, reliability of menu cycles, and responsiveness to patient preferences (Barros et al., 2025; Mabini et al., 2024).

Recent evidence indicates that patients often rate staff and service highly, whereas ratings of food quality, portion size, taste, texture, temperature, choice, and suitability are more variable (Mahdavi-Roshan et al., 2023; Potsi et al., 2025; Rapo et al., 2021). Validated hospital-food-experience instruments identify sensory attributes and food choice as important and link meal quality with dietary intake (Furness et al., 2023; Lai & Gemming, 2021; Trinca et al., 2021, 2023). Flexible service models, individualized menus, and experience-based codesign may improve patient experience, intake, and satisfaction (Abid et al., 2024; Abou El Hassan et al., 2022; Neaves et al., 2022; Okkels et al., 2024). Poor meal quality may be associated with low

intake and plate waste (Fuleihan et al., 2024; Hoteit et al., 2024; Jonathan et al., 2023; Sfeir et al., 2025). Findings vary across settings because food-production systems, patient populations, food cultures, prescribed diets, and measurement approaches differ.

At Dr. H. Mohamad Rabain Regional Hospital, internal Infection Prevention and Control Committee reports and patient-feedback records noted complaints about foreign matter in food, doneness, menu variety, taste, temperature on arrival, and staff communication. The source documents did not provide numerical summaries of complaints or plate waste by period; therefore, these observations were treated as quality signals rather than prevalence estimates. Recent studies likewise identify food temperature, sensory quality, menu choice, staff interaction, and delivery processes as central components of the inpatient meal experience (Barsha et al., 2023; Lam et al., 2025; Piciocchi et al., 2022; Saraç et al., 2026). No local analysis had simultaneously examined these seven aspects. This study aimed to analyze the associations of food appearance, utensil cleanliness, meal timeliness, menu variety, service speed, food safety and hygiene, and staff courtesy with inpatient.

Methods

Study Design and Setting

This analytical observational study used a cross-sectional design. Perceptions of nutrition-service aspects and satisfaction were measured concurrently in one interview conducted from April 6 to 13, 2026, in the inpatient units of Dr. H. Mohamad Rabain Regional Hospital, Muara Enim Regency, South Sumatra, Indonesia. The study included VVIP, Utama, Class I, Class II, and Class III patients. The source documents did not specify bed capacity, participating wards, the food-production system, or the distribution of diet types; this limited description of the setting should be considered when assessing applicability. This study is reported in accordance with the current STROBE cross-sectional reporting checklist.

Participants and Sampling

The source population comprised all inpatients at the hospital (recorded population, 5,700). The original sample size was calculated using the Slovin formula with a 10% margin of error, resulting in a minimum of 99 respondents. This approach is retained to describe the study as

conducted; however, it was not based on the outcome proportion, expected association, statistical power, or number of regression parameters and therefore cannot establish the adequacy of the multivariable model. Contemporary reporting literature emphasizes transparent reporting of sampling assumptions, participant flow, missing data, and model-building decisions in cross-sectional studies (Duan et al., 2023; EQUATOR Network, 2026).

Quota sampling continued until the target was reached. Eligible participants were inpatients who had been hospitalized for at least 2 days, could participate in an interview, and provided informed consent. Patients who were unconscious, had a psychiatric disorder, were too clinically unwell to be interviewed, or were hospital employees or their family members were excluded. The source documents did not record the basis of the quotas by ward, class, or diet; the numbers screened, eligible, or declining participation; or reasons for nonparticipation. Consequently, participant flow could be reported only from the 99 respondents with complete data who were analyzed. The absence of a recruitment denominator was recognized as a potential source of selection bias.

Variables and Measurements

The outcome was satisfaction with nutrition services. Logistic regression modeled dissatisfaction, with satisfaction as the reference category. Exposures were food appearance, utensil cleanliness, meal timeliness, menu variety, service speed, food safety and hygiene, and courteous staff behavior. Age, sex, occupation, and inpatient class were available as descriptive characteristics but were not entered into the initial model. Length of stay, diagnosis, diet type, food texture, previous hospitalization, and clinical condition were unavailable.

The nutrition-service questionnaire was developed with reference to SERVQUAL and contained 25 statements: five items each for tangibles, reliability, responsiveness, assurance, and empathy. Responses used a four-point scale (4 = very good to 1 = very poor). Satisfaction was measured with five statements (4 = very satisfied to 1 = dissatisfied). Item scores were summed, with higher scores indicating more positive evaluations. In accordance with the original protocol, each construct was categorized using the sample median as poor/adequate or

dissatisfied/satisfied. The actual median cutoffs, language-adaptation process, content or construct validity, pilot testing, and reliability coefficients were not available in the source documents. Measurement validity and potential information loss from dichotomization therefore could not be established and were treated as limitations.

Data Collection and Bias Control

Primary data were collected through face-to-face interviews using the structured questionnaire after participants received explanations of the study purpose, procedures, benefits, and right to decline and provided consent. Responses were checked for completeness and consistency. The source documents did not identify interviewers, their training, interview duration, instrument language, privacy of the interview location, or whether food-service staff were present. Measuring exposures and the outcome from the same respondent may have introduced common-method bias, while interviewing patients during hospitalization may have introduced courtesy and social-desirability bias. Completeness checks reduced missing data but did not address these potential biases.

Statistical Analysis

Data processing included editing, coding, entry, tabulation, and cleaning. Analyses were performed using IBM SPSS Statistics Version 26. Age was summarized using the mean and range; categorical variables were summarized using frequencies and percentages. Chi-square tests examined bivariable associations. Crude ORs and 95% CIs were calculated using positive service ratings as the reference categories. Based on the reported cell counts, expected frequencies were adequate for the 2×2 tables. No data were missing among the 99 records analyzed.

Variables with $p < .25$ in bivariable analysis were considered candidates for multivariable analysis.

Seven exposures were entered into a multiple logistic regression model with dissatisfaction as the outcome. Backward elimination sequentially removed service speed, meal timeliness, and staff courtesy. The final model reports regression coefficients (B), AORs, 95% CIs, and p values, together with Cox and Snell R^2 and Nagelkerke R^2 . The original analysis did not document variance inflation factors or a correlation matrix, interactions, the Hosmer–Lemeshow test, influential observations, a classification table, sensitivity analysis using continuous scores, or Firth penalized regression. With 31 dissatisfaction events and seven candidate predictors, the model was susceptible to overfitting or quasi-complete separation; therefore, multivariable estimates were treated as exploratory and not causal.

Ethical Considerations

Participation was voluntary. Respondents received study information, provided informed consent, could withdraw without affecting their care, and were not identified in the database or report. Data were maintained anonymously and confidentially. The name of the ethics committee, approval number, and approval date were not available in the source documents used for this manuscript; therefore, no unverifiable ethics approval was inserted.

Results

Data from 99 adult inpatients were analyzed. The mean age was 42.46 years (range: 25–64). Men comprised 51.5% of participants, and 40.4% were hospitalized in class III. The available report identified 99 analyzed participants but did not record the numbers assessed, eligible, approached, declining, or excluded. Additional clinical characteristics, length of stay, diagnosis, diet type, food form, ward, previous admissions, and variable-specific missingness were not available (Table 1).

Table 1. Characteristics of participants

Characteristic	Category	n or value	%
Age, years	Mean	42.46	-
	Range	25–64	-
Sex	Male	51	51.5
	Female	48	48.5
Occupation	Civil servant	16	16.2
	Self-employed	28	28.3
	Driver	4	4.0

Characteristic	Category	n or value	%
Inpatient class	Farmer	8	8.1
	Military/police	9	9.1
	Homemaker	23	23.2
	Other	11	11.1
	VVIP	9	9.1
	Main class	17	17.2
	Class I	17	17.2
	Class II	16	16.2
	Class III	40	40.4

Table 2. Distribution of foodservice ratings and patient satisfaction

Variable	Category	n	%
Food presentation	Poor	33	33.3
	Adequate	66	66.7
Utensil cleanliness	Poor	41	41.4
	Adequate	58	58.6
Meal-delivery timeliness	Poor	41	41.4
	Adequate	58	58.6
Menu variety	Poor	36	36.4
	Adequate	63	63.6
Service speed	Poor	49	49.5
	Adequate	50	50.5
Food safety and hygiene	Poor	47	47.5
	Adequate	52	52.5
Staff courtesy	Poor	38	38.4
	Good	61	61.6
Patient satisfaction	Dissatisfied	31	31.3
	Satisfied	68	68.7

Table 3. Bivariable associations between foodservice attributes and dissatisfaction

Variable	Category	Dissatisfied, n (%)	Satisfied, n (%)	Crude OR (95% CI)	P value
Food presentation	Poor	24 (72.7)	9 (27.3)	22.476 (7.513-67.239)	<0.001
	Adequate	7 (10.6)	59 (89.4)	Reference	
Utensil cleanliness	Poor	26 (63.4)	15 (36.6)	18.373 (6.021-56.067)	<0.001
	Adequate	5 (8.6)	53 (91.4)	Reference	
Meal-delivery timeliness	Poor	23 (56.1)	18 (43.9)	7.986 (3.033-21.030)	<0.001
	Adequate	8 (13.8)	50 (86.2)	Reference	
Menu variety	Poor	18 (50.0)	18 (50.0)	3.846 (1.573-9.403)	0.002
	Adequate	13 (20.6)	50 (79.4)	Reference	
Service speed	Poor	22 (44.9)	27 (55.1)	3.712 (1.487-9.269)	0.004
	Adequate	9 (18.0)	41 (82.0)	Reference	
Food safety and hygiene	Poor	24 (51.1)	23 (48.9)	6.708 (2.517-17.881)	<0.001
	Adequate	7 (13.5)	45 (86.5)	Reference	
Staff courtesy	Poor	18 (47.4)	20 (52.6)	3.323 (1.373-8.042)	0.007
	Good	13 (21.3)	48 (78.7)	Reference	

Table 2 showed across the focal evidence, information clarity, All seven perceived service attributes were associated with dissatisfaction in

bivariable analyses. Table 3 showed poor food presentation had the largest crude association (OR=22.476; 95% CI: 7.513-67.239), followed by

poor utensil cleanliness (OR=18.373; 95% CI: 6.021-56.067). The final model retained food presentation, utensil cleanliness, menu variety, and food safety and hygiene. Poor utensil cleanliness had the largest adjusted estimate

(AOR=48.325; 95% CI: 5.342-437.185), but all adjusted estimates had wide CIs and should be interpreted as imprecise associations rather than causal effects (Table 4).

Table 4. Final multivariable logistic regression model for inpatient dissatisfaction

Variable	B	AOR	95% CI	p value
Poor food presentation	3.560	35.159	6.101-202.604	<0.001
Poor utensil cleanliness	3.878	48.325	5.342-437.185	0.001
Inadequate menu variety	2.251	9.500	1.486-60.755	0.017
Poor food safety and hygiene	2.173	8.780	1.599-48.224	0.012

Discussion

The principal finding was that 31.3% of patients were dissatisfied and all seven service aspects had bivariable associations with satisfaction. In the exploratory model, food appearance, utensil cleanliness, menu variety, and food safety and hygiene remained associated with dissatisfaction. These findings answer the study objective at the level of association but do not establish temporal order or causality.

The satisfaction proportion of 68.7% was lower than the 80% reported by Rapo et al. (2021) and the high satisfaction observed by Potsi et al. (2025), but it was within the broader variation reported across contemporary hospital foodservice studies (Hadjimbei et al., 2025; Mahdavi-Roshan et al., 2023; Saraç et al., 2026). Between-study variation may reflect differences in instruments, cutoffs, food-service systems, food culture, clinical condition, and stage of hospitalization. A Canadian tertiary-hospital survey also reported food-quality ratings below its benchmark and requests for improved flavor, fresh produce, and cultural diversity (Lalande et al., 2024).

The association with food appearance is consistent with evidence that taste, texture, temperature, meal combinations, food choice, and diet suitability shape the food experience and are associated with intake (Furness et al., 2023; Lam et al., 2025; Trinca et al., 2021, 2022a, 2023). Appearance is an initial sensory cue that may affect acceptance, but the cross-sectional design also allows patients' overall impressions to influence their ratings of individual attributes. The OR should therefore not be interpreted as the effect of improving food appearance.

Utensil cleanliness had the largest AOR. Conceptually, clean utensils and hygienic food support the tangible and assurance dimensions and patients' sense of safety, consistent with recent SERVQUAL-based hospital research (Hosseinzadeh et al., 2024; Rahmatia et al., 2025; Yadav et al., 2026). However, the AOR of 48.325 (95% CI [5.342, 437.185]) indicates low precision. Correlation among service aspects rated by the same respondents, the limited number of events, and possible separation may have inflated the estimate. The finding should be treated as a signal for a quality audit rather than evidence that utensil cleanliness is the dominant cause of dissatisfaction.

Meal timeliness and service speed were associated with dissatisfaction in the bivariable analysis, consistent with studies of meal-order timing, flexible dining, and room-service models (Abou El Hassan et al., 2022; Barsha et al., 2023; Neaves et al., 2022). Staff behavior is also relevant because respect, communication, and responsiveness to individual needs shape service experience (Abid et al., 2024; Kidanemariam et al., 2023; Trinca et al., 2022b). Their removal from the final model does not imply a lack of importance; it may reflect construct overlap and the backward-selection procedure.

Menu variety and food safety remained in the model. Evidence suggests that choice, preference alignment, improved cooking techniques, and personalization may improve meal experience, whereas food that does not meet expectations is associated with low intake and waste (Hoteit et al., 2024; Jonathan et al., 2023; Lalande et al., 2024; Okkels et al., 2024; Osman et al., 2021; Piciocchi et al., 2022; Trinca et al., 2022a). Contemporary intervention and qualitative reviews similarly

support patient-focused foodservice models and coordinated waste-reduction strategies (Fuleihan et al., 2024; Manimaran et al., 2025; Steer et al., 2025). The hospital can use the present findings to design audits of washing procedures, utensil inspection, temperature, delivery time, menu cycles, and patient feedback, followed by evaluation with objective measures and validated instruments.

Strengths and Limitations

This study examined seven actionable operational components and reported ORs with 95% CIs. Its limitations include quota sampling without a recruitment denominator; a single-hospital setting; unavailable information on wards, diagnosis, length of stay, diet, food texture, and previous hospitalization; a local instrument without documented validity and reliability; median dichotomization without documented cutoff values; exposure and outcome data obtained from the same perception-based interview; potential courtesy, social-desirability, common-method, and residual-confounding bias; and only 31 events for seven candidate predictors. The absence of documented multicollinearity diagnostics, goodness-of-fit assessment, influential-observation checks, and penalized regression limited evaluation of model stability. Selection and courtesy bias may have inflated reported satisfaction, whereas common-method bias may have strengthened associations. Generalizability is primarily limited to communicative adult patients hospitalized for at least 2 days in comparable settings

Conclusion and Recommendation

Most patients were satisfied, although nearly one third were dissatisfied. Food appearance, utensil cleanliness, meal timeliness, menu variety, service speed, food safety and hygiene, and staff courtesy were associated with satisfaction in bivariable analyses. In the exploratory model, food appearance, utensil cleanliness, menu variety, and food safety and hygiene were associated with dissatisfaction. Utensil cleanliness had the largest estimate, but its precision was low. These results do not establish causality.

The hospital may use these findings to support audits of utensil sanitation and food safety, monitoring of meal temperature and distribution time, review of menu cycles, and staff communication training. The effects of subsequent

improvements should be evaluated prospectively using validated instruments, continuous scores, objective measures of plate waste and temperature, probability sampling, power-based sample-size calculation, and models that control for clinical and dietary characteristics.

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Declaration of conflict of interest

The authors declare no competing interests.

Declaration on the Use of AI

No AI tools were used in the preparation of this manuscript.

Data Availability Statement

Data sharing is not applicable to this article.

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