

Association Between Tooth Loss, Nutritional Status, and Oral Health-Related Quality of Life Among Older Adults at the Integrated Clinic of RSGM Unimus

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ABSTRACT

Background: Tooth loss in older adults may impair mastication, alter food intake, and reduce oral health-related quality of life (OHRQoL). This study aimed to analyze the associations between tooth loss, nutritional status, and OHRQoL among older adults receiving care at the Integrated Clinic of RSGM Unimus.

Method: This cross-sectional analytical observational study was conducted in February 2026 at the Integrated Clinic of RSGM Unimus. Seventy-one participants aged 55–75 years were selected purposively from a population of 245 patients. Tooth loss was assessed clinically, nutritional status was determined using body mass index, and OHRQoL was assessed using the GOHAI questionnaire. Associations were analyzed using Spearman rank correlation and multinomial regression.

Result: Severe tooth loss was observed in 43.7% of participants, and 45.1% reported poor quality of life. Tooth loss was significantly associated with nutritional status and OHRQoL ($p < 0.05$). The final multinomial regression models were statistically significant, with Nagelkerke R^2 values of 0.838 for nutritional status and 0.805 for OHRQoL.

Conclusion: Tooth loss was significantly associated with nutritional status and OHRQoL among older adults. Greater tooth loss was linked to a higher likelihood of nutritional problems and poorer OHRQoL, supporting the importance of preserving oral function in older-adult care.

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INTRODUCTION

When it comes to dental health, tooth loss is still a major issue for the elderly. When teeth fall out of their alveolar sockets, a condition known as tooth loss occurs.¹ The issue is particularly relevant in Indonesia, where older adults account for 11.75% of the total population and the estimated proportion experiencing tooth loss reaches 56.9%.² Data from the 2023 Indonesian Health Survey reported an overall tooth-loss prevalence of 45.9%, with the largest proportion, 69.1%, occurring in the 55–64-year age group.³ A similar pattern was documented in the 2018 Basic Health Research (Riskesdas), indicating that tooth loss among older individuals remains an enduring and substantial public health concern.^{4,5} Edentulism can lead to structural alterations within the oral cavity, including alveolar bone resorption and impairment of orofacial tissues, which may affect masticatory efficiency, speech function, and facial aesthetics.^{6,7} These changes can reduce chewing ability, potentially influencing dietary intake and nutritional status while also contributing to a decline in overall quality of life.^{8,9} Nutritional status reflects the balance between an individual's physiological nutrient requirements and the nutrients obtained through daily food consumption, serving as an important determinant of health and functional well-being.^{8,9}

Beyond producing physical limitations, the absence of teeth can also interfere with the psychological condition and social functioning of older individuals, which may ultimately diminish their quality of life. Oral Health-Related Quality of Life (OHRQoL) represents the functional, emotional, and social effects of oral health conditions. This concept includes a person's experience of pain or discomfort and the extent to which oral problems restrict everyday activities.^{11,12,13} In older adults, reduced chewing ability caused by missing teeth may limit food consumption and nutrient intake, thereby contributing to a deterioration in their general quality of life.^{14,15}

An initial assessment conducted at the Integrated Clinic of the Unimus Dental Hospital indicated that most older patients receiving care were between 55 and 75 years of age. Removable denture treatment and periodontal care were the services most frequently provided to this group. The number of visits by older patients increased in October 2025 compared with the preceding month, particularly for these two types of treatment. Based on these clinical findings, this study examined the relationships among tooth loss, nutritional status, and quality of life in older individuals treated at the Integrated Clinic of the Unimus Dental Hospital.

Previous studies have indicated that tooth loss among older adults may adversely affect nutritional status and oral health-related quality of life (OHRQoL) through impaired masticatory function, changes in food selection, and limitations in oral function. However, findings have varied across studies, potentially due to differences in population characteristics and research settings. Evidence regarding the association between tooth loss, nutritional status, and OHRQoL among older adults at the Integrated Clinic of Unimus Dental Hospital remains limited. This clinic was selected because it provides dental care to older adults with diverse oral health conditions, including tooth loss that may influence masticatory function, nutritional intake, and quality of life. Therefore, this study aimed to analyze the relationship between tooth loss, nutritional status, and OHRQoL among older adults receiving care at the Integrated Clinic of Unimus Dental Hospital.

RESEARCH METHOD

All research variables were evaluated throughout the same observation period in this quantitative observational study that used a cross-sectional design. The Integrated Clinic of Unimus Dental Hospital in

Semarang was the site of data collecting in February 2026. The 245 patients who had previously received clinical treatment at the institution and were between the ages of 55 and 75 made up the target population. The study contained 71 individuals, as determined by the sample-size calculation using Slovin's technique.

Using pre-established eligibility criteria, participants were selected in a deliberate manner. If an elderly patient could converse well and agreed to participate in the study from start to finish, they were considered eligible. People who had trouble expressing themselves verbally were not allowed to take part.

In this study, tooth loss was the main exposure and nutritional status and quality of life were the outcome factors. Primary and secondary sources were used to compile the data. Primary data regarding tooth loss was gathered by means of intraoral examination. The GOHAI questionnaire was used to assess quality of life, while measures of nutritional status were taken by measuring height and weight and then calculating Body Mass Index (BMI). In order to characterize the study participants' demographics, secondary data were culled from patients' administrative records. Additional information about the study's respondent profile was provided by these data, which bolstered the analysis.

The severity of tooth loss was classified as low (<4 missing teeth), moderate (4-8 missing teeth), or severe (>8 missing teeth) according to Serriyati et al (2025). We used good, moderate, and poor to describe quality of life and normal and abnormal to describe nutritional status. Obtaining research approval, choosing participants, obtaining informed consent, performing clinical examinations, anthropometric measures, and questionnaire administration were all part of the data gathering process, which included both preparation and execution phases. The data was cleaned, entered, edited, and coded before analysis.

To summarize the characteristics of the participants and the distributions of the variables, univariate analysis was carried out. We used multinomial regression to look at how the independent variable affected the dependent variables, and the Spearman rank correlation test to look at how the variables were related to each other.

The Dental Hospital's Health Research Ethics Committee at Universitas Muhammadiyah Semarang issued Ethical Clearance No. 013/RSGM.KEPK/PE/2026, approving all study protocols. All phases of the study's execution were in accordance with the generally accepted ethical guidelines for research with human subjects.

RESULTS

Table 1 presents the distribution of participant characteristics, including age, sex, educational level, occupation, and marital status. Among the 71 participants, the majority were aged 55–65 years (95.8%). Most participants were female (62%), had a non-university education background (64.8%), were non-civil servants (64.5%), and were married (100%).

Table 1. Distribution of Participant Characteristics

	Characteristic	Frequency (n)	Percentage (%)
Age	55–65 years	68	95.8
	66–75 years	3	4.2
Sex	Male	27	38
	Female	44	62

Educational level		
University graduate	25	35.2
Non-university graduate	46	64.8
Occupation		
Civil servant	21	35.5
Non-civil servant	50	64.5
Marital status		
Married	71	100

Table 2 presents the distribution of the study variables, including tooth loss, nutritional status, and quality of life. Among the 71 respondents, severe tooth loss was the most prevalent category, observed in 31 participants (43.7%). Regarding nutritional status, 40 respondents (59.2%) were classified as having abnormal nutritional status, while poor quality of life was reported in 32 participants (45.1%).

Table 2. Distribution of Tooth Loss, Nutritional Status, and OHRQoL

Variable	Frequency (n)	Percentage (%)
Tooth loss		
Mild	18	25.4
Moderate	22	31.0
Severe	31	43.7
Nutritional status		
Normal	29	40.8
Abnormal	40	59.2
Quality of Life		
Good	15	21.1
Moderate	24	33.8
Poor	32	45.1

Table 3 presents the Spearman correlation analysis used to identify the association between tooth loss, nutritional status, and quality of life. The result showed a significance value of 0.000 ($p < 0.05$), which means that the relationship among these variables was statistically significant. Among the variables analyzed, quality of life had the highest standard deviation, with a value of 0.78312.

Table 3. Association Between Tooth Loss, Nutritional Status, and OHRQoL

Variable	Mild	Moderate	Severe	P-value	SD
Nutritional status					
Normal	12	13	4	<0.001	0.49505
Abnormal	6	9	27		
Quality of Life					
Good	7	6	2	<0.001	0.78312
Moderate	8	10	6		
Poor	3	6	23		

For the purpose of assessing the relationships between the independent variable and the research results, multinomial regression was used. Two independent models for analysis were created. One looked

at how tooth loss affected people's nutritional health, while the other looked at how it affected people's quality of life. What follows is a presentation of the results of these multivariate analyzes. The results of the goodness-of-fit test for the two regression models are shown in Table 4. The fact that all of the models' significance values were higher than 0.05 indicates that they accurately reflected the observed data. So, we could utilize both models for the rest of the analyzes since they were both statistically fit.

Table 4. Goodness-of-Fit Test

Model	Goodness-of-Fit Test	Chi-square	df	Sig.
Model 1	Pearson	21.949	13	0.056
	Deviance	25.183	13	0.052
Model 2	Pearson	25.536	26	0.489
	Deviance	29.321	26	0.297

Analyzed coefficients of determination are shown in Table 5. Given that Model 1's Nagelkerke value was 0.838, we may infer that tooth loss explains 83.8% of the variation in Nutritional Status, with the remaining 16.2% attributable to confounding variables. With a Nagelkerke value of 0.805 for Model 2, we may deduce that tooth loss explains 80.5% of the variability in Quality of Life, whereas the remaining 19.5% is attributable to variables outside the scope of this investigation.

Table 5. Coefficient of Determination Test

Model	Measure	Value
Model 1	Cox and Snell	0.799
	Nagelkerke	0.838
	McFadden	0.877
Model 2	Cox and Snell	0.856
	Nagelkerke	0.805
	McFadden	0.809

By contrasting the final model with the one that did not include predictor variables, Table 6 displays the model significance evaluation. The inclusion of the predictor variable improved the model's performance, as shown by the decrease in the -2 Log Likelihood value from 74.897 in the initial model (without predictors) to 38.731 in the final model, according to the goodness-of-fit test for Model 1. Model 2 also demonstrated that the -2 Log Likelihood value decreased from 94.448 in the original model to 63.208 in the final model, suggesting that the model fit was improved when the predictor variable was included.

Table 6. Model Significance Test

Model	Fit	-2 Log Likelihood	Chi-square	df	Sig.
Model 1	Intercept Only	74.897			
	Final	38.731	36.166	6	<0.001
Model 2	Intercept Only	94.448			
	Final	63.208	31.240	12	0.002

The incomplete test results are shown in Table 7. There was a statistically significant influence of tooth loss on the nutritional condition of older persons, as all categories of tooth loss in Model 1 had

significance values of $p < 0.05$. Of the covariate factors that were examined, only employment ($p < 0.05$) showed a significant connection with nutritional status, whereas the others included age, sex, education, and profession. The quality of life outcomes for older persons was shown to be strongly impacted by tooth loss in Model 2, regardless of the severity of the tooth loss (mild, moderate, or severe), with significant values of $p < 0.05$ for both good and bad quality of life. At the same time, there was no statistically significant relationship between the quality of life of older persons and the covariate variables (sex, education, occupation, and age; $p > 0.05$).

Table 7. Partial Test Results

Model	Outcome	Predictor	B	Wald	Sig.
Model 1	Normal	Intercept	19.682	148.870	<0.001
		Age	-17.729	.	.
		Sex	0.532	0.560	0.454
		Occupation	-2.088	7.121	0.008
		Education	-0.918	1.187	0.276
		Tooth Loss (1)	2.954	10.657	0.001
		Tooth Loss (2)	2.149	7.010	0.008
		Tooth Loss (3)	0b	.	.
Model 2	Good	Intercept	-2.556	0.953	0.329
		Age	2.483	1.735	0.188
		Sex	0.676	0.635	0.426
		Occupation	-0.859	0.967	0.325
		Education	-1.541	2.076	0.150
		Tooth Loss (1)	3.209	8.613	0.003
		Tooth Loss (2)	2.352	5.395	0.020
		Tooth Loss (3)	0b	.	.
	Poor	Intercept	-1.859	0.692	0.405
		Age	1.435	0.794	0.373
		Sex	1.293	2.899	0.089
		Occupation	-0.999	1.614	0.204
		Education	-0.994	1.500	0.221
		Tooth Loss (1)	2.436	7.456	0.006
		Tooth Loss (2)	1.764	5.407	0.020
		Tooth Loss (3)	0b	.	.

DISCUSSION

The aging process is closely associated with structural changes in oral tissues, characterized by tooth loss and alterations in the oral mucosa.⁷ These conditions may be influenced by several factors, including a history of severe periodontal infection, unhealthy dietary patterns, inadequate oral hygiene, and limited access to dental care.¹⁶ Tooth loss can impair oral functions, particularly mastication, aesthetics, and phonetics. Without appropriate management, these impairments may negatively affect the overall health status of older adults.¹¹

Based on the distribution of participant characteristics by age group, the majority of participants

were aged 55–65 years, accounting for 68 individuals (95.8%). Age is considered an important factor associated with the severity of tooth loss. Advancing age is related to an increased risk of dental caries and periodontal disease, which may subsequently contribute to a higher likelihood of tooth loss among older adults.⁶ Aging is also often accompanied by reduced motor function and decreased motivation to maintain oral hygiene, leading to a gradual increase in the risk of tooth loss over time.¹⁷ These findings are consistent with the 2023 Indonesian Health Survey, which reported a national tooth loss prevalence of 45.9%, with the highest prevalence observed among individuals aged 55–64 years (69,1%).³

Women constituted the larger proportion of the study sample, with 44 participants representing 62% of all respondents. Sopianah *et al* (2026) found no statistically significant relationship between sex and tooth-loss occurrence.¹⁷ In contrast, Handy *et al* (2026) reported that older women could be more susceptible to tooth loss because reduced bone density may weaken the tissues that support the teeth.¹⁸

Education and income are important factors that may contribute to tooth loss because they influence knowledge, attitudes, and oral health behavior. Older adults with lower educational and economic status are more likely to experience tooth loss than those with better access to information and healthcare services. Individuals with higher education and income generally have greater opportunities to understand preventive measures and maintain oral hygiene.¹⁹

According to Pili *et al* (2018) there is currently limited evidence from studies specifically examining the association between marital status and oral hygiene; therefore, the results of the present study cannot be directly compared with previous research.²⁰ Nevertheless, it is suggested that family support established through marital relationships may contribute to oral hygiene maintenance behavior. This perspective is in line with Ramadhana *et al* (2024) which explained that family support has a significant contribution in providing a sense of security for older adults through informational and psychological assistance, which may help reduce anxiety related to physiological changes, including tooth loss.¹¹

Partial tooth loss in older adults may impair masticatory function and limit the consumption of certain foods, particularly fruits, vegetables, meat, and nuts. This impairment may alter food choices and nutritional intake, potentially affecting nutritional status. Difficulties in chewing may also cause discomfort during meals, reduce eating enjoyment, and restrict social interaction, thereby negatively influencing quality of life. The Geriatric Oral Health Assessment Index (GOHAI) is an instrument designed to assess the impact of oral health conditions on well-being and daily functioning among older adults.¹⁴ This finding is consistent with Kaurani *et al* (2024), who reported that tooth loss may compromise nutritional intake through impaired mastication and reduced consumption of nutrient-rich foods. Individuals with missing teeth may subsequently adjust their dietary choices or eating patterns to compensate for limited chewing ability, which may contribute to dietary imbalance, nutritional deficiencies, and adverse effects on overall health.²⁶

Tooth loss in older adults is a common age-related change that may eventually lead to difficulties in chewing food.²¹ Impaired masticatory ability often causes older adults to limit consuming hard-textured nutrient-rich foods, including meat and fruits, that provide protein and vitamins.¹¹ This can decrease food intake and subsequently contribute to poorer nutritional status. Therefore, tooth loss not only affects masticatory function but may also influence the quality of dietary intake among older adults.²

Tooth loss can impair masticatory function, leading to reduced nutritional intake. In addition, it may interfere with speech and contribute to emotional changes.²² Tooth loss involving both anterior and posterior

regions has been reported to exert a stronger influence on the respondents quality of life. Individuals experiencing tooth loss in both areas tend to demonstrate a decline in quality of life.²³ These findings are consistent with Rizkillah *et al* (2019) who stated that posterior tooth loss directly affects an individual's quality of life, primarily due to impaired chewing function. The consequences of tooth loss extend beyond physical limitations and may also affect psychosocial aspects. These impacts are reflected in seven dimensions of quality of life, such as functional restriction, pain, psychological discomfort, physical impairment, psychological impairment, and social limitation.²⁴

Anterior tooth loss also contributes to reduced quality of life among older adults, particularly in relation to aesthetic concerns. This finding is consistent with the study by Dhafayanti *et al* (2021) which reported that the loss of anterior teeth may impair articulation, resulting in unclear pronunciation and reduced communication effectiveness. Anterior tooth loss can also interfere with the ability to bite food properly. Furthermore, the absence of anterior teeth affects dental and facial aesthetics, potentially causing embarrassment when opening the mouth, discomfort during speaking, and decreased self-confidence, especially during social interactions with others.²⁵

Mastication may enhance cerebral blood flow in several brain regions, thereby providing physiological benefits to cognitive functions within the central nervous system.²⁶ Maintaining adequate masticatory function is therefore important to minimize occlusal disturbances and reduced chewing activity, which may adversely affect cognitive function. Dentures may help preserve masticatory function in individuals with tooth loss, particularly older adults with edentulism, and may potentially contribute to maintaining cognitive function.²⁶

Age, occupation, diabetes, and cardiovascular disease have been identified as factors associated with tooth loss. Individuals with diabetes may have a higher risk due to complications affecting oral health, including gingival inflammation, reduced salivary flow, dental caries, periodontal disease, and tooth mobility. Other systemic conditions, such as anemia, bleeding disorders, hypertension, stroke, kidney disease, arthritis, lupus, asthma, and chronic bronchitis, as well as smoking and substance use, have also been associated with a greater number of missing teeth. Older adults with a history of stroke may experience poorer oral health, including increased tooth loss, although the evidence supporting this association remains limited. In patients with cancer, particularly head and neck malignancies, tooth loss may be related to the adverse effects of treatment. Radiotherapy can substantially reduce salivary production, thereby impairing remineralization and salivary buffering capacity, lowering oral pH, and increasing susceptibility to dental caries and periodontal disease.²⁷

CONCLUSION

Tooth loss was significantly associated with nutritional status and OHRQoL among older adults receiving care at the Integrated Clinic of RSGM Unimus. Greater tooth loss was associated with a higher likelihood of abnormal nutritional status and poorer OHRQoL. These findings support the importance of maintaining oral health and masticatory function as part of comprehensive care for older adults.

STUDY LIMITATIONS

Several limitations should be considered when interpreting the findings. Because the study applied a cross-sectional design, the results demonstrate associations among the variables but cannot establish

causality. The research was also undertaken at only one healthcare facility and involved a relatively limited number of respondents, which may restrict the applicability of the findings to the broader older population. Moreover, potentially influential variables including dietary patterns, socioeconomic conditions, systemic illnesses, medication consumption, and access to dental services were not examined.

RECOMMENDATIONS

Further efforts are needed to strengthen oral health care for older adults, especially through preventive programs that reduce the risk of tooth loss and interventions that help restore chewing ability. Future research is suggested to be conducted with more participants, more diverse research locations, and other variables that may affect oral health, nutritional status, and quality of life. A wider research design would give a better understanding of the impact of tooth loss on the health and well-being of elderly people.

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