THE PREVALENCE OF DENTAL CARIES AMONGST ADULT PATIENTS VISITING THE KORLE-BU TEACHING HOSPITAL (KBTH) DENTAL UNIT AND UNIVERSITY OF GHANA DENTAL SCHOOL (UGDS) CLINIC.

Ampofo C.P.[1]*, Quartey-Papafio N.[2], Fleischer H.N.A.[2], Wireko H.A.K.[1] , Sackeyfio J.[3] , Amoafo K.B.[4]

[1] Restorative Dentistry Department, University of Ghana Dental School, College of Health Science Korle-Bu, Accra-Ghana
[2] Biomaterials Science Department, University of Ghana Dental School, College of Health Sciences, Korle- Bu, Accra-Ghana
[3] Community and Preventive Dentistry Department, University of Ghana Dental School, College of Health Sciences, Korle- Bu, Accra-Ghana
[4] University of Ghana Dental School, College of Health Sciences, Korle-Bu, Accra-Ghana

Corresponding author:Restorative Dentistry Department, University of Ghana Dental School, College of Health Science Korle-Bu, Accra-Ghana. Email: pampofo@ug.edu.gh

DOI:https://dx.doi.org/10.4314gdj.v23i1.3

ABSTRACT

BACKGROUND: Dental caries is one of the most prevalent chronic diseases worldwide, and remains a significant public health burden, driven by socio behavioral, dietary, and health system factors, resulting in high levels of untreated disease and tooth loss.

OBJECTIVE: To determine the prevalence rate and analyse examined associations of dental caries among participating adult patients.

METHODS: A cross sectional study involving 134 adults (18–70 years) was conducted using questionnaires and oral examinations. Data collected included sociodemographic characteristics, dental visiting patterns, oral hygiene practices, diet, and DMFT scores. Descriptive statistics and chi square tests were performed using Statistical Package for Social Sciences (SPSS) version 26 with significance set at $p < 0.05$.

RESULTS: Caries prevalence was 55.97%. The mean DMFT score was 1.71 ± 1.95, driven mainly by untreated decay (D = 0.97 ± 1.37), followed by missing teeth (M = 0.44 ± 0.87) and few restorations (F = 0.31 ± 0.79). Despite 58.96% of participants holding tertiary education, 52.24% sought dental care only when in pain, and just 9.7% attended routine 6 monthly reviews. Sugar consumption was frequent, and only 28.36% flossed regularly. Routine dental check ups were significantly associated with lower DMFT scores ($p < 0.001$).

CONCLUSION: A high burden of untreated dental caries persists despite relatively high educational attainment, reflecting limited preventive care uptake and low restorative treatment. Strengthening community level oral health education and promoting regular dental attendance are essential.

KEYWORDS: Dental caries, DMFT index, prevalence, risk factors, oral health

INTRODUCTION

Dental caries remains one of the most prevalent chronic diseases globally and continues to pose a major public health burden [1]. It is a biofilm mediated, diet modulated, multifactorial disease resulting from the demineralisation of dental hard tissues by acids produced from bacterial fermentation of dietary carbohydrates [2–4]. Frequent intake of fermentable sugars combined with inadequate plaque control significantly increases caries risk and accelerates lesion progression [5]. If untreated, dental caries can lead to pain, impaired mastication, poor aesthetics, and reduced quality of life [6,7].

Globally, untreated dental caries in permanent teeth affects an estimated 2.5 billion people, making it one of the most common human diseases [8]. The burden of oral diseases varies across populations due to inequalities in living conditions, access to oral health services, fluoride availability, dietary patterns, and preventive behaviours [8–10]. The WHO reports that 44% of Africans live with at least one oral disease, with untreated dental caries accounting for nearly 39% of these conditions [11].

Regional data further highlight substantial variation. A systematic review of East African studies reported a pooled dental caries prevalence of 45.7%, with wide country level differences ranging from 30.7% in Tanzania to 65.2% in Eritrea [12]. Similarly, a meta analysis of 12 year old African schoolchildren reported a caries prevalence of 36% [13]. In West Africa, prevalence ranges from 4% to 40% depending on methodology and population type [14], while studies from southern Nigeria report prevalence rates exceeding 40% in clinical populations [15]. Ghanaian data also demonstrate variability, with schoolchildren showing prevalence rates of 13–17% [16] and adults aged 25+ showing untreated caries prevalence as high as 40.2% [17].

However, despite the public health significance of caries, there remains limited contemporary evidence describing the disease burden among Ghanaian adults who actively seek dental care. Most Ghanaian studies have focused on children, community samples, or general population surveys, with far less attention given to clinical attendees — a group that often presents with advanced disease, higher treatment needs, and delayed care seeking patterns. Clinic based prevalence data are essential for three reasons namely; helping to identify unmet treatment needs within high risk patient groups, revealing the real world pattern of disease severity seen in dental facilities, and are critical for guiding resource allocation, strengthening preventive programs, and designing adult focused oral health policies.

This study therefore sought to determine the prevalence of dental caries and to identify factors associated with caries experience among adult dental patients in Accra, Ghana. By examining sociodemographic characteristics, dental visiting behaviours, oral hygiene practices, dietary patterns, and clinical DMFT profiles, this study contributes essential evidence to support improved preventive strategies, targeted patient education, and enhanced adult oral health care delivery in Ghana.

MATERIALS AND METHODS

Study Design and Setting

A descriptive cross sectional study was conducted among adult patients attending two major dental referral centres

in Ghana: Korle Bu Teaching Hospital (KBTH) Dental Unit and the University of Ghana Dental School (UGDS) Clinic, both located within the Korle Bu medical enclave in the Greater Accra Region. These clinics serve diverse populations and receive high patient volumes, making them suitable for evaluating the oral health status of adults actively seeking dental care.

Study Population

The study included adult patients aged 18–70 years who reported to the clinics for any dental condition during the study period. All eligible patients were approached consecutively as they arrived, screened for inclusion, and invited to participate.

Inclusion Criteria

- Adults aged 18–70 years.
- Patients attending KBTH Dental Unit or UGDS Clinic.
- Individuals who consented to participate.
- Patients undergoing a clinical dental examination.

Exclusion Criteria

- Patients outside the 18–70 age range.
- Individuals unwilling or unable to provide informed consent.
- Medically compromised patients whose condition precluded safe examination.

Sampling Method

A consecutive sampling strategy was employed, where all eligible patients presenting during clinic hours were approached and recruited until the target sample size was reached. This approach was chosen to ensure feasibility within the clinical environment, and allowed recruitment within the approved ethical review time frame.

Sample Size Determination

The sample size was derived from the Cochran formula for prevalence studies [18].

- Z = 1.96 (95% confidence)
- Expected prevalence (p) = 0.404 (from prior Ghanaian adult caries data) [17]
- Margin of error (e) = 0.05

The minimum sample required was 130, which was achieved with a final sample of 134 participants.

Data Collection Procedures

Data were collected through two complementary methods conducted in clinic:

1. Structured Interview Administered Questionnaire

Trained dental staff administered a structured questionnaire to each participant. Items assessed:

- Sociodemographic characteristics
- Dental visiting behaviour
- Oral hygiene practices (brushing, flossing, fluoride use)
- Dietary habits (sugary and acidic food intake)
- Oral health knowledge and awareness

2. Clinical Oral Examination

Each participant underwent a chairside dental examination conducted by a calibrated clinician following World Health Organization (WHO) Oral Health Survey Guidelines.

The following clinical measures were recorded:

Caries Assessment (DMFT Index)

Caries status was assessed using the DMFT index following WHO Oral Health Survey Guidelines [19]. The DMFT captured:

- D (Decayed teeth) — cavitated lesions
- M (Missing teeth) due to disease or other causes
- F (Filled teeth) — restorations due to caries

Although ICDAS provides higher diagnostic sensitivity and includes early/non cavitated lesions, the DMFT index was chosen because:

1. It is the standard metric used in national and regional caries surveillance.
2. It allows comparability with existing Ghanaian and African studies.
3. It aligns with WHO guidelines, which were part of the original ethical approval framework.

Ethical Considerations

Ethical approval was obtained from the Ethics and Protocol Review Board of the Department of Community and Preventive Dentistry, University of Ghana Dental School. Written informed consent was obtained from all participants prior to questionnaire administration and examination. No deviations from the approved protocol occurred.

Data Management and Statistical Analysis

Data were entered and analysed using SPSS version 26. The following analytical procedures were performed:

- Descriptive statistics: frequencies, percentages, means, and standard deviations.
- Statistical significance was set at $p < 0.05$.

RESULTS

Participant Characteristics

A total of 134 adult participants were included in the analysis, comprising 70 females (52.24%) and 64 males (47.76%). The mean age was 36.79 ± 13.40 years, with participants ranging from 18 to 70 years. Most participants (55.22%) were employed, while 17.16% were self employed and 17.91% were students. Only 9.70% were unemployed. A majority (58.96%) had attained a bachelor's degree, whereas 19.40% had senior high school education and 10.45% had a diploma. More than half of respondents (51.49%) reported a previous history of dental caries. Nearly three quarters (74.63%) had not received any dental treatment within the past 12 months (Table 1).

Dental Visiting Patterns

Over half of participants (52.24%) reported visiting the dentist only when in pain, demonstrating a predominantly emergency driven care pattern. Only 9.70% attended dental check ups every 6 months, while 22.39% reported never visiting the dentist. A majority of participants (61.94%) had previously received professional dental cleaning (scaling and polishing) (Table 1).

Table 1. Sociodemographic Characteristics of Participants (n = 134)

Characteristics	Participants	Frequency	Percentage (%)
Sex	Female	70	52.24
	Male	64	47.76
Occupation	Employed	74	55.22
	Self employed	23	17.16
	Student	24	17.91
	Unemployed	13	9.70
Highest level of education	Bachelor's Degree	79	58.96
	Diploma	14	10.45
	Postgraduate Degree	8	5.97
	Primary School/Junior High School	7	5.22
	Senior High School	26	19.40
History of dental caries	Yes	65	48.51
	No	69	51.49
History of dental treatment	Yes	34	25.37
	No	100	74.63
Frequency of dental visit	Every 6 months	13	9.7
	Never	30	22.39
	Once a year	21	15.67
	Only when in pain	70	52.24
Scaling and polishing	Yes	83	61.94
	No	51	38.06

Oral Hygiene Practices

Toothbrushing habits were favourable overall, with 55.97% brushing twice daily and 44.03% once daily. Most participants (96.27%) used fluoridated toothpaste. Flossing frequency was low: only 28.36% flossed regularly, 64.93% did not floss, and 6.72% were unsure (Table 2).

Dietary Habits

Consumption of sugary foods and drinks varied among participants, 52.99% consumed them "sometimes," 25.37% rarely, 16.42% often, and 5.22% never. Similarly, acidic food/drink consumption occurred "sometimes" among 50% of participants, "rarely" among 28.36%, "often" among 14.18%, and "never" among 7.46% (Table 2).

Table 2. Oral Hygiene and Dietary Habits Practices

Oral hygiene practice		Frequency	Percentage (%)
Frequency of Tooth Brushing	Once	59	44.03
	Twice	75	55.97
The use of fluoridated toothpaste	No	1	0.75
	Not Sure	4	2.99
	Yes	129	96.27
Flossing	No	87	64.93
	Not Sure	9	6.72
	Yes	38	28.36
Consumption of foods and drinks high in sugar?	Never	7	5.22
	Often	22	16.42
	Rarely	34	25.37
	Sometimes	71	52.99
Consumption of acidic foods and drinks	Never	10	7.46
	Often	19	14.18
	Rarely	38	28.36
	Sometimes	67	50.00

Knowledge and Awareness

Most participants (94.78%) had previously heard of dental caries. Among them: 72.39% understood it as a "hole in the tooth," 17.91% as "discolouration," 3.73% identified both, while 1.50% were unsure.

Self rated knowledge of dental caries prevention was predominantly "fair" (46.27%), followed by "good" (29.85%), "very good" (14.93%), and "poor" (8.96%). More than half (58.96%) had not received oral health education in the past year (Table 3).

Table 3. Knowledge and Awareness

Variable	Category	Frequency	Percentage (%)
Self-Rated Knowledge	Very good	20	14.93
	Good	40	29.85
	Fair	62	46.27
	Poor	12	8.96
Heard of Dental Caries	Yes	127	94.78
	No	7	5.22
Meaning of Dental Caries	Hole in a tooth	97	72.39
	Dark colour	24	17.91
	Both	5	3.73
	Not sure	1	0.75
	Infected tooth	1	0.75
Received Oral -Health Education (past year)	Yes	55	41.04
	No	79	58.96

Prevalence of Dental Caries

The overall prevalence of dental caries was 55.97% (75 of 134 participants). Caries was more prevalent in females (58.57%) than males (53.13%), though differences were not tested for significance beyond the chi square analyses described below (Table 4)

DMFT Findings

The mean DMFT score was 1.71 ± 1.95, with the following component means:

- Decayed teeth (D): 0.97 ± 1.37
- Missing teeth (M): 0.44 ± 0.87
- Filled teeth (F): 0.31 ± 0.79

Caries experience was therefore dominated by untreated decay, followed by missing teeth, with very few restorations (Table 4).

DMFT Distribution Across Age Groups

Participants aged 18–24 and 25–34 years showed the highest proportions of DMFT = 0, indicating the lowest disease experience in younger adults.

In contrast, participants aged 35–44, 45–54, and 55–64 exhibited progressively higher DMFT values, with increasing numbers of decayed, missing, and filled teeth (Table 4).

Association Between DMFT and Demographic Variables

Chi square analysis revealed:

- No significant association between DMFT scores and age, sex, occupation, highest education, oral hygiene practices, or dietary habits.
- A significant association between routine dental check ups and lower DMFT scores ($p < 0.001$), indicating better oral health outcomes among participants who attended for preventive care (Table 4)

Table 3. Knowledge and Awareness

Prevalence of dental caries				
Characteristic	**Total**	**Cases**	**Prevalence**	
Overall	134	75	55.97%	
Gender				
Males	64	34	53.13%	
Females	70	41	58.57%	
DMFT Index	Decayed Teeth	Missing Teeth	Filled Teeth	DMFT Score
Mean	0.97	0.44	0.31	1.71
Std. Deviation	1.365	0.872	0.789	1.954
Association between DMFT scores and demographic Features				
Association	**P-Value**			
DMFT score * Age groups	0.123			
DMFT score * Gender	0.270			
DMFT score * HLE	0.130			
DMFT score * Occupation	0.080			
DMFT score * RDC	<0.001			
HLE – Highest level of education RDC- Routine dental check-up				

DISCUSSION

The present study assessed the prevalence of dental caries and associated factors among adults attending two major dental facilities in Ghana. The overall caries prevalence of 55.97% aligns with existing clinical findings from Ghana and other African regions, where high levels of untreated decay have been consistently reported among adult dental patients[20,21]. Despite the relatively high proportion of participants with tertiary education, untreated caries remained prevalent. This finding supports earlier work by Tafere et al., suggesting that educational attainment alone does not necessarily translate into optimal oral health behaviours or reduced disease burden [21,22]. The finding that more than half of participants sought

dental care only when in pain reflects a persistently reactive model of dental care utilisation. This symptom driven pattern has been widely observed in low resource settings, where barriers such as cost, limited awareness of preventive care, and fear of dental treatment often led to postponed attendance [23,24]. The significant association identified between routine dental check ups and lower DMFT scores further emphasises the benefits of preventive care and aligns with recommendations from professional bodies such as the American Dental Association [25]. Oral hygiene practices among participants showed strong adherence to daily toothbrushing and high usage of fluoridated toothpaste—both protective factors against caries development [26,27]. However, flossing rates were substantially low, consistent with Sambunjak et al., demonstrating that interdental cleaning is often underutilised, yet essential for effective plaque control and prevention of gingivitis and dental caries [28].

Dietary behaviours also played a considerable role in caries burden. Frequent or moderate consumption of sugary foods and drinks was common among participants, supporting longstanding evidence of the relationship between refined sugar intake and caries risk [29]. Similar associations have been reported in studies from India and other countries, where frequent free sugar consumption was significantly correlated with high caries prevalence [29,30]. These findings are particularly relevant in Ghana, where increased availability of processed foods and sugar sweetened beverages parallels a broader nutrition transition.

Despite high educational attainment among many participants, more than half had not received any oral health education within the past year. This corresponds with earlier research demonstrating that sustained oral health education is crucial for improving preventive behaviours, dietary choices, and overall oral health outcomes [31]. Strengthening community based and clinic based oral health promotion may therefore help address behavioural risk factors and enhance preventive care uptake. Terezakis et al., [31] emphasized that educational interventions significantly improve knowledge and practices related to oral health, leading to reduced caries prevalence.

Age related variation in DMFT scores was also evident, with older adults exhibiting greater disease experience. This observation is consistent with findings from Chile, the United States, and other global settings, where cumulative lifetime exposure to caries risk factors results in higher levels of tooth decay and tooth loss with advancing age [32,33]. The increased proportion of missing teeth among older participants in this study further reflects historical tendencies toward extraction based treatment. A review by Chan et al., [34] revealed that DMFT score were higher in institutionalized adults above 60 years, that is, 29.7 in South Africa and 6.9 in Malawi. Additionally, the trend of increasing DMFT scores with age aligns with findings from Dye's study [33], which indicated that older adults are at a higher risk for dental caries due to cumulative exposure to risk factors over time. Kassebaum et al., [2] stated varying DMFT scores globally, with higher scores often associated with older populations and lower socioeconomic status. Schwendicke et al., [35] also concluded that individuals with lower socioeconomic status have a higher risk of developing dental caries.

Gender differences, although not statistically significant, showed slightly higher caries prevalence among females. This pattern has been previously linked to hormonal influences, oral hygiene habits, dietary behaviours, and sociocultural factors [36]. These gender differences observed in DMFT scores also reflect a similar pattern noted in Lukacs [36], where women generally have a higher prevalence of dental caries compared to men. Furthermore, the understanding of the global burden of dental caries led to its classification as a non-communicable disease, making it vital in policy creation globally and at the country level for easy access to oral health care [37]. The 2021 WHO Resolution on Oral Health, approved by the World Health Assembly in May 2021, urges countries to move towards a preventive promotional approach to improve the oral health of the population to positively impact on overall health, by emphasizing on less invasive dentistry and environmentally friendly approaches to support countries with setting national objectives and preventive programmes for caries prevention and health promotion [38].

Overall, the findings reveal a substantial burden of untreated dental caries among adults seeking dental care in Ghana and highlight the need for a transition from an emergency driven, extraction oriented model of care toward a preventive, restorative, and health promotive oral health system. Strategies such as strengthening access to affordable restorative services, expanding oral health literacy programs, promoting routine dental attendance, and supporting diet based behavioural interventions may collectively help reduce the prevalence and impact of dental caries in Ghanaian adults. Integrating oral health services into primary healthcare policies could further enhance early detection, prevention, and timely intervention, thereby improving long term oral health outcomes.

CONCLUSION

This study demonstrates a substantial burden of untreated dental caries among adults seeking care at two major dental centres in Ghana. Although most participants reported favourable brushing habits and widespread use of fluoridated toothpaste, untreated decay remained the dominant component of the DMFT index, reflecting delayed care seeking, limited uptake of restorative services, and gaps in preventive practices. Routine dental attendance was significantly associated with lower DMFT scores, underscoring the importance of preventive care in reducing caries experience.

The high prevalence of dental caries, despite relatively high educational attainment, highlights the need for improved oral health literacy, strengthened public health messaging, and greater integration of preventive oral health into routine clinical practice. Targeted interventions such as community based oral health education, improved access to affordable restorative options, and programmes promoting regular dental visits are essential to reduce the prevalence and consequences of dental caries among Ghanaian adults.

Future studies should incorporate more sensitive diagnostic tools, such as ICDAS, and larger, multi centre samples to capture early lesions and provide more comprehensive epidemiological data. Strengthening surveillance and preventive strategies at both community and clinical levels will be critical for improving adult oral health outcomes and reducing the long term burden of dental caries in Ghana.

LIMITATIONS

This study has several limitations that should be considered when interpreting the findings. First, although ICDAS provides greater diagnostic sensitivity and captures lesion severity more comprehensively, DMFT index was used. Although widely used and aligned with WHO oral health surveillance guidelines, has important diagnostic limitations. DMFT does not record early enamel lesions or non cavitated caries, and therefore underestimates the true burden of disease in clinical populations. Additionally, the

"Missing" (M) component cannot differentiate whether tooth loss resulted from dental caries, periodontal disease, trauma, or elective extractions, limiting the ability to attribute missing teeth solely to caries experience.

Also, the use of a consecutive sampling method. Clinic attendees typically present with symptoms or advanced disease and may not represent the general adult population. This selection bias may lead to higher observed caries prevalence relative to community based samples.

Finally, reliance on self reported behavioural data, such as dietary habits, brushing frequency, and flossing practices, introduces the potential for recall and social desirability bias. These factors may lead to over reporting of positive behaviours or under reporting of high risk habits.

Despite these limitations, the study provides valuable clinical evidence on dental caries patterns among Ghanaian adults and highlights key behavioural and preventive gaps that warrant attention in future oral health programming and research.

REFERENCES

1. Petersen PE, Bourgeois D, Ogawa H, Estupinan Day S, Ndiaye C. The global burden of oral diseases and risks to oral health. Bull World Health Organ. 2005;83:661 669.
2. Kassebaum NJ, Bernabé E, Dahiya M, Bhandari B, Murray CJ, Marcenes W. Global burden of untreated caries: a systematic review and metaregression. J Dent Res. 2015;94:650 658.
3. Lamont RJ, Koo H, Hajishengallis G. The oral microbiota: dynamic communities and host interactions. Nat Rev Microbiol. 2018;16:745 759.
4. Takahashi N, Nyvad B. The role of bacteria in the caries process: ecological perspectives. J Dent Res. 2011;90:294 303.
5. Selwitz RH, Ismail AI, Pitts NB. Dental caries. Lancet. 2007;369:51 59.
6. Marcenes W, Kassebaum NJ, Bernabé E, Flaxman A, Naghavi M, Lopez A, Murray CJ. Global burden of oral conditions in 1990–2010: a systematic analysis. J Dent Res. 2013;92:592 597.
7. Marinho VCC, Higgins J, Logan S, Sheiham A. Fluoride toothpastes for preventing dental caries in children and adolescents. Cochrane Database Syst Rev. 2003;1:1 93.
8. Peres MA, Macpherson LMD, Weyant RJ, Venturelli R, Mathur MR, Listl S, et al. Oral diseases: a global public health challenge. Lancet. 2019;394:249 260.
9. Fejerskov O. Changing paradigms in concepts on dental caries: consequences for oral health care. Caries Res. 2004;38:182 191.
10. Vos T, Abajobir AA, Abate KH, Abbafati C, Abbas KM, Abd Allah F, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries, 1990–2016. Lancet. 2017;390:1211 1259.
11. World Health Organization. Oral health: fact sheet. 2022.
12. Teshome A, Muche A, Girma B. Prevalence of dental caries and associated factors in East Africa (2000–2020): systematic review and meta analysis. Front Public Health. 2021;9:1 15.
13. Kimmie Dhansay F, Bhayat A. Prevalence of dental caries in the permanent dentition amongst 12 year olds in Africa: a systematic review and meta analysis. BMC Oral Health. 2022;22:1 20.
14. Okeigbemen SA, Ibiyemi O. Prevention of dental caries in Nigeria: a narrative review (1999–2019). J Int Soc Prev Community Dent. 2020;10:240 245.
15. Osadolor AJ, Ekariama A, Oyibo AI, Osadolor OO, Omorodion G. Prevalence of dental caries among dental patients in southern Nigeria: a 5 year retrospective study. Yenagoa Med J. 2021;3:89 95.
16. Ndanu TA, Aryeetey R, Sackeyfio J, Otoo G, Lartey A. Oral hygiene practices and caries prevalence among 9–15 year old Ghanaian school children. J Nutr Health Sci. 2015;2:1 8.
17. Hewlett SA, Blankson P K, Aheto JMK, Anto F, Danso Appiah T, Sackeyfio J, et al. Assessment of oral health status in a Ghanaian population: rationale, methods, and population characteristics. BMC Oral Health. 2022;22:1 13.
18. Ampofo P, Fleischer H, Aprese D, Wireko H, Sackeyfio J, Ndanu T, Djarbeng A, Quartey-Papafio N. Knowledge, Awareness, and Attitudes towards Tooth Wear among Adult Patients who Visit the University of Ghana Dental School Clinic. Open Dent J, 2026; 20: e18742106428836.
19. World Health Organization. Oral health surveys: basic methods. 5th ed. Geneva: World Health Organization; 2013
20. Bukhari OM. Dental Caries Experience and Oral Health Related Quality of Life in Working Adults. Saudi Dent J. 2020;32:382 389.
21. Tafere Y, Chanie S, Dessie T, Gedamu H. Dental caries in Debre Tabor General Hospital. BMC Oral Health. 2018;18:1 7.
22. Omitola OG, Arigbede AO. Dental caries among patients in South South Nigeria. Port Harcourt Med J. 2012;6:52 58.
23. Bukmir RP, Paljević E, Pezelj Ribarić S, Pršo IB. Socioeconomic status and untreated caries in adults. Dent Med Probl. 2022;59:539 545.
24. da Rosa SV, Moysés SJ, Theis LC, Soares RC, Moysés ST, Werneck RI, Rocha JS. Barriers to dental care for people with disabilities. Int J Dent. 2020;2020:1 17.
25. American Dental Association. Caries Risk Assessment and Management. 2023.
26. Patel S, Bay RC, Glick M. Dental recall intervals and caries incidence. J Am Dent Assoc. 2010;141:527 539.

27. Riley P, Worthington HV, Clarkson JE, Beirne PV. Recall intervals for oral health in primary care. Cochrane Database Syst Rev. 2013;12:CD004346.

28. Sambunjak D, Nickerson JW, Poklepovic T, Johnson TM, Imai P, Tugwell P, et al. Flossing and caries prevention. Cochrane Database Syst. Rev. 2011;12:1 64.

29. Maru AM, Narendran S. Caries epidemiology in rural India. J Contemp Dent Pract. 2012;13:382 388.

30. Moynihan PJ, Kelly SAM. Effect of sugar restriction on caries. J Dent Res. 2014;93:8 18.

31. Terezakis E, Needleman I, Kumar N, Moles D, Agudo E. Impact of hospitalisation on oral health. J Clin Periodontol. 2011;38:628 636.

32. Urzua I, Mendoza C, Arteaga O, Rodriguez G, Cabello R, et al. Caries prevalence and tooth loss in Chilean adults. Int J Dent. 2012;2012:1 6.

33. Dye BA, Tan S, Smith V, Lewis BG, Barker LK, Thornton Evans G, et al. Trends in oral health status: United States. Vital Health Stat 11. 2007;248:1 92.

34. Chan AKY, Tamrakar M, Jiang CM, Lo ECM, Leung KCM, Chu CH. Caries status in older adults: systematic review. Int J Environ Res Public Health. 2021;18:1 15.

35. Schwendicke F, Dörfer CE, Paris S. Incomplete Caries Removal: A Systematic Review and Meta-analysis. J of Dent Res. 2013; 92(4):306-314.

36. Lukacs JR. Sex differences in dental caries experience: clinical evidence, complex etiology. Clinical Oral Invest. 2010; 15:649-656.

37. Pitts NB, Twetman S, Fisher J, Marsh PD. Understanding dental caries as a non-communicable disease. Br Dent J. 2021; 231:749-753.

38. World Health Organisation. Oral Health. Geneva: World Health Organisation, 2021.