

FACTORS ASSOCIATED WITH THE UTILIZATION OF TOOTH EXTRACTION AT THE RENGAS PULAU COMMUNITY HEALTH CENTER

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ABSTRACT

Oral health remains a significant global challenge, with tooth extraction being a primary curative solution in primary care. Despite its availability, the utilisation of these services at Community Health Centres (Puskesmas) is influenced by various multifaceted factors. This study aims to analyse factors associated with the utilisation of tooth extraction services at the Rengas Pulau Community Health Centre, Medan. An explanatory sequential mixed-methods design was employed. The quantitative phase involved 110 adult patients selected via purposive random sampling, while the qualitative phase included 5 key informants for in-depth interviews. Data were analysed using Chi-Square tests, Multiple Logistic Regression, and thematic analysis. Quantitative findings revealed that income ($p=0.000$; $r=0.464$), facilities and infrastructure ($p=0.000$; $r=0.625$), accessibility ($p=0.000$; $r=0.648$), and service quality ($p=0.000$; $r=0.643$) were significantly associated with service utilisation. Conversely, gender ($p=0.115$) and occupation ($p=0.023$) showed no significant relationship. Qualitative data reinforced these findings, highlighting that low-income patients utilised services more due to the National Health Insurance (BPJS), and perceived facility modernity significantly reduced dental anxiety. Socio-structural factors (enabling and need factors) are more predictive of tooth extraction utilisation than predisposing demographic characteristics. Strengthening infrastructure and maintaining service excellence are critical to optimising primary oral healthcare.

Keywords: *Tooth Extraction, Mixed-Methods, Service Utilization, Primary Health Care, Andersen Model.*

Introduction

Oral health is a significant global public health challenge, with the World Health Organisation (WHO) estimating that nearly 3.5 billion people, or approximately half the world's population, suffer from at least one form of oral disease (Jain et al., 2023). This global burden of oral disease is extraordinary, surpassing the combined burden of the five most common non-communicable diseases worldwide (Jain et al., 2023). Among these conditions, periodontal disease has been identified as a major public health problem, having a wide

impact on individuals' socioeconomic well-being and systemic health (Hashim et al., 2025). Severe periodontitis and edentulism (total tooth loss) are major contributors to years lived with disability (YLDs), with the burden projected to continue to increase significantly through 2050 (Nascimento et al., 2024). As a consequence of untreated dental caries and periodontal disease, tooth extraction remains the most common clinical procedure worldwide (Suzuki et al., 2021). This high rate of tooth extraction reflects barriers to accessing preventive care and demonstrates the complexity of the

challenges facing oral health management at the primary care level globally (Sharif et al., 2020).

Utilisation of dental health services is hindered by complex, multifactorial barriers encompassing psychological, sociocultural, and structural factors that prevent patients from seeking professional care (Rosa et al., 2020). Dental anxiety is the most prevalent barrier, with fear of clinical procedures and medical equipment often leading individuals to delay visits until pathological conditions reach an advanced stage (M et al., 2025). In addition to psychological factors, low levels of oral health literacy also limit patients' understanding of the importance of preventive measures and the utility of available services, thus triggering avoidance behaviour (Badran et al., 2023). Barriers also arise from the service provider side, where professionals' reluctance to handle certain cases or limited competence in treating patients with special needs often create significant access gaps (Alshatrat et al., 2020). Systemically, economic constraints and perceived high treatment costs remain key determinants hindering accessibility for vulnerable groups (Rosa et al., 2020). Therefore, failure to identify and mitigate the interaction between individual anxiety, lack of knowledge, and institutional barriers can lead to a progressive decline in community dental

health status (Badran et al., 2023; M et al., 2025).

Primary healthcare is the foundation of any health system, responsible for providing access to essential, affordable dental services for the wider population (Domnariu et al., 2024). In low- and middle-income countries, optimising primary oral healthcare is crucial for reducing the burden of disease, although its utilisation often lags behind that of general medical services (Susarla et al., 2022). In the Indonesian context, the quality of care at public dental health centres is a determining factor that directly influences patient satisfaction and their motivation to continue using these facilities (Akbar et al., 2020). A breakdown of factors in a health utility model indicates that the availability of human resources, geographic accessibility, and family perceptions are key drivers of dental service utilisation at primary care facilities (Nagdev et al., 2023). Furthermore, strengthening public-sector dental services, particularly in rural and remote areas, is essential to ensure equitable access to oral health rehabilitation (Ghanem et al., 2023).

Although the literature on dental health service utilisation has grown globally, critical gaps remain in understanding how oral health literacy and subjective perceptions interact to shape care-seeking behaviour in primary

healthcare settings (King et al., 2023). Most previous studies have tended to focus on specific risk groups or use only quantitative metrics, which often fail to capture the dynamics of personal barriers and facilitators experienced by the general population (Alsoghier et al., 2024). Furthermore, while health behaviour models have been widely applied to assess utility, evidence from mixed-methods analyses specifically evaluating the utilisation of dental extraction services in urban community health centres in developing country contexts remains limited (Sidharthan et al., 2024). A comprehensive approach that integrates facility surveys with individual narratives of experiences is needed to uncover the systemic and psychosocial mechanisms that influence patients' decisions to access basic oral surgery services (Panditi et al., 2025). Therefore, this study aims to fill this knowledge gap by analysing factors related to the utility of tooth extraction at the Rengas Pulau Community Health Centre through a sequential explanatory mixed-methods design to provide a more in-depth and holistic perspective.

Method

Design and Rationale This study used a mixed-methods design with an exploratory sequential approach (QUAN qual). In the first phase, quantitative data were collected and analysed to identify

significant factors associated with service utilisation. The second phase involved a qualitative approach to explore these findings in more depth. The rationale for this design was to provide a comprehensive understanding of patient behaviour; while quantitative data identify which factors are statistically significant, qualitative data explain why and how these factors (such as dental anxiety or perceived quality) influence the decision-making process in ways that cannot be captured by numbers alone. **Study Location and Participants:** This study was conducted at the Community Health Centre (Puskesmas) in Rengas Pulau, Medan Marelan, North Sumatra. **Quantitative Phase:** The target population consisted of 150 patients. Using the Slovin formula with a 5% margin of error, a sample size of 110 respondents was determined. Participants were selected using purposive random sampling based on the inclusion criteria: adults (aged 18 years), registered as patients at the health centre, and having used the centre's services more than once. **Qualitative Phase:** To achieve "data saturation" and provide depth of explanation, 5 key informants were selected from the quantitative sample. These participants were selected using a maximum variation sampling strategy to represent different levels of service utilisation and socioeconomic backgrounds. **Variables and Instruments**

This study is based on Andersen's Behavioural Model of Health Service Utilisation, which categorises variables into: Independent Variables: Gender and occupation (Predisposing factors); Income, facilities/infrastructure, and accessibility (Enabling factors); and Quality of service (Need/perception factors). Dependent Variable: Utilisation of tooth extraction services (Categorical: Used vs Not Used). Quantitative data were collected using a structured questionnaire that has undergone rigorous validity and reliability testing. The instrument demonstrated high internal consistency, as indicated by Cronbach's Alpha. Qualitative data were collected through semi-structured in-depth interviews, guided by a questionnaire that focused on perceived barriers, psychological factors (e.g., fear of dental care), and satisfaction. Data Analysis and Integration Quantitative Analysis: Data were processed using SPSS version 25.0. Analysis included univariate tests for frequency distributions and bivariate tests using the Chi-Square test (replacing

Pearson's for categorical outcomes) to determine Odds Ratios (ORs) and 95% Confidence Intervals (CIs). Multivariate analysis was conducted using Multiple Logistic Regression to identify the most dominant predictors of service utilisation. Qualitative Analysis: Qualitative narratives were analysed using the Miles and Huberman model, which involves data reduction, data display, and drawing/verifying conclusions through thematic coding. Data Integration: Results from both phases were integrated during the "interpretation" stage through triangulation. This ensured that statistical predictors were validated and explained by patients' lived experiences. Ethical Considerations: The study protocol was reviewed and approved by the Health Research Ethics Committee of the Faculty of Medicine, Universitas Prima Indonesia. Ethical principles, including informed consent, anonymity, and data confidentiality, were strictly adhered to throughout the study. All participants provided written informed consent before data collection.

Results

Quantitative Analysis

Bivariate Analysis

Table 1. Factors Associated with Tooth Extraction at the Rengas Pulau Community Health Center

Variable	Sig. (2-tailed)	Pearson Correlation
Gender vs. Dental Care Utilization	0.115	0.115
Occupation vs. Dental Care Utilization	0.811	0.023
Income vs. Dental Care Utilization	0.000	0.464
Facilities and Infrastructure on Dental Care Utilization	0.000	0.625
Accessibility vs. Dental Health Utilization	0.000	0.648

Variable	Sig. (2-tailed)	Pearson Correlation
Quality of Service on Dental Care Utilization	0.000	0.643

Table 1 above shows that there is a correlation coefficient (r) of 0.115, with the level of association or correlation falling into the very weak category; furthermore, this correlation is not statistically significant because $p > 0.05$ ($0.115 < 0.05$). This indicates that there is no relationship between gender and the utilization of tooth extraction at the Rengas Pulau Community Health Center.

Shows that there is a correlation coefficient (r) of 0.023, indicating a very weak relationship or correlation, and this correlation is not significant because $p > 0.05$ ($0.023 < 0.05$). This indicates that there is no relationship between occupation and the utilization of tooth extraction at the Rengas Pulau Community Health Center.

Shows that there is a correlation coefficient (r) of 0.464 between income and tooth extraction at the Rengas Pulau Community Health Center, indicating a moderate level of correlation. This correlation is significant because $p < 0.05$ ($0.000 < 0.05$). This indicates that there is a relationship between income and the utilization of tooth extraction services at the Rengas Pulau Community Health Center.

Shows that there is a correlation coefficient (r) of 0.625 between facilities

and infrastructure and the utilization of tooth extraction at the Rengas Pulau Community Health Center, with a correlation level in the strong category; this correlation is significant because $p < 0.05$ ($0.000 < 0.05$). This indicates that there is a relationship between facilities and infrastructure and the utilization of tooth extraction at the Rengas Pulau Community Health Center.

shows that there is a correlation coefficient (r) of 0.648, indicating a strong correlation, and this correlation is significant because $p < 0.05$ ($0.000 < 0.05$). This indicates that there is a relationship between accessibility and the utilization of tooth extraction services at the Rengas Pulau Community Health Center.

Shows that there is a correlation coefficient (r) of 0.643 between service quality and the utilization of tooth extraction at the Rengas Pulau Community Health Center, indicating a strong correlation. This correlation is significant because $p < 0.05$ ($0.000 < 0.05$). This indicates that there is a relationship between service quality and the utilization of tooth extraction at the Rengas Pulau Community Health Center.

Multivariate Analysis

Table 2 Variable Selection for Multivariate Analysis

Variable	P-value	Candidate
Gender (X1)	0.115	No
Occupation (X2)	0.811	No
Income (X3)	0.000	Yes
Facilities and Infrastructure (X4)	0.000	Yes
Accessibility (X5)	0.000	Yes
Service Quality (X6)	0.000	Yes

Table 2 shows that the independent variables in this study with *p-values* < 0.05 are income, facilities and infrastructure, accessibility, and service quality. Based on these results, the

independent variables included in the multivariate testing model are income, facilities and infrastructure, accessibility, and service quality, with the results shown in Table 3:

Table 3 Results of Multivariate Analysis

Variable	Sig
Income (X3)	
Facilities and Infrastructure (X4)	
Accessibility (X5)	0.000
Service Quality (X6)	

Table 3 presents the results of the multivariate analysis of the variables income, facilities and infrastructure, accessibility, and service quality regarding the utilization of tooth extraction services at the Rengas Pulau Community Health Center. from the table, a significance value of $0.000 < 0.05$ can be seen, which means that the

independent variables of income, facilities and infrastructure, accessibility, and quality of service in this study collectively or simultaneously have a relationship with the dependent variable, namely the utilization of tooth extraction at the Rengas Pulau Community Health Center.

Table 4. Independent Variables with the Greatest Influence on the Dependent Variable

Variable	Odds Ratio
Income (X3)	0.777
Facilities and Infrastructure (X4)	1.240
Accessibility (X5)	1.837
Service Quality (X6)	1,522

Table 4 presents the results regarding the independent variables most

strongly associated with the dependent variable. The research findings indicate

that the highest *odds ratio* is found in the accessibility variable (X5), at 1.837. Based on these results, it can be concluded that the independent variable most strongly associated with the dependent variable in this study is the accessibility variable (X5).

Qualitative Analysis

Dental health is an integral part of overall health, and good access to dental health services is a crucial factor in maintaining community well-being. The objective of this study was to identify factors associated with dental health services, specifically tooth extraction, at the Rengas Pulau Community Health Center. In this study, interviews were conducted with five informants, all of whom had previously utilized dental health services for tooth extraction at the Rengas Pulau Community Health Center—a finding consistent with the informants' responses in this study, who stated:

Informant 1 stated: *"I have used it once."*

Informant 2 stated: *"This is the second time I've used it."* Informant 3 stated:

"This is my first time."

Informant 4 stated: *"This is the first time I've used it."* Informant 5 stated: *"I*

have."

There were several reasons given by the informants for choosing the Rengas Pulau Community Health Center

for tooth extraction services, such as its proximity to home, easy access, costs covered by BPJS, and good service. These reasons align with the informants' statements, who said:

Informant 1 stated: *"Because it's close to my house and the service good."*

Informant 2 stated: *"Because the equipment here is fairly complete and it's close to my house and the costs are covered by BPJS."*

Informant 3 stated: *"It's close to home and, as it happens, they also offer dental care as well."*

Informant 4 stated: *"It's close to home and the costs can be covered by BPJS."*

Informant 5 stated: *"The staff are friendly, the service is good, and it's also accessible "It's close to my house."*

Based on the reasons given by the informant regarding the use of dental extraction services at the Rengas Pulau Community Health Center, the informant also stated that the Rengas Pulau Community Health Center is beneficial for dental health maintenance and tooth extraction.

Informant 1 stated: *"Very beneficial."*

Informant 2 stated: *"Very beneficial."*

Informant 3 stated: *"Beneficial."*

Informant 4 stated: *"Beneficial."*

Informant 5 stated: *"Very beneficial."*

With benefits that provided by Rengas Pulau Community Health

Center in dental health services, the informant in this study stated that if a family member has dental health issues, they will be taken to the Rengas Pulau Community Health Center.

Informant 1 stated: *“It depends on the person’s preference, but personally, I would recommend going to the health center first.”*

Informant 2 stated: *“Yes.”*

Informant 3 stated: *“Yes, because the Rengas Pulau Community Health Center offers a fairly comprehensive.”*

Informant 4 stated: *“I would definitely recommend going to the nearest community health center to get first aid.”*

Informant 5 stated: *“Yes.”*

Based on the interviews with the informants, the factors influencing your decision to use dental health services at the Rengas Pulau Community Health Center include good service, proximity to home, adequate facilities and infrastructure, and costs covered by BPJS, as indicated by the statements from the informants in this study.

Informant 1 stated: *“Facilities and infrastructure, quality of service, and cost.”*

Informant 2 stated: *“The main reason is that the Rengas is close to my home, and the service is also good and fast.”*

Informant 3 stated: *“Cost, location, service, and good facilities and equipment.”*

Informant 4 stated: *“Access, good service, and cost.”*

Informant 5 stated: *“The main factors are good service and cost.”*

The informants’ responses regarding the factors influencing the utilization of tooth extraction services at the Rengas Pulau Community Health Center indicate that the results of this qualitative study align with previous quantitative research, where key related factors include facilities and infrastructure, service quality, and accessibility.

Discussion

Relationship Between Income and the Use of Tooth Extraction

This study found a significant, moderate relationship between income level and the utility of tooth extraction services, but with a unique pattern. Although the general theory suggests that higher income is directly proportional to utility, field findings indicate that low-income groups (< Rp 3,500,000) are the most active service users. This "anomalous" phenomenon can be explained by the role of social health insurance (BPJS), which has successfully reduced financial barriers for lower-income communities. Income

functions as an enabling factor, but at the Rengas Pulau Community Health Centre, government subsidies make tooth extraction services very affordable. This indicates that low-income groups rely more on Community Health Centres as the primary route for curative care, while high-income groups may have alternative access to private practices.

This study's findings, identifying income as a significant determinant of tooth extraction service utilisation, reinforce global evidence that socioeconomic status is a key determinant of oral health access and outcomes (Northridge et al., 2020). The phenomenon in which lower-income groups demonstrated higher utilisation of extraction procedures at the Rengas Pulau Community Health Centre aligns with the analysis of (Cunha et al., 2022), who reported that individuals with lower economic status are more likely to seek dental care for mutilative procedures such as extractions than for preventive care. This is often driven by the perceived high cost of treatment, which has consistently been identified as a major barrier for vulnerable populations seeking medical assistance (Treloar et al., 2021). Furthermore, this income-based disparity contributes to the

disparity in the number of functional teeth, with higher-income groups better able to access dental conservation services. In contrast, lower-income groups often consider extraction as a final solution (Rachel et al., 2025).

However, the availability of subsidised or free healthcare services—such as the role of BPJS in this study—suggests that when financial barriers are reduced, service utilisation patterns are more influenced by non-financial factors and urgent clinical needs (Carlsen et al., 2021). Collectively, these results underscore the importance of financial protection policies to ensure equitable access to primary care for low-income communities (Cunha et al., 2022; Northridge et al., 2020).

The Relationship Between Facilities and Infrastructure Factors and the Utilization of Tooth Extraction

The availability of facilities and infrastructure has been shown to have a very strong and significant relationship with patients' decisions to utilise tooth extraction services. The majority of patients' positive perceptions of the equipment's quality and the comfort of the procedure room are the primary motivators (push factors) for undergoing invasive oral surgery. For patients, the completeness of facilities is not merely

an aesthetic aspect, but also a symbol of clinical safety and institutional professionalism. These findings confirm that patients tend to feel more at ease and confident undergoing tooth extraction when they see modern, well-maintained medical equipment, as this is directly related to their perception of reduced risk of post-procedure complications.

The findings of this study, which demonstrate a strong and significant relationship between the quality of infrastructure and the utility of tooth extraction services, support the literature that the physical environment is a crucial determinant of patient experiences in healthcare facilities (Pratama et al., 2024). This positive relationship aligns with a study by (Anisnur & Sunarto, 2025), which confirmed that patients' experiences with dental clinic facilities directly influence their level of satisfaction and confidence in utilising healthcare services continuously (Anisnur & Sunarto, 2025). The significance of facilities in driving patient interest is also supported by the findings of (Stephanie & Hutabarat, 2024), who highlighted that adequate and modern clinic infrastructure is a crucial driver of increased patient intention to seek treatment again (Stephanie &

Hutabarat, 2024). From a technical perspective, the reliability of medical equipment in dental facilities is a fundamental factor that shapes patients' perceptions of clinical safety and the quality of care provided (Zamzam et al., 2021). Furthermore, the provision of integrated healthcare facilities at the primary care level has been shown to increase the frequency with which the community utilises curative services (Danesh et al., 2022). Collectively, this comparison confirms that investment in physical infrastructure is not merely an operational aspect, but a crucial strategy for increasing public trust and the utility of oral surgery services in community health centres (Anisnur & Sunarto, 2025; Pratama et al., 2024).

The Relationship Between Accessibility Factors and the Utilization of Tooth Extraction Services

Geographic accessibility emerged as a dominant factor influencing service utility in this study, with a very strong correlation. Ease of access to the Community Health Centre (Puskesmas), short travel time, and the availability of transportation are crucial enabling factors for the surrounding urban community. When a dental health facility is physically accessible, the psychological barrier to delaying care

tends to be reduced. Conversely, this ease of access creates a more consistent pattern of visits, as patients do not need to allocate significant time and transportation costs to receive emergency dental care.

The findings of this study, which demonstrate a significant relationship between accessibility and utilisation of tooth extraction services, reinforce the global argument that geographic barriers are a key determinant of healthcare access (Hierink et al., 2021). Shorter travel distances and travel times to healthcare facilities have been consistently shown to increase individuals' likelihood of seeking primary care (Ihantamalala et al., 2020). Addressing these geographic barriers is crucial in dental healthcare, particularly to eliminate the phenomenon of "dental deserts," or areas with limited access to dentists that can hinder essential care (Edwards et al., 2025).

Furthermore, optimal spatial coverage of the community health ecentre network enables communities to access services within the recommended service radius, thereby encouraging maximum service utilisation (Ashiagbor et al., 2020). Efficient access models in areas like Rengas Island ensure that basic

oral health needs are met without imposing significant logistical constraints on patients (Verma & Dash, 2020). Collectively, these results confirm that ease of physical access is an absolute prerequisite for increasing the utility of primary oral surgery services in the community (Edwards et al., 2025; Hierink et al., 2021).

The Relationship Between Service Quality Factors and the Utilization of Tooth Extraction Services

The quality of dental health care at the Rengas Pulau Community Health eCentre (Puskesmas) was found to be strongly and significantly associated with the utilisation of extraction services. The interaction between health workers and patients, as well as technical competence in performing the procedure, was a key determinant of patient loyalty and interest. High service quality creates a positive experience, helping reduce the anxiety typically associated with tooth extraction procedures. Patients perceived staff empathy, clarity of information, and speed of service as indicators of professionalism that build trust. These results suggest that despite the availability of facilities, the quality of human interaction remains central to public health service utilisation, with perceptions of quality care driving patients to choose the Puskesmas as their

primary source of dental care.

The findings of this study, which demonstrate a strong and significant relationship between service quality and the utility of tooth extraction, support global literature suggesting that patient perceptions of care quality are a key driver of health-seeking behaviour (Ghanem et al., 2023). These results align with (Siripipatthanakul, 2021) research, which found that service quality dimensions, particularly empathy and reliability, significantly influence patient satisfaction and the intention to revisit a dental clinic. The significance of human interaction in this service is supported by (Makary, 2024), who emphasised that the professionalism and interpersonal skills of medical personnel are crucial in creating positive health outcomes and enhancing patient trust. Furthermore, effective communication has been identified as a core element of dental professionalism, determining patient comfort during clinical procedures (Cserző et al., 2022). The statistical association between perceived service quality and patient satisfaction confirms that high service standards are an absolute prerequisite for optimising the use of primary healthcare facilities (Komşuoğlu, 2022). Collectively, the synchronisation of these results confirms that increasing the utility of oral surgery

services at the primary level depends on service providers' ability to integrate clinical competence with the quality of empathetic, professional interactions (Makary, 2024; Siripipatthanakul, 2021).

Implication and Limitation

This study provides a theoretical contribution by validating the Andersen Behavioural Model in the context of primary dental care in urban Indonesia. The findings confirm that in urban communities, enabling factors (access and facilities) and need factors (perceived service quality) have a stronger influence than predisposing factors (gender and occupation). Theoretically, this suggests that dental health-seeking behaviour is driven more by accessibility and perceived clinical safety than by individual demographics.

In practice, these results suggest that Community Health Centre (Puskesmas) management should focus on improving physical aspects (modern equipment) and staff friendliness to reduce psychological barriers for patients. Furthermore, the role of BPJS Kesehatan (Social Security Agency for Health) has proven crucial as a bridge for low-income groups, so socialisation on the ease of administrative procedures must be continuously strengthened to maintain a high level of utility.

This study has several limitations

that should be considered. First, the cross-sectional design used only provides a snapshot of the relationship between variables at a single point in time, thus not allowing definitive causal conclusions. Second, this study was conducted at only one location (Rengas Pulau Community Health eCentre), so the generalizability of the findings to areas with different geographic or social characteristics (e.g., remote rural areas) may be limited. Finally, qualitative data collection was conducted with a limited number of informants, which, despite reaching data saturation, still leaves open the possibility of other variations in subjective experiences that have not been captured.

Conclusions

This study concluded that utilisation of tooth extraction services at the Rengas Pulau Community Health Centre was significantly determined by income level, infrastructure quality, geographic accessibility, and service quality. Among these factors, accessibility and physical facilities emerged as the strongest drivers in building patient confidence in undergoing oral surgery procedures. Meanwhile, gender and occupational factors did not influence patient decisions, indicating that the need for tooth extraction is experienced uniformly across the community. Integration of qualitative data confirmed

that although income is related to utility, the existence of national health insurance has successfully mitigated economic barriers, making the quality of interaction and facility convenience the primary determinants in the choice of primary dental health services.

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