

Effect of Nutrition Service Quality on Patient Experience in Inpatient Nutrition Services at Azra Hospital Bogor

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ABSTRACT Inpatient nutrition services are integral to patient-centered hospital care because meal quality, timeliness, safety, and staff interaction can shape patients' perceptions of their care experience. At Azra Hospital Bogor, a standardized nutrition service system had been implemented, but its empirical contribution to inpatient patient experience and the relative importance of individual service-quality indicators had not been established. This study aimed to assess perceived nutrition service quality, describe patient experience, and determine the effect of nutrition service quality on patient experience while identifying the most influential quality indicators. A quantitative analytic study with a cross-sectional design was conducted in April 2026 among 100 adult inpatients selected using purposive sampling. Data were collected using a structured questionnaire covering six dimensions of nutrition service quality and four dimensions of patient experience. Instrument reliability was high, with Cronbach's alpha values of 0.951 for nutrition service quality and 0.885 for patient experience. Data were analyzed using Structural Equation Modeling with LISREL 8.8. The model demonstrated good fit ($\chi^2/DF = 1.06$, RMSEA = 0.025, GFI = 0.97, AGFI = 0.96, and CFI = 0.98). Nutrition service quality had a significant positive effect on patient experience ($\beta = 0.96$, $t = 10.76$, $p < 0.001$), explaining 96% of the variance in patient experience. Timeliness of service was the strongest indicator (loading factor = 0.99), followed by food presentation and hygiene (0.98) and menu variety and taste (0.97). The findings demonstrate that multidimensional nutrition service quality is strongly associated with inpatient patient experience at Azra Hospital Bogor. Strengthening timely meal delivery, food presentation and hygiene, and menu variety and taste may support continuous improvement of patient-centered nutrition services.

INDEX TERMS Nutrition Service Quality, Patient Experience, Inpatient Care, SEM-LISREL, Hospital Quality.

I. INTRODUCTION

Hospital nutrition services are an essential component of inpatient care because meals simultaneously support nutritional requirements, recovery, and patients' perceptions of the quality of care. Recent evidence shows that hospital foodservice is associated not only with satisfaction but also with dietary intake, nutritional risk, recovery-related outcomes, and broader patient experience [1]–[5]. Food quality, meal size, taste, variety, presentation, timing, and staff-service interactions are repeatedly identified as important dimensions of the hospital food experience [1], [2], [6]–[8]. Poor food experiences may reduce food intake and contribute to food waste, whereas responsive and patient-centered foodservice models can improve satisfaction and support nutrition-related outcomes [3], [9]–[11]. Hospital nutrition care also remains affected by implementation barriers, staffing, workflow, and continuity of nutritional assessment and monitoring [12]–[14], [17], [18]. Consequently, nutrition service quality should be considered a multidimensional component of hospital quality rather than merely a food-production activity.

The state of the art has increasingly emphasized validated patient-reported measures and patient-centered foodservice models. The Acute Care Hospital Foodservice Patient Satisfaction Questionnaire has been applied in different hospital contexts to evaluate dimensions of food quality and service [1], [2], [7]. More recently, the Hospital Food Experience Questionnaire and the Austin Health Patient Mealtime Experience Tool have expanded assessment toward multidimensional mealtime experiences, including food attributes, barriers to eating, staff interaction, and assistance [5], [12]. Intervention-oriented studies have also examined experience-based codesign, flexible meal ordering, on-demand services, and mixed-model foodservice systems as approaches to improve patient experience and operational performance [6], [8], [9]. In parallel, structural equation modeling (SEM) has become an established analytical approach for examining relationships among latent constructs in healthcare service-quality research because it evaluates measurement and structural models simultaneously [15], [16]. Routine patient-experience measurement is also recognized as an important quality-management mechanism [19], [20],

while recent healthcare service-quality research has applied SEM to examine multidimensional relationships between service quality and patient experience [16].

Despite these developments, an important research gap remains. Existing hospital foodservice studies predominantly focus on patient satisfaction, descriptive evaluations, specific foodservice models, or individual aspects of mealtime experience [1], [2], [5], [7], [10], [11]. Evidence linking a multidimensional construct of nutrition service quality directly to patient experience using SEM remains comparatively limited, particularly in private hospital settings in Indonesia. Foodservice performance may vary by institutional context, patient characteristics, service model, and operational conditions [3], [8], [11]. Therefore, findings from other healthcare systems cannot be assumed to represent the Indonesian private-hospital context. At Azra Hospital Bogor, a standardized nutrition service system had been implemented; however, the relationship between nutrition service quality and patient experience had not been empirically quantified.

Accordingly, this study aimed to assess perceived nutrition service quality, describe inpatient patient experience, analyze the effect of nutrition service quality on patient experience, and identify the most dominant quality indicators at Azra Hospital Bogor. The study makes three principal contributions: (1) it operationalizes nutrition service quality as a multidimensional construct encompassing timeliness, diet accuracy, menu variety and taste, food presentation and hygiene, food safety, and staff interaction; (2) it quantitatively models the relationship between nutrition service quality and patient experience using SEM-LISREL; and (3) it identifies the relative contribution of individual quality indicators to provide institution-specific evidence for nutrition-service quality improvement.

The remainder of this article is organized as follows. Section II describes the study design, participants, measurement instruments, validity and reliability assessment, analytical procedures, and ethical considerations. Section III presents respondent characteristics, descriptive findings, SEM goodness-of-fit results, hypothesis testing, and indicator loading factors. Section IV interprets the findings in relation to previous evidence, discusses managerial implications and study limitations, and identifies directions for future research. Section V summarizes the principal findings and their implications for patient-centered inpatient nutrition services.

II. METHOD

A. STUDY DESIGN AND SETTING

This study employed a quantitative analytic approach with a cross-sectional observational design. Data were collected in April 2026 at Azra Hospital Bogor, West Java, Indonesia, in the Nutrition Installation and Class 1 and Class 2 inpatient wards. The hospital implemented a centralized food plating and distribution system with three meal deliveries per day. The cross-sectional design was used because Nutrition Service Quality and Patient Experience were measured during the same hospitalization period, without experimental manipulation. Comparable recent studies have used cross-sectional designs to assess hospital foodservice and patient satisfaction [21], [22].

B. PARTICIPANTS AND SAMPLING

The study population comprised adult inpatients receiving nutrition services at Azra Hospital Bogor. Participants were selected using purposive sampling; therefore, no randomization was performed. A total of 100 patients were recruited. Inclusion criteria were age ≥ 18 years, hospitalization for at least two days, cognitive ability to complete the questionnaire, and receipt of a regular or modified hospital diet. Patients in the ICU, ICCU, or HCU, those receiving extreme dietary interventions such as total parenteral nutrition, and those who did not provide informed consent were excluded. Sample size was calculated using Slovin's formula based on an average monthly inpatient census of approximately 200 patients and a 10% error tolerance: $n = 200 / [1 + 200(0.1)^2] \approx 100$. Similar recent hospital foodservice studies have assessed adult inpatients using structured questionnaires and defined eligibility criteria based on hospitalization duration [21], [23], [24].

C. VARIABLES AND MEASUREMENT INSTRUMENT

The independent variable was Nutrition Service Quality (X), and the dependent variable was Patient Experience (Y). Data were collected using a structured questionnaire adapted from the Hospital Foodservice Satisfaction Questionnaire and the Beryl Institute patient-experience framework, then modified for the Azra Hospital context. Recent hospital foodservice research supports structured patient-reported instruments for evaluating food quality, service delivery, staff interaction, and related patient perceptions [21], [22], [24].

Variable X consisted of 12 items across six dimensions: Timeliness of Service (X1), Diet Accuracy (X2), Menu Variety and Taste (X3), Food Presentation and Hygiene (X4), Food Safety (X5), and Nutrition Staff Interaction (X6), with two items per dimension. Variable Y consisted of eight items across four dimensions: Service Responsiveness (Y1), Staff Empathy (Y2), Service Reliability (Y3), and Physical Comfort (Y4), with two items per dimension. All items used a four-point Likert scale from 1 = strongly disagree to 4 = strongly agree. This scale was applied without a neutral midpoint. The use of multidimensional instruments and internal-consistency testing is consistent with recent patient-experience questionnaire studies [25], [26].

D. VALIDITY AND RELIABILITY

Instrument quality was assessed before inferential analysis. Item validity was evaluated using Pearson Product Moment corrected item-total correlation. Items were considered valid when $r > 0.361$, corresponding to the stated $n = 30$ and $\alpha = 0.05$ criterion. Internal consistency was assessed using Cronbach's alpha, with $\alpha \geq 0.70$ considered acceptable. The obtained coefficients were 0.951 for Nutrition Service Quality and 0.885 for Patient Experience, indicating high internal consistency. Recent patient-experience instrument studies similarly apply item-level validity assessment and Cronbach's alpha to establish measurement reliability [25], [26].

E. DATA COLLECTION PROCEDURE

Eligible patients were approached during hospitalization after satisfying the inclusion criteria. The researcher explained the study procedures, obtained written informed consent, and administered the questionnaire. Respondents completed the

instrument independently, with clarification provided when required without influencing responses. Completed questionnaires were checked for completeness before data entry. Participant confidentiality and voluntary participation were maintained throughout the procedure.

F. DATA ANALYSIS

Descriptive statistics were used to summarize respondent characteristics and scores for each study dimension. Structural Equation Modeling (SEM) using LISREL 8.8 was the primary inferential method because the proposed model contained latent constructs measured by multiple observed indicators and required simultaneous assessment of measurement and structural relationships. Recent SEM methodological guidance emphasizes explicit model specification, assessment of measurement quality, overall model fit, and transparent reporting of structural estimates [27], [28].

The measurement model was evaluated using indicator loadings, while the structural model was assessed using the standardized path coefficient (β). Model adequacy was examined using χ^2/DF , RMSEA, GFI, AGFI, and CFI. R^2 was used to determine the proportion of variance in Patient Experience explained by Nutrition Service Quality. Hypothesis testing used the standardized path coefficient and t-statistic; $t > 1.96$ at $\alpha = 0.05$ was considered statistically significant. Harman's single-factor test was also performed to assess potential common method bias. Multiple fit indices were retained to provide a broader assessment of SEM model adequacy rather than relying on a single criterion [27], [28].

G. ETHICAL CONSIDERATIONS

The study protocol received institutional ethical approval before data collection. Participation was voluntary, and written informed consent was obtained from participants. Confidentiality and anonymity were maintained throughout the study. Personal identifiers were not included in the analytical dataset.

III. RESULTS

TABLE 1

Descriptive Statistics: Nutrition Service Quality (X)

Dimension	Items	Mean Range	Dimension Mean
Timeliness of Service (X1)	X1.1,	3.51–	3.53
	X1.2	3.55	
Diet Accuracy (X2)	X1.3,	3.48–	3.56
	X1.4	3.64	
Menu Variety & Taste (X3)	X1.5,	3.45–	3.48
	X1.6	3.50	
Presentation & Hygiene (X4)	X1.7,	3.37–	3.42
	X1.8	3.47	
Food Safety (X5)	X1.9,	3.51–	3.65
	X1.10	3.78	
Staff Interaction (X6)	X1.11,	3.73–	3.76
	X1.12	3.78	

A. RESPONDENT CHARACTERISTICS

Of 100 respondents, 61% were female and 39% male. The majority (58%) were aged 24–30 years, followed by 28% aged 31–35 years, 12% aged 36–40 years, and 2% over 40 years. Regarding length of stay, 52% were hospitalized for 2 days and 48% for 3 days. Most respondents (54%) were in Class 1 wards and 46% in Class 2.

B. DESCRIPTIVE ANALYSIS OF NUTRITION SERVICE QUALITY (X)

Overall, all indicators of Nutrition Service Quality were rated favorably (mean range: 3.37–3.78). No respondent selected "Strongly Disagree" for any item. Staff Interaction (X6) received the highest mean (3.76), followed by Food Safety (X5, mean 3.65). Food Presentation and Hygiene (X4) received the lowest mean (3.42), indicating this dimension requires priority attention (TABLE 1).

C. DESCRIPTIVE ANALYSIS OF PATIENT EXPERIENCE (Y)

All Patient Experience indicators were rated positively (mean range: 3.54–3.88), with no respondents selecting "Strongly Disagree" or "Disagree." Service Reliability (Y3) received the highest mean (3.79), while Staff Empathy (Y2) received the lowest (3.55), suggesting room for improvement in personalized care interactions (TABLE 2).

TABLE 2

Descriptive Statistics: Patient Experience (Y)

Dimension	Items	Mean Range	Dimension Mean
Service Responsiveness (Y1)	Y1.1,	3.59–	3.70
	Y1.2	3.81	
Staff Empathy (Y2)	Y1.3,	3.54–	3.55
	Y1.4	3.56	
Service Reliability (Y3)	Y1.5,	3.70–	3.79
	Y1.6	3.88	
Physical Comfort (Y4)	Y1.7,	3.75–	3.77
	Y1.8	3.78	

D. SEM GOODNESS-OF-FIT

Before hypothesis testing, the overall model fit was evaluated. All nine goodness-of-fit indices met the required thresholds, confirming a good-fitting model (TABLE 3). The chi-square/degrees of freedom ratio ($\chi^2/DF = 1.06$) was well below the maximum threshold of 2.0. The RMSEA value of 0.025 indicated a very close model fit. Incremental fit indices (GFI = 0.97, AGFI = 0.96, CFI = 0.98) all exceeded the 0.90 benchmark. The R^2 value of 0.96 indicated that Nutrition Service Quality explains 96% of the variance in Patient Experience.

TABLE 3

Goodness-of-Fit Indices of the SEM Model

Index	Cut-off Value	Result	Conclusion
Degrees of Freedom (DF)	Positive	34	Good Fit
Chi-Square (χ^2)	Small	36.05	Good Fit
χ^2/DF	≤ 2.0	1.06	Good Fit
P-Value	≥ 0.05	0.373	Good Fit
RMSEA	≤ 0.08	0.025	Good Fit
GFI	≥ 0.90	0.97	Good Fit
AGFI	≥ 0.90	0.96	Good Fit
CFI	≥ 0.90	0.98	Good Fit
R^2	≥ 0.50	0.96	Good Fit

E. HYPOTHESIS TESTING

The standardized path coefficient (β) from Nutrition Service Quality (X) to Patient Experience (Y) was 0.96, with a t-statistic of 10.76, far exceeding the critical value of 1.96 ($p < 0.001$). This confirms the hypothesis that Nutrition Service

Quality has a significant positive effect on Patient Experience. All six sub-hypotheses were accepted, indicating that each dimension of nutrition service quality Timeliness (H1), Diet Accuracy (H2), Menu Variety and Taste (H3), Presentation and Hygiene (H4), Food Safety (H5), and Staff Interaction (H6) positively influenced patient experience.

TABLE 4

Loading Factor of Nutrition Service Quality Indicators (X)

Rank	Indicator	Loading Factor
1	X1 – Timeliness of Service	0.99
2	X4 – Food Presentation & Hygiene	0.98
3	X3 – Menu Variety & Taste	0.97
4	X5 – Food Safety	0.96
5	X2 – Diet Accuracy	0.86
6	X6 – Staff Interaction	0.73

F. LOADING FACTOR ANALYSIS

Loading factor analysis identified the relative contribution of each indicator to the Nutrition Service Quality construct (TABLE 4). Timeliness of Service (X1) emerged as the strongest indicator ($\lambda = 0.99$), followed by Food Presentation and Hygiene (X4, $\lambda = 0.98$), Menu Variety and Taste (X3, $\lambda = 0.97$), Food Safety (X5, $\lambda = 0.96$), Diet Accuracy (X2, $\lambda = 0.86$), and Staff Interaction (X6, $\lambda = 0.73$). All indicators exceeded the SEM threshold of $\lambda \geq 0.50$.

IV. DISCUSSION

A. EFFECT OF NUTRITION SERVICE QUALITY ON PATIENT EXPERIENCE

The present study demonstrated that Nutrition Service Quality had a strong and statistically significant positive effect on Patient Experience among inpatients at Azra Hospital Bogor. The structural model produced a standardized path coefficient of $\beta = 0.96$, with a t-statistic of 10.76 and $p < 0.001$, indicating that higher perceived nutrition service quality was associated with a substantially more favorable patient experience. The coefficient of determination (R^2) was 0.96, suggesting that Nutrition Service Quality accounted for 96% of the observed variance in Patient Experience within the model. Although this magnitude should be interpreted cautiously because both constructs were assessed using patient-reported measures collected at the same time, the result indicates a strong empirical relationship between the quality of inpatient nutrition services and how patients perceive their service experience.

The finding is consistent with recent evidence showing that hospital foodservice is an important component of patients' perceptions of healthcare quality. Barros et al. [29], using a cross-sectional SERVQUAL-based assessment, reported that food quality, meal diversity, empathy, perceived value, and responsiveness were associated with patient satisfaction. Their findings indicate that patients evaluate hospital foodservice not solely according to nutritional adequacy but also according to the way food is delivered and how staff interact with patients. This multidimensional perspective is compatible with the present study, in which Nutrition Service Quality incorporated timeliness, diet accuracy, menu variety and taste, food presentation and hygiene, food safety, and staff interaction.

The present finding is also supported by Firdaus et al. [30], who reported a significant relationship between foodservice quality and patient satisfaction among inpatients at Muhammadiyah Kalitidu Hospital. Their cross-sectional study identified a significant association with a correlation coefficient of 0.506 ($p < 0.05$). While the statistical approaches and effect magnitudes cannot be directly equated because the present study used SEM whereas their study used bivariate analysis, both studies indicate that patients' evaluations of nutrition service quality are closely related to their overall evaluation of nutrition-related care. This consistency across different hospital settings strengthens the relevance of foodservice quality as an important patient-centered service component.

Recent evidence from Indonesian hospital settings also demonstrates that different dimensions of foodservice can contribute to patient-related outcomes. A recent PLS-SEM study involving 385 inpatients found significant associations of menu quality and foodservice quality with patient satisfaction and patient trust [31]. Foodservice quality was associated with patient satisfaction ($\beta = 0.263$, $p < 0.001$), while menu quality showed a stronger association with satisfaction ($\beta = 0.446$, $p < 0.001$). Compared with those findings, the $\beta = 0.96$ observed in the present study is considerably larger. This difference may reflect the different conceptualization of the dependent construct, measurement instruments, hospital characteristics, sample populations, and SEM approaches used. Therefore, the present coefficient should be interpreted as evidence of a strong relationship within the studied hospital rather than as a universally applicable effect size.

The very high R^2 value also requires careful interpretation. Nutrition Service Quality and Patient Experience were measured through related patient perceptions within the same nutrition-service context. Consequently, conceptual overlap between the constructs may contribute to the large proportion of explained variance. Although Harman's single-factor test in the present study indicated that a single factor did not account for more than 50% of the variance, common-source measurement cannot be completely excluded. Moreover, the cross-sectional design prevents temporal ordering between Nutrition Service Quality and Patient Experience. The result therefore supports a strong association but should not be interpreted as definitive evidence of causality.

From a practical perspective, the finding indicates that hospital nutrition services should be considered part of the broader patient-experience strategy rather than merely an auxiliary operational function. Improvements in meal distribution, dietary accuracy, food quality, hygiene, food safety, and communication with patients may contribute to a more positive perception of inpatient care. Nevertheless, service improvement should be evaluated using both subjective patient feedback and objective operational indicators to avoid relying exclusively on perception-based measures.

B. DOMINANT NUTRITION SERVICE QUALITY INDICATORS AND PATIENT EXPERIENCE

The SEM loading analysis provided additional insight into which dimensions contributed most strongly to the Nutrition Service Quality construct. Timeliness of Service demonstrated the highest loading factor ($\lambda = 0.99$), followed by Food Presentation and Hygiene ($\lambda = 0.98$), Menu Variety and Taste ($\lambda = 0.97$), Food Safety ($\lambda = 0.96$), Diet Accuracy ($\lambda = 0.86$), and Nutrition Staff Interaction ($\lambda = 0.73$). All six indicators exceeded the minimum loading criterion used in the study, demonstrating that each dimension contributed meaningfully to the latent construct.

The dominant position of Timeliness of Service is consistent with the operational nature of inpatient nutrition services. Meal delivery occurs according to predefined schedules, and delays can directly affect patients who must follow medication schedules, therapeutic diets, fasting requirements, or other clinical routines. The importance of timeliness is also supported by recent hospital foodservice research. Barros et al. [29] identified meal delivery and responsiveness among attributes associated with patients' evaluations of foodservice. Similarly, recent Indonesian research has continued to identify timeliness of meal distribution as one of the observable components of nutrition-service quality [32]. These findings suggest that timeliness functions not only as an operational indicator but also as a visible signal of service reliability from the patient's perspective.

An important finding is the difference between the loading factor and descriptive performance of Food Presentation and Hygiene. Although this dimension had a high loading factor of $\lambda = 0.98$, its mean score of 3.42 was the lowest among the six Nutrition Service Quality dimensions. This indicates that Food Presentation and Hygiene was strongly related to the overall perception of nutrition service quality while simultaneously representing the comparatively weaker-performing aspect of the service. The combination is particularly relevant for quality improvement because an indicator can have a strong contribution to a construct while still receiving a relatively lower observed score.

This result corresponds with findings from recent Indonesian hospital research. Azwarjaya et al. [33], evaluating nutrition installation services at PKU Muhammadiyah Gamping Hospital, reported generally positive patient evaluations but identified aspects of healthy menu options and food taste as areas requiring further improvement. Their study also found high ratings for food safety and the neat and clean delivery of meals. Similarly, Setiawan et al. [34] found that meal variety and utensils could represent areas requiring improvement even when other foodservice attributes performed well. These findings indicate that patient perceptions of foodservice are multidimensional and that high overall satisfaction does not necessarily imply uniformly high performance across all service components.

Menu Variety and Taste had the third-highest loading factor ($\lambda = 0.97$), demonstrating the importance of sensory and choice-related characteristics in patients' evaluation of nutrition services. This finding is consistent with Barros et al. [29], who identified meal diversity and food quality as relevant contributors to foodservice satisfaction. It is also

consistent with the recent evidence from Indonesia showing significant relationships between menu quality, foodservice quality, and patient satisfaction [31]. However, the present study did not separately examine individual components of taste, portion size, temperature, or menu preference. Therefore, the high loading for Menu Variety and Taste should be interpreted as a contribution of the combined indicator rather than evidence that one specific food characteristic was responsible for the observed relationship.

Nutrition Staff Interaction had the lowest loading factor among the six dimensions ($\lambda = 0.73$), but it remained above the measurement threshold and therefore continued to contribute to the Nutrition Service Quality construct. Importantly, Patient Experience also showed variation across its dimensions. Service Reliability had the highest mean score (3.79), whereas Staff Empathy had the lowest mean score (3.55). This pattern suggests that patients may have perceived the nutrition service as operationally dependable while experiencing comparatively less personalized interpersonal interaction. The distinction is important because reliable service delivery and interpersonal quality represent different components of patient experience and may require different improvement strategies.

The findings have several implications for hospital management. Timeliness should be monitored through measurable distribution indicators, such as scheduled versus actual meal-delivery times. Food presentation and hygiene should be assessed through routine audits of plating, utensils, packaging, cleanliness, and meal appearance. Menu variety and taste can be evaluated through periodic patient preference surveys and systematic monitoring of food waste. Staff interaction and empathy may be strengthened through communication training and patient-centered service protocols. These interventions should be accompanied by repeated measurement so that changes in perceived quality can be evaluated over time.

C. LIMITATIONS, IMPLICATIONS AND FUTURE RESEARCH

Several limitations should be considered when interpreting the findings. First, the cross-sectional design limits the ability to establish temporal or causal relationships between Nutrition Service Quality and Patient Experience. Because both variables were measured during the same period, it cannot be determined whether improvements in service quality would produce an equivalent increase in patient experience over time. Future research should therefore employ longitudinal or quasi-experimental designs to evaluate changes before and after specific nutrition-service interventions.

Second, the study was conducted at a single private hospital and involved only adult inpatients from Class 1 and Class 2 wards. Patients receiving critical care or extreme dietary interventions were excluded. Consequently, the findings may not be directly generalizable to ICU patients, pediatric populations, patients with highly specialized nutritional requirements, Class 3 wards, public hospitals, or other healthcare institutions. Differences in hospital management systems, socioeconomic characteristics, menu systems, and patient expectations may produce different

relationships between nutrition service quality and patient experience.

Third, purposive sampling was used rather than probability sampling. Although this approach enabled recruitment of participants who met the predefined study criteria, it limits the representativeness of the sample. The sample size of 100 respondents was also relatively modest for a complex SEM model containing multiple indicators. The excellent model-fit values should therefore be interpreted in conjunction with the sample characteristics rather than as evidence that the proposed model will necessarily demonstrate equivalent performance in larger and more diverse populations.

Fourth, the study relied primarily on self-reported questionnaire data. Patient perceptions are essential for evaluating experience, but they may be influenced by expectations, previous hospitalization experiences, current clinical condition, length of stay, or other aspects of care unrelated to nutrition services. The present study attempted to assess common method bias using Harman's single-factor test, but this procedure does not eliminate all potential sources of measurement bias. Future studies should combine questionnaire responses with objective operational data, such as actual meal-delivery times, diet-order accuracy, food temperature, plate waste, menu acceptance, and documented complaints.

Despite these limitations, the findings have practical implications for patient-centered hospital management. The high loading factors indicate that nutrition service quality should be managed as a multidimensional construct rather than through a single satisfaction score. The particularly high loading of Timeliness of Service suggests that monitoring meal-delivery reliability may be useful as a routine quality indicator. At the same time, the comparatively low mean for Food Presentation and Hygiene indicates an identifiable area for improvement despite its strong contribution to overall service quality. Hospital managers can therefore combine importance-oriented indicators, represented by SEM loadings, with performance-oriented indicators, represented by descriptive scores, to establish more targeted quality-improvement priorities.

Future research should expand the study to multiple hospitals and patient classes and employ larger probability-based samples. Comparative research between public and private hospitals could determine whether institutional characteristics modify the relationship between nutrition service quality and patient experience. Longitudinal studies could further evaluate whether improvements in meal distribution, menu planning, food presentation, hygiene, and staff communication result in sustained changes in patient experience. Future SEM research may also incorporate objective service indicators, patient satisfaction, food waste, nutritional intake, and patient trust into a broader model. Such an approach would provide a more comprehensive understanding of how hospital nutrition services contribute to patient-centered care and organizational quality.

V. CONCLUSION

This study aimed to describe the perceived quality of inpatient nutrition services and patient experience at Azra Hospital

Bogor and to analyze the effect of Nutrition Service Quality on Patient Experience while identifying the most influential quality indicators. The findings demonstrate that Nutrition Service Quality was significantly and positively associated with Patient Experience, as indicated by a standardized path coefficient of $\beta = 0.96$, a t-statistic of 10.76, and $p < 0.001$. The structural model produced an R^2 value of 0.96, indicating that Nutrition Service Quality accounted for 96% of the variance in Patient Experience within the proposed model. All six dimensions of Nutrition Service Quality contributed to the construct, namely Timeliness of Service, Diet Accuracy, Menu Variety and Taste, Food Presentation and Hygiene, Food Safety, and Nutrition Staff Interaction. Among these dimensions, Timeliness of Service demonstrated the highest loading factor ($\lambda = 0.99$), followed by Food Presentation and Hygiene ($\lambda = 0.98$), Menu Variety and Taste ($\lambda = 0.97$), Food Safety ($\lambda = 0.96$), Diet Accuracy ($\lambda = 0.86$), and Nutrition Staff Interaction ($\lambda = 0.73$). Although Food Presentation and Hygiene had a relatively high contribution to Nutrition Service Quality, it obtained the lowest descriptive mean among the six dimensions (3.42), indicating a performance area that warrants further attention. For Patient Experience, Service Reliability obtained the highest mean score (3.79), whereas Staff Empathy had the lowest mean score (3.55), suggesting that operational reliability was perceived more favorably than interpersonal empathy. These findings indicate that hospital nutrition services should be managed as an integral component of patient-centered care, with quality improvement addressing both operational reliability and patients' sensory and interpersonal experiences. Nevertheless, interpretation should consider the single-hospital setting, purposive sampling, relatively limited sample size, cross-sectional design, and reliance on patient-reported data, which restrict causal interpretation and generalizability. Future studies should involve larger and more diverse samples across multiple hospitals, incorporate probability-based or longitudinal designs, and combine patient-reported outcomes with objective indicators such as actual meal-delivery time, dietary-order accuracy, food temperature, food waste, and menu acceptance. Further research may also develop expanded SEM models incorporating patient satisfaction, nutritional intake, food waste, and patient trust to clarify the broader contribution of hospital nutrition services to quality of care and patient-centered healthcare outcomes.

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DATA AVAILABILITY

No datasets were generated or analyzed during the current study.

AUTHOR CONTRIBUTION

Gabriela Ratri Rachmatia conceptualized and designed the study, conducted data collection, performed data analysis, and drafted the manuscript. Lia Gardenia Partakusuma and Mulyadi Muchtiar provided supervision, guided the theoretical framework, contributed to manuscript revision, and provided critical scientific feedback. All authors reviewed and approved the final version of the manuscript.

DECLARATIONS

ETHICAL APPROVAL

This study was conducted in accordance with ethical standards for human research. Informed consent was obtained from the parents or guardians of all participating patients. Confidentiality and anonymity of participants were maintained throughout. All procedures adhered to ethical guidelines for research involving human subjects.

CONSENT FOR PUBLICATION PARTICIPANTS

Consent for publication was given by all participants.

COMPETING INTERESTS

The authors declare no competing interests.

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