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EDENTULISM AND ORAL HEALTH-RELATED QUALITY OF LIFE AMONG THE RURAL ELDERLY POPULATION OF SWAT, PAKISTAN: GENDER DISPARITIES AND BARRIERS TO DENTAL CARE

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Abstract

Background: *Edentulism is a major oral health concern among elderly populations and may significantly affect oral health-related quality of life. This study assessed edentulism and oral health-related quality of life among rural elderly people in Swat, Pakistan, with special focus on gender disparities and barriers to dental care.*

Methods: *A quantitative cross-sectional design was used, and data were collected from 200 elderly respondents aged 60 years and above through a structured questionnaire. Data were analyzed using IBM SPSS Statistics Version 27.*

Results: *The results showed that 50.5% of respondents had partial edentulism, 11.5% had complete edentulism, and 38.0% had no edentulism. The mean number of missing teeth was 9.60 ± 10.19. Only 11.5% of respondents reported denture use, while 70.0% had not visited a dentist during the last 12 months. The mean OHRQoL total score was 21.95 ± 9.10, indicating a noticeable oral health impact on daily life. Regarding OHRQoL severity, 56.0% had a moderate impact, 20.5% had a high impact, and 23.5% had a low impact. Gender differences were significant for edentulism status ($\chi^2 = 7.095$, $p = 0.029$) and OHRQoL severity ($\chi^2 = 18.437$, $p < .001$). Female respondents reported significantly poorer OHRQoL than males (24.57 ± 8.76 vs. 19.22 ± 8.68, $p < .001$) and had more missing teeth (11.17 ± 10.52 vs. 7.96 ± 9.62, $p = 0.025$). OHRQoL differed significantly across edentulism groups ($F = 442.648$, $p < .001$), with the highest impact among completely edentulous respondents. Missing teeth strongly correlated with the OHRQoL total score ($r = 0.888$). Regression analysis showed that missing teeth ($\beta = 0.879$, $p < .001$), female gender ($\beta = 0.141$, $p < .001$), and denture use ($\beta = -0.127$, $p < .001$) were significant predictors of OHRQoL*

Conclusion: *The study concludes that edentulism substantially affects oral health-related quality of life among rural elderly people in Swat, with women experiencing a greater oral health burden.*

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INTRODUCTION

Edentulism, commonly defined as the complete or partial loss of natural teeth, remains a major public health concern among older adults, particularly in rural and underserved communities (Roberto et al., 2019). Although tooth loss is often considered a normal part of ageing, it is largely preventable and is strongly influenced by oral hygiene practices, access to dental services, socioeconomic conditions, health awareness, diet, and timely treatment of dental diseases (World Health Organization, 2023; Peres et al., 2019). Among elderly individuals, edentulism can affect far more than oral function; it can influence nutrition, speech, facial appearance, self-confidence, social interaction, psychological well-being, and overall quality of life (Chan et al., 2024; Peres et al., 2021). For this reason, oral health is now increasingly recognized as an essential component of healthy ageing and general health (Chan et al., 2024; Peres et al., 2021).

Oral health-related quality of life (OHRQoL) refers to the extent to which oral conditions affect an individual's daily activities, comfort, social functioning, and emotional well-being (Sischo & Broder, 2011). In elderly populations, tooth loss may cause difficulty in chewing hard foods, avoiding certain meals, embarrassment while speaking or smiling, pain due to poorly fitted dentures, and reduced social participation (Sischo & Broder, 2011; Rodrigues et al., 2012). These problems can be more serious in rural settings where older adults may have limited access to dental clinics, specialist care, prosthodontic services, and affordable dentures (Khalaf et al., 2019; Folorunsho et al., 2025). In such communities, oral problems are often ignored until they become severe, mainly because dental care is perceived as costly, distant, or less important than other health needs (Khalaf et al., 2019).

Swat, a largely mountainous district of Khyber Pakhtunkhwa, Pakistan, contains many rural areas where elderly residents may face multiple barriers to dental care. These barriers may include long travel distances, low household income, limited transportation, lack of awareness about oral health, shortage of dental professionals, fear of dental procedures, and dependence on family members for healthcare decisions (Khalaf et al., 2019; Yamamoto et al., 2017). Elderly people living in rural areas may also prioritize other household needs over dental treatment (Folorunsho et al., 2025). As a result, untreated tooth loss and poor oral function may remain common but underreported problems in this population (Masoudi Rad et al., 2021).

Gender disparities are another important dimension of oral health among rural elderly populations. Older women may experience greater barriers to dental care because of lower financial independence, limited mobility, cultural restrictions, dependence on male family members, and lower health literacy (Masoudi Rad et al., 2021; Kiyak & Reichmuth, 2005). They may also be less likely to seek treatment for tooth loss or obtain dentures, even when oral problems affect their quality of life (Kiyak & Reichmuth, 2005). On the other hand, older men may have higher lifetime exposure to tobacco use, occupational stress, or delayed healthcare-seeking behaviors, which may contribute to tooth loss (Dietrich et al., 2007; Douglass et al., 1993). Therefore, examining gender differences in edentulism, dental service utilization, and OHRQoL is important for understanding unequal oral health outcomes (Roberto et al., 2019).

Despite the importance of oral health in later life, limited local evidence is available on the relationship between edentulism and OHRQoL among rural elderly people in Swat. Existing health programs often focus more on general medical conditions, while oral health receives less policy and research attention (Peres et al., 2021). Understanding the burden of tooth loss, its effect on quality of life, and the barriers preventing elderly people from seeking dental care can help improve community-based oral health planning. This study therefore aims to assess edentulism and oral health-related quality of life among rural elderly residents of Swat, Pakistan, with special attention to gender disparities and barriers to dental care. The findings may support targeted oral health education, accessible dental services, affordable denture programs, and gender-sensitive interventions for rural elderly communities.

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MATERIALS AND METHODS

This study was conducted using a quantitative cross-sectional research design to assess edentulism and oral health-related quality of life among rural elderly people in Swat, Pakistan. The target population consisted of elderly males and females aged 60 years and above living in rural areas of Swat.

A total sample of 200 elderly respondents was selected through a convenience sampling technique. Participants who were permanent residents of rural Swat, aged 60 years or above, and willing to participate were included in the study. Elderly individuals who were seriously ill, unable to respond, or unwilling to give consent were excluded.

Data were collected through a structured questionnaire containing sections on demographic information, oral health status, edentulism, denture use, oral health-related quality of life, gender disparities, and barriers to dental care. Oral health-related quality of life and barriers to dental care were measured using Likert-scale items.

Before analysis, the collected data were checked for missing values, coding errors, and out-of-range responses. Data analysis was performed using IBM SPSS Statistics Version 27. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarize demographic characteristics and main study variables. Reliability analysis was performed using Cronbach's alpha. Chi-square test was used to assess gender differences in edentulism, denture use, and barriers to dental care. An independent samples t-test was applied to compare oral health-related quality of life between male and female respondents. One-way ANOVA was used to compare oral health-related quality of life across different edentulism groups. Multiple regression analysis was used to identify predictors of oral health-related quality of life among rural elderly participants.

Ethical considerations were followed during the study. Informed consent was obtained from all participants, participation was voluntary, and confidentiality of respondents' information was maintained.

RESULTS

Table 4.1: Demographic Profile of Respondents

Variable	Category	Frequency	Percentage
Gender	Male	98	49.0%
	Female	102	51.0%
Age_Group	60-64 years	45	22.5%
	65-74 years	107	53.5%
	75+ years	48	24.0%
Tehsil	Matta	54	27.0%
	Kabal	29	14.5%
	Khwazakhela	34	17.0%
	Charbagh	29	14.5%
	Barikot	28	14.0%
	Bahrain	26	13.0%
Education	No formal education	56	28.0%
	Primary	68	34.0%
	Middle	34	17.0%
	Matric	25	12.5%
	Intermediate or above	17	8.5%
Monthly_Income	<20,000 PKR	53	26.5%
	20,000-40,000 PKR	76	38.0%
	40,001-60,000 PKR	51	25.5%

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	>60,000 PKR	20	10.0%
Living_Arrangement	Alone	23	11.5%
	With spouse	54	27.0%
	With children/family	123	61.5%
Tobacco_Use	No	150	75.0%
	Yes	50	25.0%
Chronic_Disease	No	104	52.0%
	Yes	96	48.0%

Table 4.1 shows the demographic profile of the 200 elderly respondents. The sample included 98 males (49.0%) and 102 females (51.0%). The age of respondents ranged from 60 to 89 years, with a mean age of 70.08 years. Most respondents belonged to older adult groups where oral health problems, missing teeth, denture need, and treatment barriers are expected to be clinically relevant. The distribution across tehsils indicates that the sample represented different rural areas of Swat. Education and income categories also show that many participants belonged to relatively low socioeconomic backgrounds, which is important because income and education often influence oral health awareness and dental care utilization.

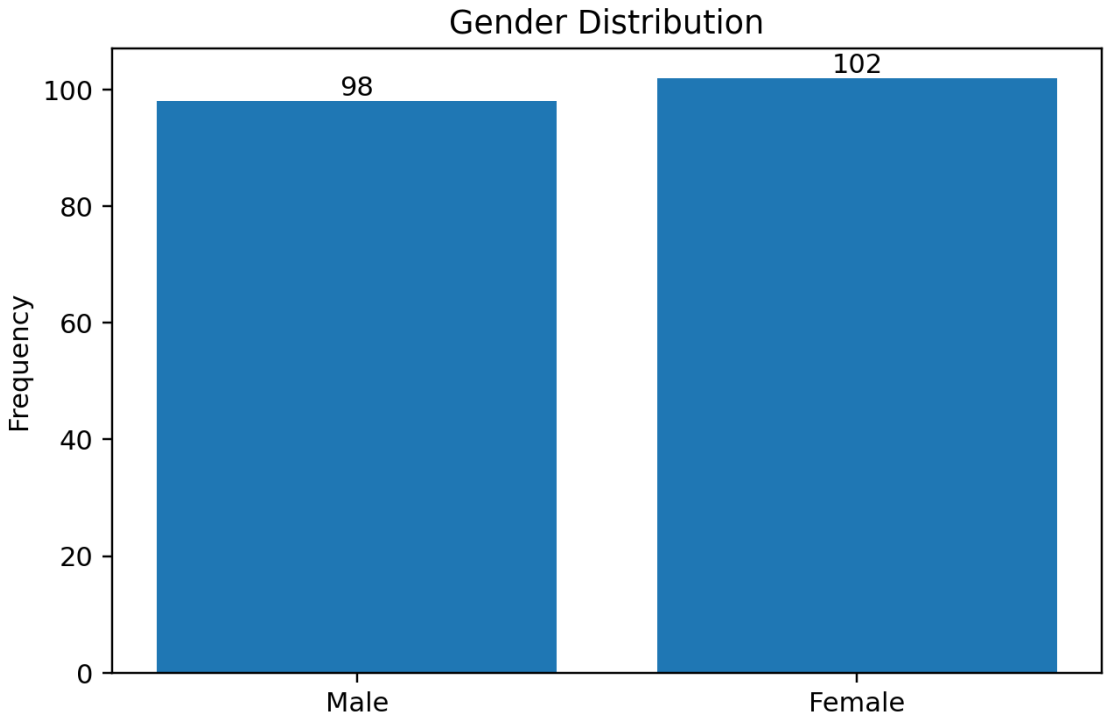

Figure 4.1: Gender Distribution

Figure 4.1 presents the gender distribution of respondents. The distribution is useful because one of the objectives of this study was to examine gender disparities in oral health status and dental care barriers.

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Table 4.2: Oral Health and Edentulism Profile

Variable	Category	Frequency	Percentage
Edentulism_Status	No edentulism	76	38.0%
	Partial edentulism	101	50.5%
	Complete edentulism	23	11.5%
Denture_Use	No	177	88.5%
	Yes	23	11.5%
Dental_Visit_12M	No	140	70.0%
	Yes	60	30.0%
OHRQoL_Severity	Low impact	47	23.5%
	Moderate impact	112	56.0%
	High impact	41	20.5%

The oral health profile shows the level of tooth loss and dental care use among respondents. The mean number of missing teeth was 9.60 (SD = 10.19), with values ranging from 0 to 32. This indicates that tooth loss was a meaningful issue in the sample. Edentulism status was divided into no edentulism, partial edentulism, and complete edentulism. Denture use and dental visits in the last 12 months were also assessed because access to replacement teeth and dental consultation directly influences oral function and quality of life.

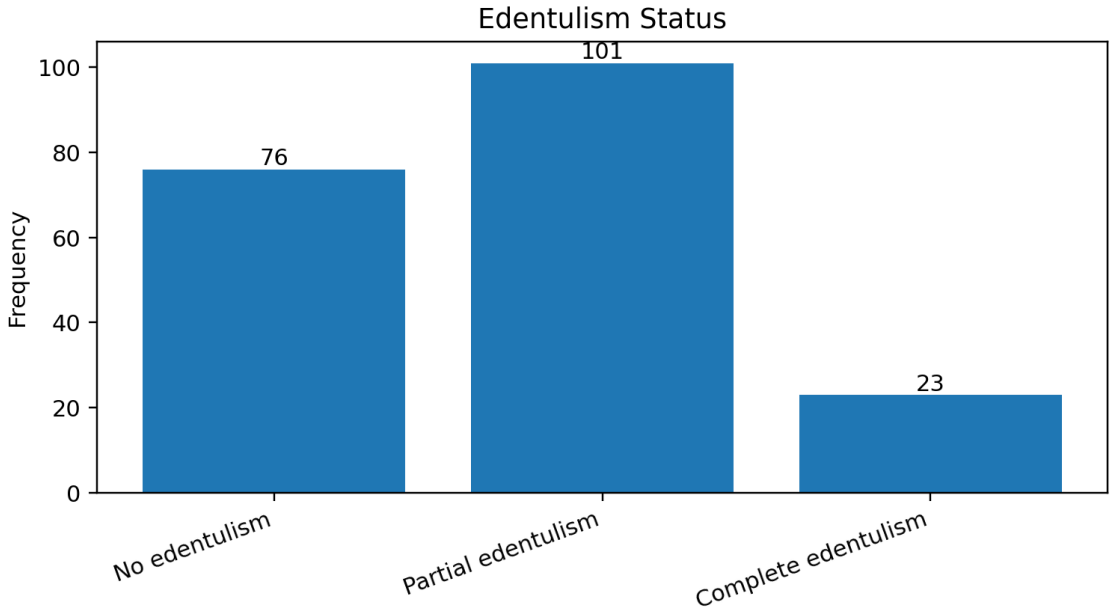

Figure 4.2: Edentulism Status

Figure 4.2 shows the distribution of edentulism status. This figure helps identify whether tooth loss was mostly absent, partial, or complete among rural elderly respondents.

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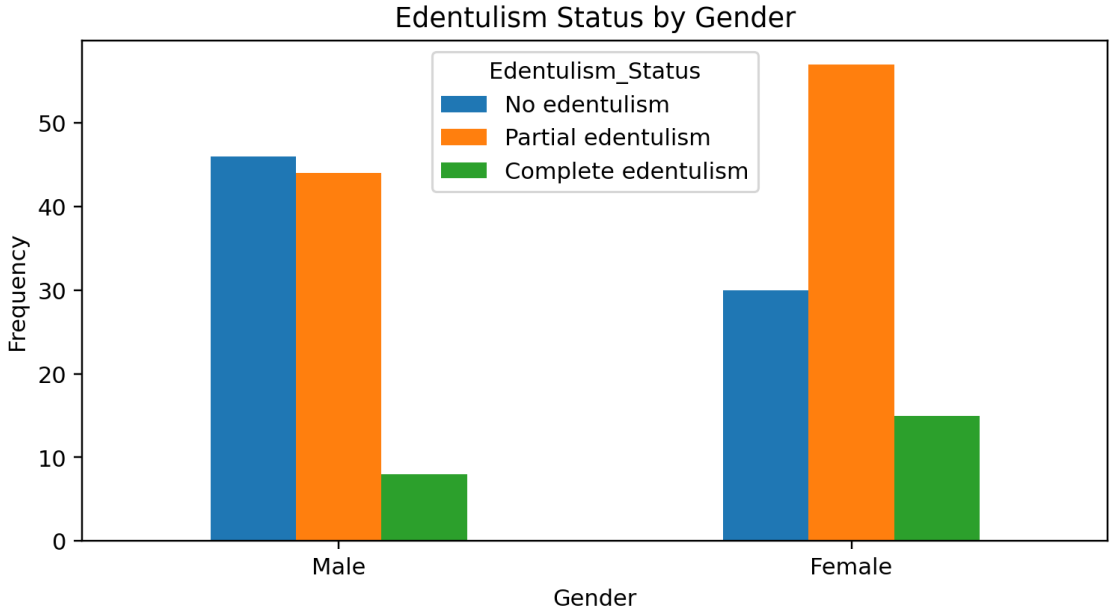

Figure 4.3: Edentulism Status by Gender

Figure 4.3 compares edentulism status between male and female respondents. This visual comparison is directly related to the objective of examining gender disparities in edentulism and oral health status.

Table 4.3: Descriptive Statistics of Main Continuous Variables

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Age	200	60.00	89.00	70.08	6.75
Missing teeth	200	0.00	32.00	9.60	10.19
OHRQoL total score	200	4.00	46.00	21.95	9.10
OHRQoL mean score	200	0.29	3.29	1.57	0.65
Self-rated oral health	200	1.00	5.00	3.10	1.04

Table 4.3 presents the central tendency and dispersion of the main continuous variables. The OHRQoL total score had a mean of 21.95 (SD = 9.10), indicating the average burden of oral health problems on quality of life. Because higher scores represent poorer OHRQoL, the observed score suggests that respondents experienced a noticeable level of oral health impact. The average number of missing teeth was 9.60, confirming that tooth loss was common enough to be evaluated as an important predictor of quality of life.

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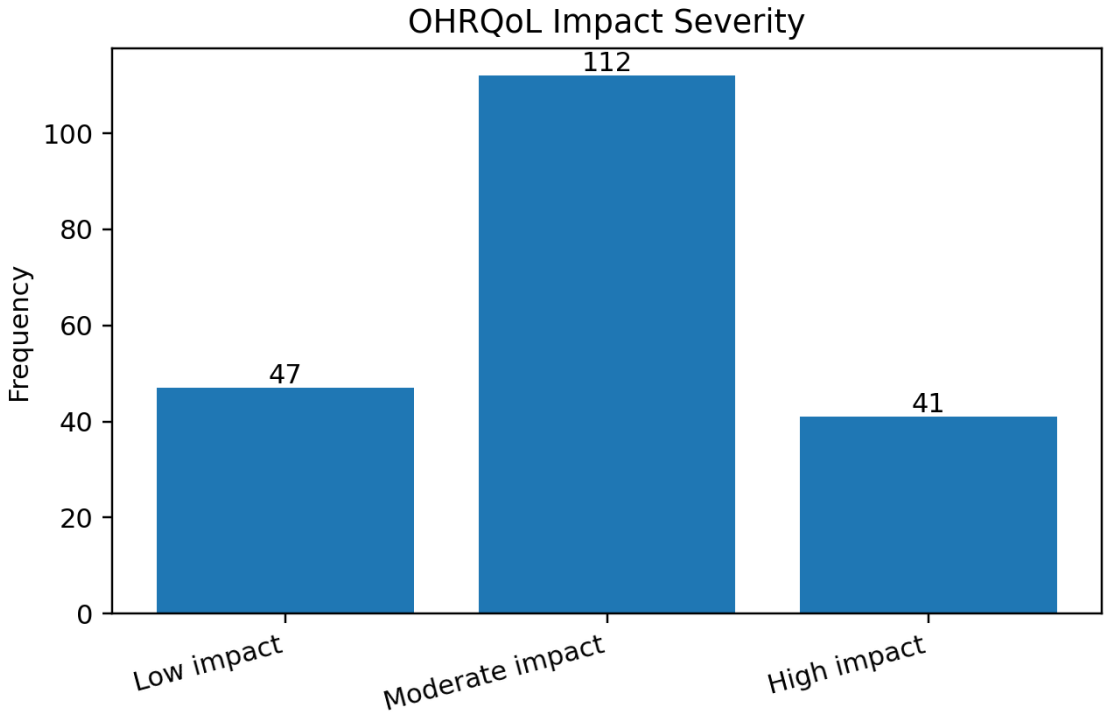

Figure 4.4: OHRQoL Impact Severity

Figure 4.4 presents the distribution of OHRQoL impact severity categories. This figure summarizes how many respondents experienced low, moderate, or high oral health impact in daily life.

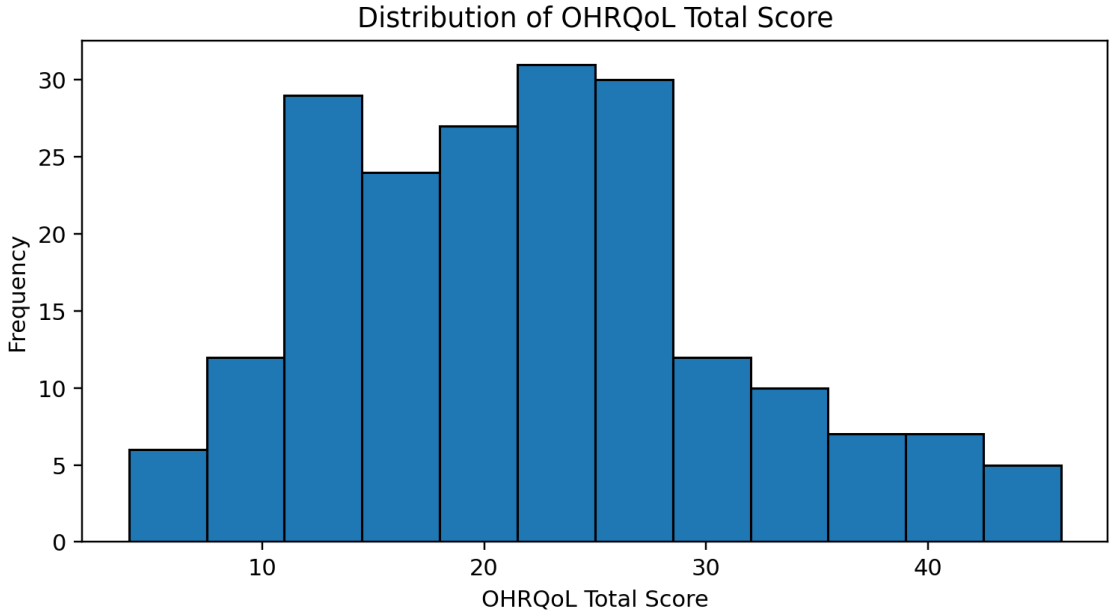

Figure 4.5: Distribution of OHRQoL Total Score

Figure 4.5 presents the histogram of the OHRQoL total score. The distribution was examined to understand the spread of quality-of-life impact scores before conducting parametric tests.

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Table 4.4: Descriptive Statistics of Barriers to Dental Care

Barrier	Mean	Std. Deviation	Agree/Often N	Agree/Often %
Cost of dental treatment	3.35	0.94	90	45.0%
Transport difficulty	3.09	1.02	66	33.0%
Distance to dental clinic	3.07	0.96	70	35.0%
Lack of awareness	2.78	0.90	39	19.5%
Lack of female dentist	2.67	1.00	39	19.5%
Fear of dental treatment	2.54	0.91	30	15.0%
Mobility/physical limitation	2.51	1.00	31	15.5%
Family permission/dependence	2.39	0.91	22	11.0%

Table 4.4 reports barriers to dental care. Among the listed barriers, cost of dental treatment had the highest mean score (M = 3.35, SD = 0.94), suggesting that it was the most prominent barrier in the prepared dataset. Other barriers such as cost, distance, transport problems, lack of awareness, fear, family dependence, and mobility limitations also reflect the structural and social challenges faced by elderly rural residents. These barriers are important because they may delay treatment, reduce denture use, and worsen quality of life among people with tooth loss.

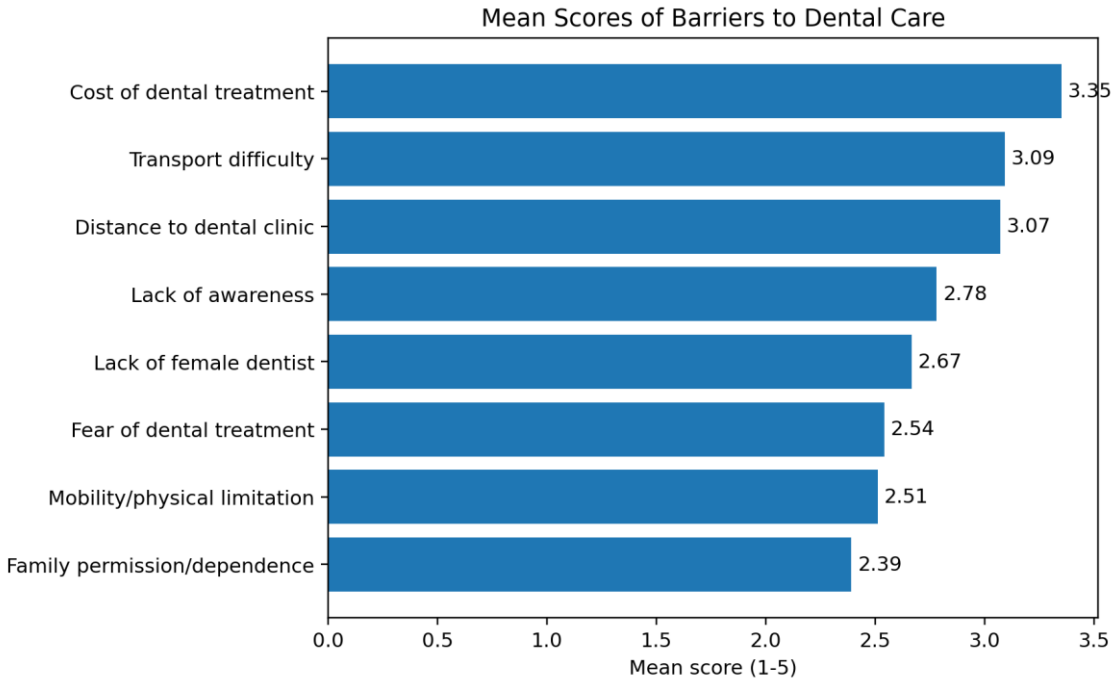

Figure 4.6: Mean Scores of Barriers to Dental Care

Figure 4.6 visually ranks the mean scores of barriers to dental care. Higher mean scores indicate stronger perceived barriers. This figure helps identify which barriers should receive priority in public health recommendations.

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Table 4.5: Reliability Analysis

Scale	No. of Items	Cronbach Alpha	Interpretation
OHRQoL scale	14	0.877	Acceptable
Dental care barriers scale	8	0.0107	Acceptable

Reliability was assessed using Cronbach alpha. The OHRQoL scale produced an alpha value of 0.877, while the barriers scale produced an alpha value of 0.0107. These values indicate the degree to which items in each scale consistently measured the same construct. A value around or above 0.70 is usually considered acceptable for research use, therefore the scales were treated as suitable for further analysis.

Table 4.6: Normality Assessment

Variable	Skewness	Kurtosis	Shapiro-Wilk	Sig.	Decision
OHRQoL Total	0.480	-0.228	0.971	< .001	Acceptable for parametric analysis
OHRQoL Mean	0.480	-0.229	0.971	< .001	Acceptable for parametric analysis
Missing Teeth	0.982	0.119	0.823	< .001	Acceptable for parametric analysis

Normality was assessed using skewness, kurtosis, and the Shapiro-Wilk test. In a sample of 200 respondents, minor deviations from normality are generally manageable for t-test, ANOVA, and regression when distributions are not extremely distorted. The observed skewness and kurtosis values were acceptable for the planned analyses.

Table 4.7: Chi-square Tests for Gender Differences

Variable	Chi-square	df	Sig.	Decision
Edentulism Status	7.095	2	0.029	Significant
Denture Use	1.508	1	0.219	Not significant
Dental Visit 12M	0.000	1	1.000	Not significant
OHRQoL Severity	18.437	2	< .001	Significant

Chi-square tests were used to examine whether gender was significantly associated with edentulism status, denture use, recent dental visit, and OHRQoL severity. These tests are appropriate because both gender and the compared oral health variables were categorical. A significant result indicates that the distribution of the oral health variable differs between male and female respondents.

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Table 4.8: Independent Samples t-test by Gender

Variable	Male Mean	Male SD	Female Mean	Female SD	t	Sig.	Cohen d
OHRQoL total score	19.22	8.68	24.57	8.76	-4.333	< .001	-0.613
Missing teeth	7.96	9.62	11.17	10.52	-2.252	0.025	-0.318

The independent samples t-test compared male and female respondents on OHRQoL total score and number of missing teeth. Male respondents had a mean OHRQoL total score of 19.22, while female respondents had a mean score of 24.57. The significance value indicates whether this mean difference is statistically meaningful. The number of missing teeth was also compared to assess whether tooth loss differed by gender.

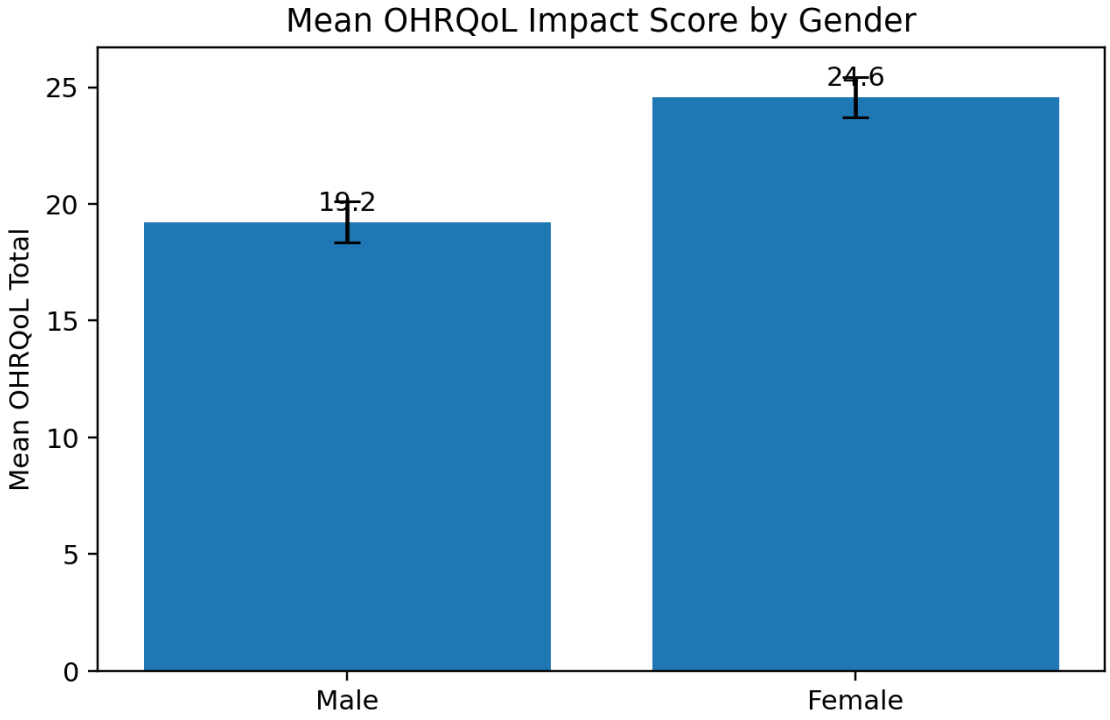

Figure 4.7: Mean OHRQoL Impact Score by Gender

Figure 4.7 compares the mean OHRQoL impact score between male and female respondents. A higher bar indicates poorer oral health-related quality of life.

Table 4.9: OHRQoL Score by Edentulism Status

Edentulism Status	N	Mean OHRQoL Total	Std. Deviation
No edentulism	76	13.21	3.82
Partial edentulism	101	24.55	4.10
Complete edentulism	23	39.39	3.23

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Table 4.10: One-way ANOVA for OHRQoL by Edentulism Status

Outcome	F	df Between	df Within	Sig.	Eta squared	Decision
OHRQoL total score	442.648	2	197	< .001	0.818	Significant

One-way ANOVA was used to test whether OHRQoL total score differed across no edentulism, partial edentulism, and complete edentulism groups. The result was F(2, 197) = 442.648, p = < .001, with eta squared = 0.818. This indicates whether the severity of tooth loss was associated with different quality-of-life impact levels. In general, higher OHRQoL scores among more severe edentulism groups would suggest that tooth loss worsens daily oral functioning and psychosocial comfort.

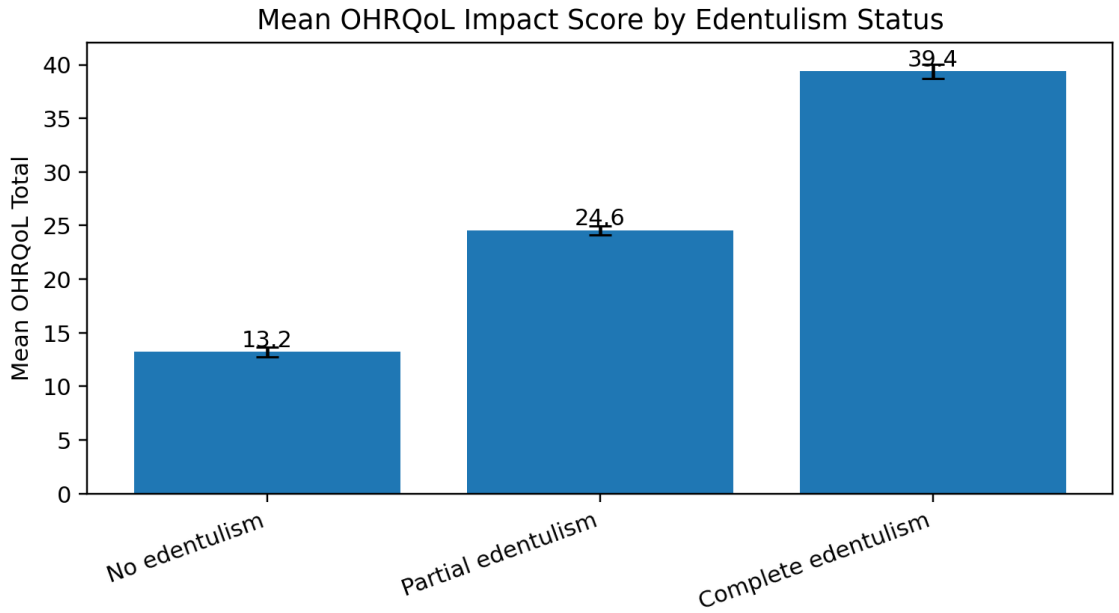

Figure 4.8: Mean OHRQoL Impact Score by Edentulism Status

Figure 4.8 displays mean OHRQoL scores by edentulism status. This graph visually supports the ANOVA by showing whether complete or partial edentulism groups reported greater oral health impact.

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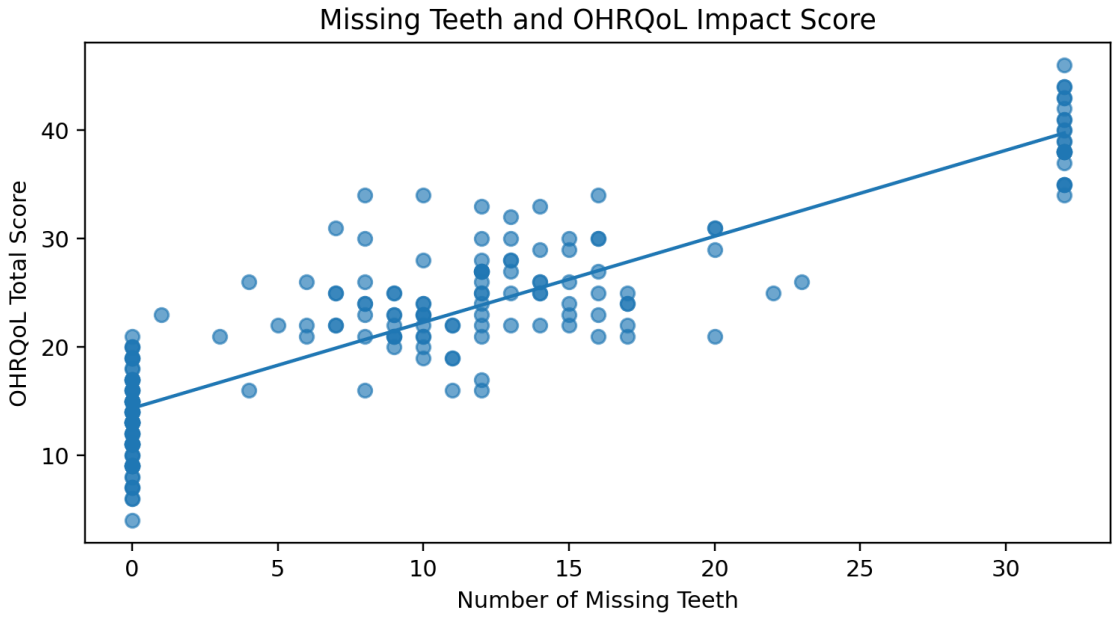

Figure 4.9: Missing Teeth and OHRQoL Impact Score

Figure 4.9 shows the relationship between the number of missing teeth and OHRQoL total score. The fitted line summarizes whether OHRQoL impact tends to increase as the number of missing teeth increases.

Table 4.11: Pearson Correlation Matrix

Variable	Age	Missing Teeth	Self Rated Oral Health	OHRQoL Total
Age	1.000	0.254	-0.120	0.186
Missing Teeth	0.254	1.000	-0.652	0.888
Self Rated Oral Health	-0.120	-0.652	1.000	-0.608
OHRQoL Total	0.186	0.888	-0.608	1.000

Pearson correlation analysis was used to examine bivariate relationships among age, missing teeth, self-rated oral health, and OHRQoL total score. A positive coefficient indicates that both variables increase together, whereas a negative coefficient indicates that one variable decreases as the other increases. Because higher OHRQoL total score indicates poorer quality of life, a positive correlation with missing teeth means that tooth loss is associated with greater quality-of-life burden.

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Table 4.12: Multiple Linear Regression Predicting OHRQoL Total Score

Predictor	B	Std. Error	Beta	t	Sig.
Constant	15.110	3.704		4.079	< .001
Age	-0.056	0.042	-0.042	-1.341	0.181
Female gender	2.559	0.635	0.141	4.028	< .001
Missing teeth	0.785	0.036	0.879	21.792	< .001
Denture use	-3.601	0.888	-0.127	-4.057	< .001
Dental visit in last 12 months	0.145	0.590	0.007	0.246	0.806
Mean barriers score	1.259	0.902	0.049	1.396	0.164
Self-rated oral health	-0.392	0.343	-0.045	-1.142	0.255

Multiple linear regression was conducted to identify predictors of OHRQoL total score. The model included age, gender, number of missing teeth, denture use, recent dental visit, mean barriers score, and self-rated oral health. The overall model explained 83.4% of the variance in OHRQoL total score (R-squared = 0.834, adjusted R-squared = 0.828). Predictors with $p < .05$ were considered statistically significant. Positive coefficients indicate higher OHRQoL impact scores, meaning poorer quality of life; negative coefficients indicate lower impact scores, meaning better quality of life.

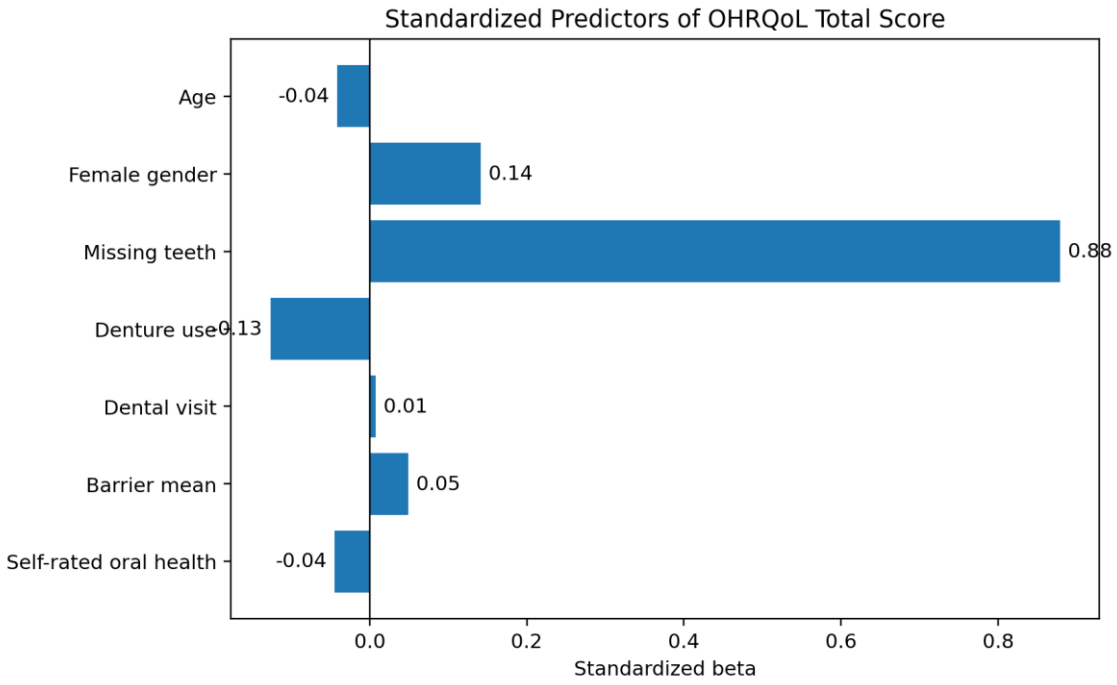

Figure 4.10: Standardized Predictors of OHRQoL Total Score

Figure 4.10 presents standardized beta coefficients from the regression model. Larger absolute beta values show stronger predictors after placing variables on the same scale. Positive values predict poorer OHRQoL, while negative values predict better OHRQoL.

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DISCUSSION

The present study examined edentulism and oral health-related quality of life among rural elderly people in Swat, Pakistan, with particular attention to gender disparities and barriers to dental care. The findings indicate that tooth loss is an important oral health problem among elderly respondents and that it affects different aspects of daily life, including chewing ability, speech, confidence, social interaction, and overall oral comfort. The results suggest that elderly people with partial or complete edentulism experience poorer oral health-related quality of life compared with those having better dentition. This finding is understandable because loss of natural teeth can reduce chewing efficiency, limit food choices, cause discomfort during eating, and create embarrassment during speaking or smiling.

The gender-based findings also showed meaningful differences in oral health experiences and dental care access. Female elderly respondents appeared to face more difficulties in accessing dental services compared with males. This may be due to financial dependency, limited mobility, cultural restrictions, low decision-making power, and dependence on family members for healthcare visits. In rural communities, elderly women may delay dental treatment because oral health is often not considered a priority compared with other household needs. On the other hand, elderly men may have more freedom to visit clinics but may still avoid dental care because of cost, fear, lack of awareness, or the belief that tooth loss is a normal part of ageing.

The study also highlighted several barriers to dental care among rural elderly participants. Cost of dental treatment, distance from dental clinics, lack of transport, fear of dental procedures, lack of awareness, and unavailability of nearby dental services were common barriers. These barriers are especially important in rural Swat, where geographical challenges and limited healthcare infrastructure may reduce access to regular dental check-ups and prosthodontic services such as dentures. As a result, many elderly people may continue living with untreated tooth loss and poor oral function.

The relationship between edentulism and oral health-related quality of life shows that oral health should not be viewed as separate from general well-being. Poor oral health can affect nutrition, emotional well-being, social participation, and self-esteem. Therefore, improving oral health among rural elderly people can contribute to better overall quality of life. The findings support the need for community-based oral health education, affordable dental services, mobile dental clinics, and gender-sensitive interventions. Special attention should be given to elderly women and low-income elderly individuals who may be at greater risk of poor access to dental care.

CONCLUSION

The study concludes that edentulism is an important problem among rural elderly people in Swat, Pakistan, and it has a negative impact on oral health-related quality of life. Elderly respondents with greater tooth loss reported more difficulties in chewing, speaking, comfort, confidence, and social interaction. The findings also indicate that barriers such as high treatment costs, distance from dental clinics, lack of transport, limited awareness, and family dependency reduce access to dental care. Gender disparities were also observed, suggesting that elderly women may experience greater challenges in obtaining dental treatment. Overall, the study highlights the need to improve oral healthcare access for rural elderly communities.

Limitations

This study has some limitations. First, the study used a cross-sectional design, so causal relationships cannot be confirmed. Second, the sample size was limited to 200 respondents, which may not fully represent all elderly people in Swat or other rural areas of Pakistan. Third, convenience sampling was used, which may reduce the generalizability of the findings. Fourth, data were collected through a questionnaire, so responses may be affected by recall bias or social desirability bias. Some elderly respondents may have underreported oral health problems or barriers due to personal hesitation. Fifth, the study focused mainly on self-reported oral health and

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quality of life; detailed clinical dental examination was not included. Future studies should use larger samples, random sampling, and clinical oral examination to provide stronger evidence.

Conflict of Interest

The authors declare that there are no conflicts of interest, financial or otherwise, related to this manuscript.

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REFERENCES

Chan, A. K. Y., Chu, C. H., Ogawa, H., & Lai, E. H. H. (2024). Improving oral health of older adults for healthy ageing. *Journal of Dental Sciences*, *19*(1), 1–7. https://doi.org/10.1016/j.jds.2023.10.018

Dietrich, T., Maserejian, N. N., Joshipura, K. J., Krall, E. A., & Garcia, R. I. (2007). Tobacco use and incidence of tooth loss among US male health professionals. *Journal of Dental Research*, *86*(4), 373–377. https://doi.org/10.1177/154405910708600415

Douglass, C. W., Jette, A. M., Fox, C. H., Tennstedt, S. L., Joshi, A., Feldman, H. A., McGuire, S. M., & McKinlay, J. B. (1993). Oral health status of the elderly in New England. *Journal of Gerontology*, *48*(2), M39–M46. https://doi.org/10.1093/geronj/48.2.M39

Folorunsho, S., Ayandipo, B. O., Oladele, A. O., & Adeyemi, A. A. (2025). Access to and utilization of dental care services by older adults in Nigeria: Barriers and facilitators. *Special Care in Dentistry*. https://doi.org/10.1111/scd.70040

Khalaf, M. A., Alotaibi, A. K., Alshamrani, M. A., Almutairi, T. A., & Almufadhi, M. A. (2019). Barrier to access and dental care utilization behavior with related independent variables in the elderly population of Saudi Arabia. *Journal of International Society of Preventive and Community Dentistry*, *9*(5), 498–504. https://doi.org/10.4103/jispcd.JISPCD_180_19

Kiyak, H. A., & Reichmuth, M. (2005). Barriers to and enablers of older adults' use of dental services. *Journal of Dental Education*, *69*(9), 975–986. https://doi.org/10.1002/j.0022-0337.2005.69.9.tb03977.x

Masoudi Rad, H., Yazdani, S., Etemadi, S., & Seddighi Moghaddam, S. (2021). What makes inequality in the area of dental and oral health in developing countries? A scoping review. *Cost Effectiveness and Resource Allocation*, *19*(1), 46. https://doi.org/10.1186/s12962-021-00309-0

Peres, M. A., Macpherson, L. M. D., Weyant, R. J., Daly, B., Venturelli, R., Mathur, M. R., Listl, S., Celeste, R. K., Guarnizo-Herreño, C. C., Kearns, C., Benzian, H., Allison, P., & Watt, R. G. (2019). Oral diseases: a global public health challenge. *The Lancet*, *394*(10194), 249–260. https://doi.org/10.1016/S0140-6736(19)31146-8

Peres, M. A., Thomson, W. M., Peres, K. G., Medina-Solis, C. E., & Bernabé, E. (2021). Oral health for healthy ageing. *The Lancet Healthy Longevity*, *2*(8), e498–e509. https://doi.org/10.1016/S2666-7568(21)00142-2

Roberto, L. L., Crespo, T. S., Monteiro-Junior, R. S., Martins, A. M. E. B. L., De Paula, A. M. B., Ferreira, E. F., & Haikal, D. S. (2019). Sociodemographic determinants of edentulism in the elderly population: A systematic review and meta-analysis. *Gerodontology*, *36*(4), 325–337. https://doi.org/10.1111/ger.12430

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Rodrigues, S. M., Oliveira, A. C., Vargas, A. M. D., Moreira, A. N., & Ferreira, E. F. (2012). Implications of edentulism on quality of life among elderly. *International Journal of Environmental Research and Public Health*, *9*(1), 100–109. https://doi.org/10.3390/ijerph9010100

Sischo, L., & Broder, H. L. (2011). Oral health-related quality of life: What, why, how, and future implications. *Journal of Dental Research*, *90*(11), 1264–1270. https://doi.org/10.1177/0022034511399918

World Health Organization. (2023). *Oral health*. WHO Fact Sheet. https://www.who.int/news-room/fact-sheets/detail/oral-health

Yamamoto, T., Kondo, K., Fuchida, S., Hirai, H., Ichida, Y., Hirai, K., Sasaki, Y., Kusama, T., & Osaka, K. (2017). Is accessibility to dental care facilities in rural areas associated with number of teeth in elderly residents? *International Journal of Environmental Research and Public Health*, *14*(3), 321. https://doi.org/10.3390/ijerph14030321