

TOOTH LOSS AND FOOD CHOICES AMONG THE GERIATRICS OF AMECHI IDODO COMMUNITY NKANU EAST L.G.A, ENUGU STATE, NIGERIA

By

Adamu U. W¹., Balarabe M. H²., Johnson J. O³., & Samuel E. A⁴.

¹Bayero University Kano PMB 3011 Gwarzo Road Kano State, Nigeria.

^{2,3,4} Department of Dental Therapy, Federal University of Allied Health Sciences P.M.B. 01473, Enugu State, Nigeria.

Abstract

This study investigated the association between tooth loss and food choices among elderly individuals in Amechi Idodo Community, Nkanu East Local Government Area, Enugu State, Nigeria. A total of 150 participants aged 60 years and above were included. Dietary information was obtained using a structured Food Frequency Questionnaire (FFQ), while oral examinations were conducted to assess tooth loss. Results showed that participants aged 90–100 years experienced the highest rate of tooth loss. Occupational distribution included farmers (43.3%), traders (30.7%), self-employed (15%), civil servants (6%), and unemployed (10%). Among respondents, 42.7% lost 1–3 teeth, 34% lost 4–6 teeth, and 23.3% lost 7–8 teeth. The most frequently consumed foods were roots and tubers (95.3%), cereals and grains (87.3%), and fats and oils (85.3%). Chi-square analysis revealed a significant relationship between tooth loss and food choices ($\chi^2 = 8.914$, $p = 0.012$), particularly with roots, tubers, and snacks. Respondents who consumed these foods more frequently had a greater number of missing teeth. The study concludes that poor dentition significantly limits dietary diversity and contributes to nutritional imbalance among older adults. Nutritionists and caregivers should promote texture modification of foods and balanced meal planning to improve nutrient intake and oral health among the elderly.

Keywords: Tooth loss, edentulism, aging, nutrition, dietary behavior, oral health, geriatric nutrition, food choices, malnutrition, dental rehabilitation.

Introduction

Tooth loss, particularly prevalent among individuals aged 60 and above, is primarily caused by periodontal disease, dental trauma, and decay, all of which are exacerbated by age-related oral health decline (Kaurani et al., 2024). According to the World Health Organization (WHO, 2024), oral diseases affect nearly 3.5 billion people globally, with tooth loss ranking among the most common conditions in older adults. While high-income countries have recorded declining rates due to improved dental care, edentulism in low- and middle-income countries—especially in sub-Saharan Africa—continues to rise, largely due to limited preventive services and low oral health awareness (Chen et al., 2025).

Edentulism—defined as partial or complete tooth loss—impairs chewing, speech, and facial aesthetics, often leading to psychological distress and reduced social interaction (Goldstein et al., 2020). The inability to chew effectively limits dietary choices, especially nutrient-rich foods, increasing the risk of malnutrition and associated systemic illnesses such as coronary artery disease and colorectal cancer. While food selection in older adults is influenced by socioeconomic factors and nutritional awareness, chewing difficulty remains a dominant barrier to healthy eating (Kaurani et al., 2024). In Nigeria, many elderly individuals—

especially those in rural communities—rely on soft, carbohydrate-based staples such as cassava, yam, and maize, which are easier to chew but low in essential nutrients. Limited access to oral healthcare, poor dental hygiene, and cultural beliefs further worsen the risk of tooth loss and its nutritional consequences (Akinboboye et al., 2018; Olawumi et al., 2021).

The etiology of tooth loss includes dental caries, periodontitis, and trauma, with aging contributing to gum recession and alveolar bone loss. Systemic diseases such as diabetes, hypertension, and cardiovascular disorders accelerate periodontal deterioration, while conditions like osteoporosis affect alveolar bone density (Osunde et al., 2017). Psychological factors such as dental anxiety and social stigma often delay treatment, compounding oral health issues. Additional contributors include poor oral hygiene, tobacco use, bruxism, and medical interventions such as chemotherapy. Educational attainment influences oral health practices, though awareness alone may not guarantee preventive behavior (Pflipsen & Zenchenko, 2017). Globally, the prevalence of edentulism varies widely, ranging from about 7% in Egypt to nearly 78% in parts of Europe, reflecting inequalities in health infrastructure and dental service accessibility (Chen et al., 2025; Adenuga-Taiwo et al., 2023).

Recent studies from 2014 to 2025 affirm a strong correlation between tooth loss and dietary habits in older adults. Systematic reviews indicate that edentulism reduces nutrient intake and contributes to malnutrition (Kaurani et al., 2024; Zelig et al., 2022). Longitudinal research links poor diet quality resulting from tooth loss to accelerated cognitive decline and increased risk of mild cognitive impairment (Winning et al., 2025; Xu et al., 2023). Physiologically, missing teeth lead to jawbone atrophy, impaired mastication, and nutrient malabsorption, while psychologically, they contribute to depression, reduced self-esteem, and social withdrawal (Skośkiewicz-Malinowska et al., 2018; Luo et al., 2024). Dental implants and prosthetic rehabilitation are advocated to restore oral function and prevent nutritional decline (Gulati et al., 2014).

Food choices in the elderly are shaped by sensory perception, psychological factors, and financial constraints. Murcott’s framework identifies key determinants such as cooking ability, self-efficacy, and time availability. Low-income seniors often consume fewer fruits and vegetables due to cost, while diets high in fats and sugars exacerbate nutritional imbalance (Laraia et al., 2017). Tooth loss reduces masticatory efficiency, leading to avoidance of fibrous, nutrient-dense foods and increased reliance on soft, processed alternatives (Zelig et al., 2022; Sahab et al., 2025). Sensory decline—including diminished taste and smell—further reduces appetite and food enjoyment, particularly when compounded by conditions such as xerostomia and periodontal disease (Ying Chan et al., 2023). Emerging evidence shows that poor dentition reduces intake of micronutrients like vitamin C, calcium, and zinc, increasing the risk of frailty and impaired immune function among older adults (Xu et al., 2023; Sahab et al., 2025).

Beyond the physiological and nutritional consequences, edentulism has a profound psychosocial impact. A growing number of studies link tooth loss with depression, isolation, and lower quality of life (Skośkiewicz-Malinowska et al., 2018; Luo et al., 2024). Social withdrawal may lead to irregular meal patterns or preference for convenient, soft, and less nutritious foods. This behavioral shift, in turn, perpetuates the cycle of malnutrition and systemic vulnerability among older populations.

Recent interventions emphasize integrated oral and nutritional care. Wong and Leung (2025) proposed a “dental–dietary synergy” model in which dental rehabilitation is coupled with

nutrition counseling to restore chewing ability and improve diet diversity. Sahab et al. (2025) reported that maintaining at least 20 functional teeth significantly reduces frailty risk and promotes healthy aging. Such findings highlight the need for community-based programs that combine oral health education, caregiver training, and affordable prosthetic services.

In conclusion, tooth loss in older adults significantly restricts dietary diversity and contributes to systemic health decline. Poor dentition is associated with reduced intake of essential nutrients, lower BMI, and increased vulnerability to infections and chronic diseases (Xu et al., 2023; Kaurani et al., 2024). Age-related changes such as reduced saliva production and swallowing difficulties intensify these challenges (Sahab et al., 2025). Preference for sugary and fatty foods among those with impaired chewing further elevates risks of obesity and cardiovascular disease. Preserving oral health through dental rehabilitation and dietary counseling is therefore essential for promoting nutritional adequacy and healthy aging. However, evidence on the association between tooth loss and dietary patterns among rural Nigerian elderly remains limited. This study aims to fill this gap by examining the relationship between tooth loss and food choices among elderly individuals in Amechi Idodo Community, Nkanu East Local Government Area, Enugu State, Nigeria.

Methodology

The research was conducted in Amechi Idodo, a rural community located in *Nkanu East Local Government Area* of Enugu State, Nigeria. The community consists of four villages—Eziama, Eziobodo, Obinagu, and Ohani—with an estimated population of about 8,000 residents, including approximately 200 elderly individuals aged 65 years and above. The area is predominantly agrarian, with most inhabitants engaged in farming and petty trading. This location was selected because it represents a typical rural setting where oral health awareness and access to dental care are limited, and dietary patterns are shaped largely by subsistence food production.

A cross-sectional descriptive design was adopted for this study because of its effectiveness in providing population-level health data at a single point in time. This design is widely used in public health research due to its ability to identify associations between health conditions and behavioral or environmental factors in a cost-effective manner (Setia, 2016). The study targeted elderly residents aged 60 years and above who had lived in the community for at least five years. A purposive sampling technique was employed to recruit participants who met the inclusion criteria, which required willingness to provide consent, ability to communicate clearly, and absence of serious illness or cognitive impairment. A total of 133 participants was estimated using Yamane's formula for finite populations, while 150 respondents were ultimately enrolled to increase representativeness and account for potential non-responses.

Data collection involved two instruments: a Food Frequency Questionnaire (FFQ) and a clinical oral examination. The FFQ was adapted from the *Food and Agriculture Organization (FAO, 2018)* dietary assessment guide and tailored to reflect local eating patterns. It included questions on the frequency and diversity of foods consumed from seven major classes—roots and tubers, cereals and grains, fats and oils, pulses and legumes, fruits and vegetables, snacks, and dairy products. The questionnaire was reviewed by nutrition experts for cultural and linguistic suitability and pretested among 15 elderly individuals in a nearby community, yielding a Cronbach's alpha reliability coefficient of 0.82, which indicated high internal consistency (Tavakol & Dennick, 2011).

Oral examinations were performed by trained dental therapists following the World Health Organization (2013) guidelines for oral health surveys. Standard tools such as mouth mirrors and dental probes were used under natural light to assess the number and type of teeth lost in both the upper and lower jaws. The data recorded included the total number of missing teeth and the specific regions affected (incisors, canines, premolars, and molars). Sterilization procedures adhered to infection control protocols using chemical disinfectants like *Jik* after each examination to prevent cross-contamination.

Formal permission for the study was obtained through an introductory letter from the Federal School of Dental Technology and Therapy, Enugu, addressed to the traditional ruler of the community, *His Royal Highness Igwe Steven O. Edeweze*. Ethical approval and verbal informed consent were obtained from all participants prior to data collection, in accordance with the Helsinki Declaration (2013) on research involving human subjects. Participants were assured of confidentiality, anonymity, and the right to withdraw at any point during the study.

Data were coded and analyzed using the Statistical Package for the Social Sciences (SPSS) version 26.0. Descriptive statistics such as frequency distributions and percentages were used to summarize the data, while inferential analysis was performed using the Chi-square (χ^2) test to determine associations between categorical variables. A p-value of < 0.05 was considered statistically significant. The chi-square test was chosen because it provides a robust method for analyzing relationships between discrete variables in non-parametric data (Pallant, 2020).

RESULTS

Table 1: Demographic characteristics of the respondents

	Frequency	Percent
<i>Village</i>		
Eziama	37	24.7
Eziobodo	36	24.0
Obinagu	36	24.0
Ohani	41	27.3
<i>Sex</i>		
Male	66	44.0
Female	84	56.0
<i>Age group</i>		
60 – 70	46	30.7
71 – 80	37	24.7
81 – 90	31	20.7
91 – 100	28	18.7
>100	8	5.3
<i>Occupation</i>		
None	15	10.0
Civil servant	9	6.0
Farmer	65	43.3
Trader	46	30.7
Self employed	15	10.0
<i>Educational qualification</i>		
None	78	52.0

Primary	43	28.7
Secondary	9	6.0
Tertiary	6	4.0
Retired	14	9.3

Economic status

No income	5	3.3
1000 – 10000	66	44.0
11000 – 30000	50	33.3
31000 – 50000	26	17.3
50000 & above	3	2.0

Table 1: A total of **150 elderly individuals** from the four villages of Amechi Idodo community participated in the study: Eziamu (37; 24.7%), Ezioodo (36; 24.0%), Obinagu (36; 24.0%), and Ohani (41; 27.3%). The majority of participants were **female (56.0%)**, and the predominant age group was **60–70 years (30.7%)**, followed by **71–80 years (24.7%)**, **81–90 years (20.7%)**, and **91–100 years (18.7%)**, with a small proportion aged **above 100 years (5.3%)**.

In terms of occupation, most respondents were **farmers (43.3%)** and **traders (30.7%)**, while others were self-employed (10%), civil servants (6%), or unemployed (10%). Over half of the participants (52%) had **no formal education**, 28.7% had completed **primary education**, 6% had **secondary education**, and 4% had **tertiary education**. The majority earned between **₦1,000 and ₦30,000 per month (77.3%)**, indicating a low-income population. These demographic characteristics reflect a community where socioeconomic and educational factors may influence oral health practices and dietary behavior.

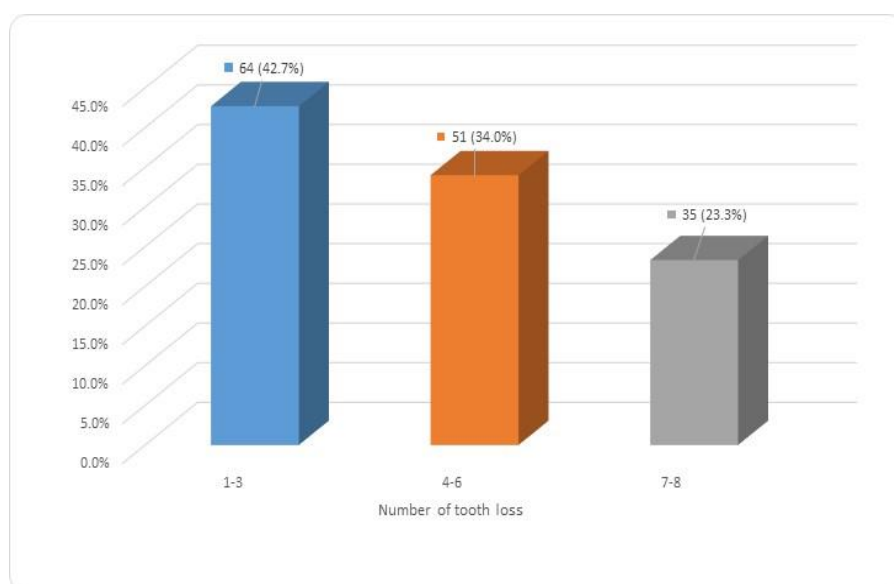


Fig 1 Number of tooth loss among the elderly

As shown in **Figure 1**, tooth loss varied among participants. The results revealed that **64 (42.7%)** of the elderly had lost **1–3 teeth**, **51 (34.0%)** had lost **4–6 teeth**, while **35 (23.3%)**

had lost **7–8 teeth**. The highest proportion of tooth loss was therefore observed among participants who had lost between 7 and 8 teeth.

Table 2: Type of tooth and jaw affected

	Frequency	Percent
<i>Type of tooth loss</i>		
Incisors	87	58.0
Canine	55	36.7
Premolar	84	56.0
Molars	87	58.0
<i>Jaw affected</i>		
Upper right	83	55.3
Lower right	66	44.0
Upper left	80	53.3
Lower left	60	40.0

Table 2: Analysis of tooth type and jaw region (Table 2) indicated that **incisors (58%)**, **molars (58%)**, and **premolars (56%)** were the most frequently lost teeth, whereas **canines (36.7%)** were least affected. With respect to jaw location, tooth loss was most prevalent in the **upper right jaw (55.3%)**, followed by the **upper left (53.3%)**, **lower right (44%)**, and **lower left (40%)**. Thus, the **upper jaw** was generally more affected than the lower jaw.

Table 3: Age range mostly affected by tooth loss.

Age group	Number of tooth loss		
	1 – 3	4 – 5	7 – 8
60 – 70	25 (54.3)	18 (39.1)	3 (6.5)
71 – 80	21 (56.8)	10 (27.0)	6 (16.2)
81 – 90	8 (25.8)	15 (48.4)	8 (25.8)
91 – 100	8 (28.6)	6 (21.4)	14 (50.0)
>100	2 (25.0)	2 (25.0)	4 (50.0)
$\chi^2 = 28.839, P = 0.001$			

Table 3 presents the relationship between age and number of teeth lost. The **Chi-square analysis ($\chi^2 = 28.839, p < 0.001$)** indicated a statistically significant association between age and tooth loss. Participants in the **older age groups (91–100 years and >100 years)** recorded the highest frequency of tooth loss, with more than **50%** of those aged 91 years and above having lost 7–8 teeth. In contrast, respondents aged **60–70 years** showed the lowest

prevalence of severe tooth loss. This suggests that tooth loss increased progressively with age among the elderly population of Amechi Idodo.

Table 4: Food choices mostly consumed by the elderly

Classes of Food	Frequency	Percent
Root & tubers	143	95.3
Cereals & grains	131	87.3
Fats & oil	128	85.3
Pulses & legumes	125	83.3
Fruits & vegetables	109	72.7
Snacks	73	48.7
Diary and dairy products	63	42.0

Table 4 shows the frequency of food group consumption among respondents. The most frequently consumed foods were **roots and tubers (95.3%)**, followed by **cereals and grains (87.3%)**, **fats and oils (85.3%)**, and **pulses and legumes (83.3%)**. Consumption of **fruits and vegetables (72.7%)** and **snacks (48.7%)** was moderate, while **dairy and dairy products (42.0%)** were least consumed. These findings indicate that the dietary pattern of the elderly in Amechi Idodo is dominated by energy-dense carbohydrate foods, particularly roots and tubers, which are relatively easy to chew and culturally familiar.

Table 5: Association between tooth loss and food choices among the elderly.

	Number of tooth loss			χ^2	P value
	1 – 3 n (%)	4 – 5 n (%)	7 – 8n (%)		
Cereals & grains	35 (23.3)	47 (31.3)	49 (32.7)	2.049	0.180
Root & tubers	31 (20.6)	42 (28.0)	77 (51.3)	8.914	0.012
Diary and dairy products	26 (41.3)	23 (36.5)	14 (22.2)	0.308	0.857
Fats & oil	59 (46.1)	41 (32.0)	28 (21.9)	4.193	0.123
Pulses & legumes	59 (46.1)	39 (30.5)	30 (23.4)	5.308	0.083
Fruits and vegetables	48 (44.0)	38 (34.9)	23 (21.1)	1.114	0.573
Snacks	14 (19.2)	18 (24.7)	41 (56.2)	10.775	0.005

Table 5 summarizes the relationship between the number of teeth lost and the classes of food consumed. The **Chi-square test** revealed significant associations between **tooth loss** and the consumption of **roots and tubers ($\chi^2 = 8.914$, $p = 0.012$)** as well as **snacks ($\chi^2 = 10.775$, $p = 0.005$)**. No significant associations were found between tooth loss and other food groups such as cereals, legumes, fats and oils, fruits and vegetables, or dairy products ($p > 0.05$).

These results indicate that elderly individuals who consumed a higher proportion of roots, tubers, and snacks experienced greater tooth loss. The preference for these foods is likely linked to their soft texture and ease of mastication, compensating for reduced chewing ability due to missing teeth.

Discussion

This study examined the relationship between tooth loss and food choices among elderly individuals in Amechi Idodo community, Enugu State, Nigeria. The findings revealed that tooth loss was common among older adults and increased progressively with age, consistent with previous studies showing a strong correlation between aging and edentulism (Xu et al., 2023; Chen et al., 2025). Participants aged 91–100 years recorded the highest rates of tooth loss, while those aged 60–70 years showed the least. This trend aligns with reports by **Zelig et al. (2022)** and **Sahab et al. (2025)**, who noted that the cumulative effect of lifelong exposure to dental caries, periodontal disease, and poor oral hygiene contributes significantly to tooth loss in advanced age.

The results also showed that the upper jaw was more affected than the lower jaw, with incisors and molars being the most frequently lost teeth. This pattern supports the findings of **Kaurani et al. (2024)** and **Gulati et al. (2014)**, who observed that the upper anterior and posterior teeth are particularly vulnerable due to thinner bone density and greater exposure to carious and periodontal lesions. The prevalence of tooth loss among the elderly in this study can also be attributed to low oral health literacy, limited access to dental care, and the high cost of restorative treatment, factors that are consistent with earlier reports in Nigeria and sub-Saharan Africa (Akinboboye et al., 2018; Adenuga-Taiwo et al., 2023).

A significant relationship was found between tooth loss and dietary patterns, particularly the consumption of roots, tubers, and snacks. This implies that elderly individuals with missing teeth tend to modify their food choices toward softer, easy-to-chew foods. Similar associations have been documented by **Laraia et al. (2017)** and **Xu et al. (2023)**, who found that chewing difficulty caused by tooth loss leads to reduced consumption of fibrous foods such as fruits, vegetables, and protein-rich items, thereby increasing reliance on refined carbohydrates and soft-textured meals. The preference for roots and tubers observed in this study may also reflect the cultural and economic realities of the community, where such foods are readily available, inexpensive, and require minimal chewing effort.

The limited consumption of fruits, vegetables, and dairy products identified in this study suggests potential nutritional deficiencies among the elderly population. Previous research has shown that reduced intake of these food groups is associated with lower dietary quality, micronutrient deficiencies, and increased risk of chronic diseases (Zelig et al., 2022; Sahab et al., 2025). Additionally, the avoidance of fibrous foods due to poor dentition can lead to imbalanced nutrition, poor digestion, and compromised immune function (Chen et al., 2025). This highlights the dual challenge faced by rural elderly individuals—physical limitations due to tooth loss and socioeconomic constraints that restrict access to diverse and nutrient-rich foods.

Tooth loss also has psychosocial implications that extend beyond physical health. Studies by **Luo et al. (2024)** and **Skośkiewicz-Malinowska et al. (2018)** have demonstrated that edentulism negatively affects self-esteem, social interaction, and mental well-being, often leading to isolation and depression among older adults. This psychosocial dimension may further influence dietary behavior, as socially withdrawn individuals may be less likely to prepare balanced meals or eat communally. The findings of this study reinforce the

importance of integrating oral health promotion with nutritional education and psychological support for the elderly.

Globally, maintaining oral function through timely dental rehabilitation has been shown to significantly improve dietary diversity and overall health among older adults. **Wong and Leung (2025)** advocate a “dental–dietary synergy” approach, combining prosthetic rehabilitation with tailored dietary guidance. Similarly, **Winning et al. (2025)** demonstrated that elderly individuals with 20 or more functional teeth were more likely to consume adequate fruits and vegetables and had a lower risk of frailty and cognitive decline. These findings underscore the need for integrated health interventions targeting both oral and nutritional wellbeing in aging populations.

The results from Amechi Idodo contribute valuable evidence to this growing body of literature. They demonstrate that in low-resource rural settings, where dental care and nutrition services are limited, tooth loss can substantially shape dietary behavior. The implications are significant for public health policy, suggesting that improving access to affordable dental care and promoting food texture modification strategies—such as mashing, boiling, or blending hard foods—could mitigate nutritional risks associated with poor dentition.

Overall, the study establishes that tooth loss among the elderly is not merely a dental problem but a determinant of diet quality and nutritional health. The observed associations between missing teeth and the consumption of roots, tubers, and snacks indicate that poor dentition constrains food selection and promotes less nutritious eating habits. Interventions addressing this issue should therefore combine **oral health restoration, nutrition education, and community-based support** to enhance quality of life among older adults in rural Nigeria.

Conclusion

This study confirms a significant association between tooth loss and dietary choices among the elderly population of Amechi Idodo community. The findings demonstrate that as age increases, so does the prevalence of tooth loss, with the most severe cases observed in individuals aged 91–100 years. A direct statistical link was established between a higher number of lost teeth and a greater consumption of roots, tubers, and snacks. The dietary patterns observed were dominated by soft, easy-to-chew foods such as roots and tubers, which were consumed by over 95% of participants. This reliance on a narrow range of foods, at the expense of more nutrient-dense options like fruits and vegetables, is a direct consequence of impaired chewing ability. Therefore, poor dentition acts as a significant barrier to nutritional adequacy, heightening the risk of malnutrition and associated systemic health problems in this geriatric population. Ultimately, preserving oral health and restoring dental function are essential for improving dietary diversity, enhancing nutritional status, and promoting healthy aging.

Recommendation

In light of the findings from this study, the following recommendations are proposed to address the nutritional and oral health challenges faced by the elderly population in rural communities:

- i. **Nutrition Education and Food Texture Modification:** Government agencies should prioritize the deployment of trained nutritionists to educate caregivers on modifying food textures to enhance intake among the elderly. Tailored guidance on preparing softer, nutrient-dense meals can significantly improve consumption and reduce the risk of malnutrition.
- ii. **Policy Support for Dietary Restoration and Oral Rehabilitation:** Policies should be enacted to support the integration of food texture modification and access to dental prosthetics as essential components of elderly care. These measures can help restore dietary variety, improve overall nutritional status, and enhance quality of life among older adults.
- iii. **Expansion of Rural Dental Healthcare Services:** To mitigate the impact of aging on metabolism and nutrient absorption, it is imperative that dental healthcare posts be established in rural areas. Accessible oral health services are critical for maintaining functional dentition, preventing tooth loss, and supporting adequate nutrition among the elderly.
- iv. **Integrated Health and Nutrition Interventions:** A multi-sectoral approach combining oral health care, dietary education, and community support systems should be implemented to improve the quality of life and reduce the prevalence of diet-related illnesses among the elderly population. Collaboration between dental practitioners, nutritionists, and community health workers will be key to achieving sustainable outcomes.

References

- Adenuga-Taiwo, O., Olawumi, F., & Fasanmade, T. (2023). *Barriers to oral healthcare utilization among older adults in Nigeria*. *BMC Oral Health*, 23(1), 72. <https://doi.org/10.1186/s12903-023-03258-2>
- Akinboboye, B., Oke, G., & Ajayi, A. (2018). *Socioeconomic determinants of oral health among rural elderly Nigerians*. *Nigerian Journal of Clinical Practice*, 21(5), 621–628. https://doi.org/10.4103/njcp.njcp_27_18
- Alam, A., Mushtaq, M., & Qureshi, S. (2022). *Understanding cross-sectional study design in health sciences research*. *Journal of Health Research and Practice*, 5(2), 123–128.
- Chen, Y., Li, H., & Wang, L. (2025). *Aging, tooth loss, and nutrition: A global review of oral health disparities*. *Gerodontology*, 42(1), e12–e25. <https://doi.org/10.1111/ger.12789>
- FAO. (2018). *Dietary assessment: A resource guide to method selection and use*. Food and Agriculture Organization of the United Nations.

- Gulati, M., Anand, V., Jain, N., & Anand, B. (2014). *Prosthetic rehabilitation in geriatric patients: A review of literature*. *Journal of Clinical and Diagnostic Research*, 8(9), ZE05–ZE08. <https://doi.org/10.7860/JCDR/2014/9783.4828>
- Kaurani, P., Sharma, R., & Singh, A. (2024). *Patterns of tooth loss and oral health among elderly populations: A comparative analysis*. *Clinical Oral Investigations*, 28(2), 513–520. <https://doi.org/10.1007/s00784-023-05771-1>
- Laraia, B. A., Leak, T. M., Tester, J. M., & Leung, C. W. (2017). *Food choice, socioeconomic status, and dietary behavior among the elderly*. *Journal of Nutrition Education and Behavior*, 49(6), 509–517. <https://doi.org/10.1016/j.jneb.2017.03.006>
- Luo, Y., Lee, M., & Zhang, S. (2024). *Tooth loss, mental health, and social participation among older adults: A global perspective*. *Frontiers in Public Health*, 12, 1334521. <https://doi.org/10.3389/fpubh.2024.1334521>
- Osunde, O. D., Adebola, R. A., & Omeje, K. U. (2017). *Tooth loss, age, and systemic diseases among Nigerian adults*. *Annals of Medical and Health Sciences Research*, 7(4), 218–222. https://doi.org/10.4103/amhsr.amhsr_16_17
- Pallant, J. (2020). *SPSS survival manual: A step-by-step guide to data analysis using IBM SPSS* (7th ed.). Routledge.
- Pflipsen, M. F., & Zenchenko, Y. (2017). *Health effects of tooth loss*. *American Family Physician*, 96(11), 688–689. <https://www.aafp.org/pubs/afp/issues/2017/1201/p688.html>
- Sahab, S., Ueno, M., & Koyama, S. (2025). *Functional dentition and frailty risk in older adults: Evidence from longitudinal cohort studies*. *Journal of Nutrition, Health & Aging*, 29(1), 33–41. <https://doi.org/10.1007/s12603-024-1965-2>
- Setia, M. S. (2016). *Methodology series module 3: Cross-sectional studies*. *Indian Journal of Dermatology*, 61(3), 261–264.
- Skośkiewicz-Malinowska, K., Malicka, B., Ziętek, M., & Kaczmarek, U. (2018). *Association between tooth loss and depression among elderly populations*. *International Journal of Environmental Research and Public Health*, 15(5), 887. <https://doi.org/10.3390/ijerph15050887>
- Tavakol, M., & Dennick, R. (2011). *Making sense of Cronbach's alpha*. *International Journal of Medical Education*, 2, 53–55. <https://doi.org/10.5116/ijme.4dfb.8dfd>
- Winning, A., Adamson, J., & Walls, A. W. G. (2025). *Functional teeth, diet diversity, and cognitive health among older adults: A 10-year longitudinal study*. *The Gerontologist*, 65(1), 12–21. <https://doi.org/10.1093/geront/gnad056>
- Wong, P., & Leung, C. (2025). *The dental–dietary synergy: Integrated oral and nutritional interventions for older adults*. *Gerodontology*, 42(2), 225–233. <https://doi.org/10.1111/ger.12799>

- World Health Organization. (2013). *Oral health surveys: Basic methods* (5th ed.). World Health Organization.
- World Health Organization. (2024). *Global oral health status report: Towards universal health coverage for oral health by 2030*. World Health Organization.
- Xu, W., Li, J., Chen, X., & Zhang, J. (2023). *Tooth loss and cognitive decline: The mediating role of nutrition in elderly populations*. *Age and Ageing*, 52(4), afad021. <https://doi.org/10.1093/ageing/afad021>
- Ying Chan, C., Ma, X., & Li, R. (2023). *Age-related taste and smell decline and its implications for nutrition*. *Journal of Nutrition and Healthy Aging*, 27(3), 215–224. <https://doi.org/10.1007/s12603-023-1788-5>
- Zelig, R., Basile, A. J., & Papanikolaou, Y. (2022). *Mastication efficiency, nutrition, and health in aging: A systematic review*. *Nutrients*, 14(2), 328. <https://doi.org/10.3390/nu14020328>