

SYSTEMATIC REVIEW

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Periodontal diseases among pregnant adolescents and young women in Nigeria: a scoping review

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Abstract

Background Gingivitis increases the risk of adverse pregnancy outcomes. The study aimed to map the evidence of periodontal diseases in pregnant adolescents and young adults in Nigeria.

Methods This scoping review was registered on the Open Science Framework (registration DOI <https://doi.org/10.17605/OSF.IO/HVCD5>). A literature search was conducted in August 2024 in two electronic databases (Web of Science, PubMed), and EBSCO, and Google Scholar for articles written in English reporting periodontal diseases in pregnant adolescents (15–19 years) and young adults (20–24 years) in Nigeria following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Reviews (PRISMA-ScR). This review excluded abstracts, literature reviews, conference proceedings, letters to the editor, and editorials. Information extracted from the publications that met the inclusion criteria were the study design, study location, sample size, gestation stage, prevalence of periodontal diseases, and identified risk factors for periodontal diseases. A descriptive analysis of the extracted data was conducted.

Results Among the 768 articles screened, no study met the eligibility criteria. However, four studies reported on risk factors for periodontal diseases in a sample of 1066 pregnant women age < 20 years to > 40 years that included 202 (18.9%) pregnant adolescents and young adults. The prevalence of periodontal diseases ranged from 45.8 to 100%. One study reported that the highest score of healthy gingivae was among the 20–24 age group; one study reported that prevalence of gingivitis increased with increasing trimester; another reported the highest prevalence of gingival bleeding and the lowest prevalence of calculus in the first trimester, while one study could not establish a statistically significant relationship between periodontal diseases and gestational age. The four studies were conducted in two of Nigeria's six geopolitical zones, and all were hospital-based.

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Conclusion The lack of generalizable studies on risk factors for periodontal diseases among pregnant adolescents and young adults in Nigeria limits access to evidence for policy and program design. There is a need for broader, representative research to address these gaps.

Keywords Periodontal disease, Oral health, Adolescents, Pregnancy, Review, Nigeria

Introduction

Adolescents and young adults face huge maternal health challenges when pregnant [1, 2]. A possible contributor is poor oral health linked to adverse pregnancy outcomes, including preterm birth, low birth weight, and preeclampsia [3–5]. The prevalence of poor oral health among pregnant women is high due to the physiological changes that a woman's body undergoes to adapt to the demands of pregnancy. Elevated levels of hormones, particularly oestrogen and progesterone, along with changes in diet and hygiene habits, increase the risk of oral diseases [6–8].

The risk for oral diseases in adolescents and young women may be further elevated. Adolescence is a critical period marked by rapid physical and psychological changes, making this group particularly susceptible to health disparities [9, 10]. When compounded by pregnancy, adolescents and young adults encounter additional stressors, including increased nutritional demands and limited access to healthcare resources. These factors heighten the risk of oral health complications, including gingivitis [11, 12]. Understanding the prevalence, risk factors, and management practices for gingivitis in this demographic is vital for improving both maternal and neonatal health outcomes.

Gingivitis, a common form of periodontal disease, is characterized by inflammation of the gingival tissues and is often precipitated by the accumulation of dental plaque [13, 14]. Gingivitis poses a significant oral health challenge globally, particularly among vulnerable populations such as pregnant adolescents and young adults [15]. Hormonal fluctuations during pregnancy exacerbate gingival inflammation and other forms of periodontal diseases, making pregnant individuals particularly vulnerable [16–18]. This heightened susceptibility is further compounded by immunological changes, poor oral hygiene, and socio-economic challenges commonly encountered in low—and middle-income countries like Nigeria.

Nigeria is the most populous country in Africa, with a youthful population: about 70% of the population is below the age of 30 [19, 20]. The country bears a considerable burden of oral health issues, exacerbated by socio-economic inequalities and limited access to dental care services, especially in rural and underserved communities [21]. Despite efforts to improve maternal and child health outcomes, oral health remains a neglected aspect of antenatal care, with limited attention given to

preventive measures and management strategies for periodontal diseases among pregnant adolescents and young adults.

While periodontal diseases are prevalent conditions across various demographics, their impact during pregnancy extends beyond oral health, potentially affecting maternal and foetal well-being [4, 22–24]. Despite its importance, there is a dearth of comprehensive research specifically addressing periodontal diseases among pregnant adolescents and young adults in Nigeria. Understanding the risk factors and management of periodontal diseases in this demography is imperative. This scoping review aims to fill this gap by systematically analyzing risk factors for periodontal diseases among pregnant adolescents and young adults in Nigeria.

Methods

The study protocol was registered on the Open Science Framework on February 3, 2024, with the registration DOI <https://doi.org/10.17605/OSF.IO/HVCD5>. This scoping review was conducted using Arksey and O'Malley's scoping review framework [25], as adapted by Mary Gillespie [26], and adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) checklist [27].

Review questions

The following research questions guided this scoping review: What are the risk factors associated with periodontal diseases among pregnant adolescents and young adults in Nigeria?

Eligibility criteria

The review included cross-sectional, cohort, and case-control studies conducted in Nigeria, focusing on pregnant adolescents (15–19-year-olds) and young adults (20–24-year-olds) [28]. These studies were required to provide data on periodontal diseases as a clinical outcome within the target population. Reviews, editorials, case reports, opinion pieces, clinical trials, and studies that reported periodontal diseases but lacked sufficient information to extract information on their risk factors for adolescents and young women were excluded.

Identification of relevant studies

In August 2024, relevant articles published in English were searched using keywords and Medical Subject

Headings (MeSH) terms shown in Appendix 1, in two electronic databases, Web of Science, PubMed, considered as principal search systems because they met all necessary performance requirements suited for evidence synthesis [29]. A search was also conducted in EBSCO, a database aggregator that provides access to curated, subject-specific databases, and in Google Scholar, a freely accessible search engine that indexes scholarly content from a wide range of sources, including Africa, that may not be in the electronic databases [30]. These other two search systems are considered supplementary to the principal systems [29]. The search terms included “periodontal disease,” “pregnancy,” “adolescent,” “young adult,” “Nigeria,” and relevant variations.

Selection of studies

The identified studies were downloaded into EndNote and subsequently imported into Rayyan, where duplicates were removed. Rayyan, an automation tool, was utilized to improve the accuracy and validity of the study selection process for inclusion in the review [31]. Two researchers (SAI and OAA) independently screened the titles and abstracts based on predefined inclusion and exclusion criteria. Articles were selected only when both researchers agreed on their relevance. In cases where there were discrepancies in the eligibility of publications as determined by the two researchers, a third researcher (MOF) independently assessed the publications to resolve the disagreements. Following this, a discussion was held among the three researchers to reach a consensus on the eligibility of each publication. Subsequently, the researchers individually evaluated the full texts of the remaining articles. In addition, manual supplementary searches were conducted on the reference lists of potentially relevant publications.

Data charting

Two co-authors (SAI and OAA) created a data-charting template to extract relevant variables and independently conducted data extraction for each study included in the review. The extracted data encompassed study details (author, publication year, study design, sample size, setting), participant characteristics (age, gestational age), prevalence of periodontal diseases, and associated risk factors. In addition, the study’s limitations and identified research gaps were documented. This scoping review did not evaluate the methodological quality or statistical analysis of the included studies.

Reliability assessment

The reliability assessment for the two reviewers in the scoping review examined the consistency of their evaluations through an inter-rater reliability measure. Using Cohen’s kappa analysis, an inter-rater reliability score

of 0.8 was achieved during the title and abstract screening phase. This indicates a high level of standardized and consistent application of the criteria, which strengthens the credibility and reproducibility of the review.

Data analysis

The extracted data were presented using descriptive statistics as numbers, frequencies, and sums. In addition, information on risk factors associated with periodontal diseases was extracted from the publications. The conclusions of the studies were inductively analysed and synthesized narratively around the key concepts and used to highlight gaps in the existing literature using a reflexive thematic analysis [32]. We followed a systematic process to identify, analyze, and interpret patterns (themes) within the provided data.

Results

Search results are presented in Fig. 1. A total of 768 articles were retrieved from the searched databases. After removing duplicates, 734 articles were screened based on title and abstract. 13 articles were found to be eligible for full-text screening based on the eligibility criteria. The 13 articles were excluded from the review due to the absence of data on gingivitis ($n=6$), the target population not being pregnant women ($n=2$), non-clinical measure of gingivitis ($n=1$), and unextractable data on gingiva prevalence data for adolescents and young people ($n=4$).

Although none of the studies described a direct association between periodontal diseases and pregnancy among adolescents and young adults, four studies showed a link between the two variables in study populations, including adolescents and young adults. A summary of the four included articles [33–36] and their extracted data is presented in Table 1.

Characteristics of the studies

The studies were conducted in 2014 ($n=2$) and 2018 ($n=2$). Two studies were cross-sectional in design [33, 34], one was a cohort study [35], and one was a case-control study [36]. Three of the studies were conducted in southwestern Nigeria [33–35], and one was from north-central Nigeria [36]. All the studies were hospital-based, and the clinical assessment for periodontal diseases was done using the Community Periodontal Index in three of the studies.

The total sample for the study was 1066 pregnant women, with a study sample size ranging from 81 [35] to 415 [33]. The age of the study participants ranged from <20 years to >40 years. 202 (18.9%) study participants were adolescents and young adults.

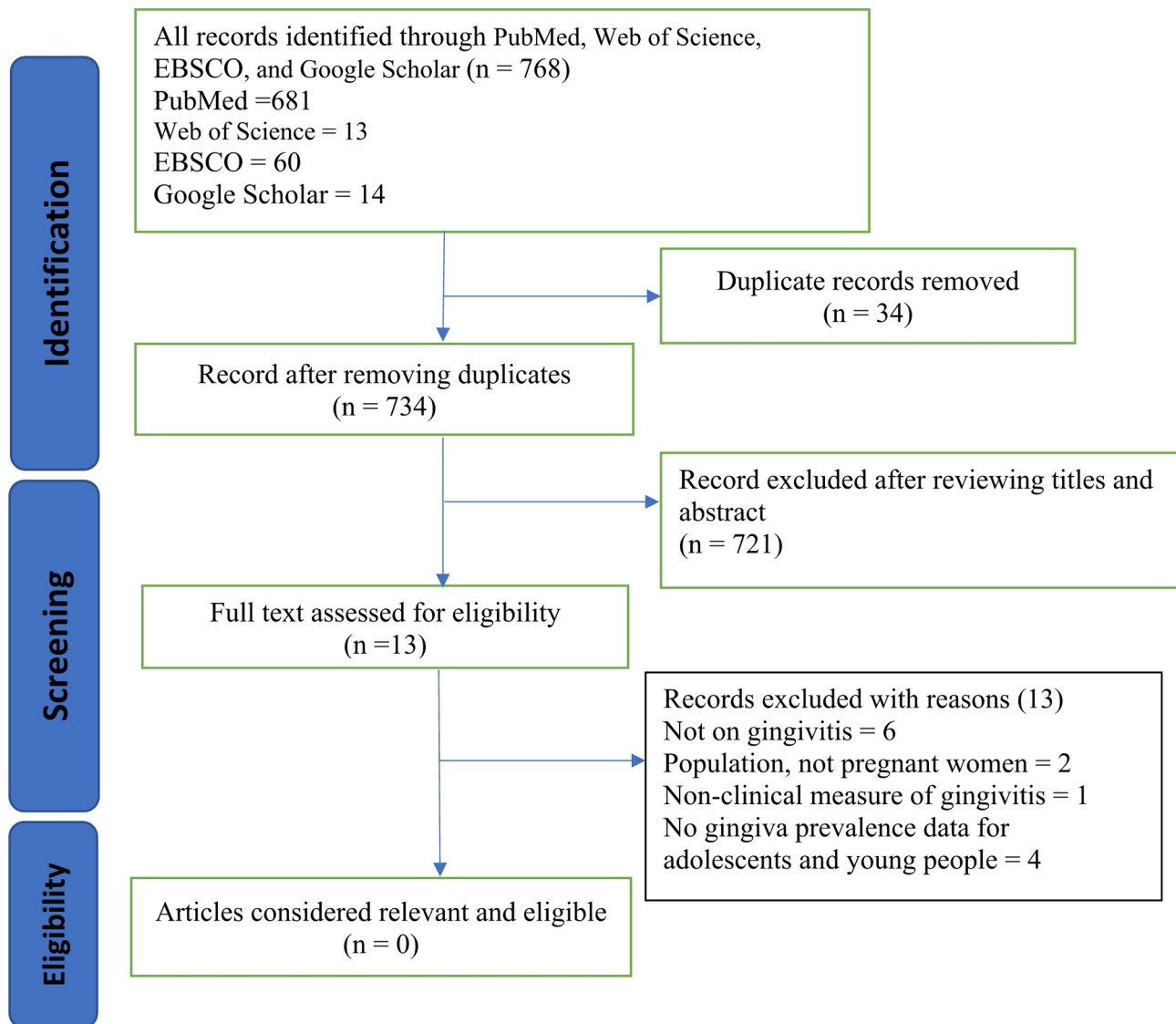


Fig. 1 PRISMA flow chart of the literature search for studies investigating gingivitis among pregnant adolescents and young women in Nigeria

Prevalence of periodontal diseases

The prevalence of periodontal diseases ranged from 45.8 to 100%. One study reported that the highest score of healthy gingivae was among the 20–24 age group [33]. One study reported that gingivitis progresses across trimesters, with the majority of cases occurring in the third trimester [36]. Another reported the highest prevalence of gingival bleeding and the lowest prevalence of calculus in the first trimester [33], while another could not establish a statistically significant relationship between gingivitis and gestational age [36].

Risk factors for periodontal diseases

The significant reduction in deep pockets postpartum observed in one study highlights a pregnancy-related influence on periodontal tissues [35]. No statistically

significant association was observed between the mean worst CPITN score and factors like prior live births [34] or oral contraceptive use [34]. A history of dental visits correlated with an increased prevalence of gingival bleeding [33].

The reflexive thematic analysis of the data revealed three key themes: (i) dynamic periodontal health during and after pregnancy, (ii) limited influence of demographic and behavioural factors, and (iii) progressive gingivitis in pregnancy.

1. **Dynamic periodontal health during and after pregnancy:** Periodontal health undergoes significant changes during pregnancy [34], with trimester-specific trends such as increased bleeding in the

Table 1 Characteristics of the studies included in the scoping review

S.N.	Author/Year of Publication	Study Design	Study Location	Sample Size	Age Range (total number in the target population)	Clinical measure of periodontal diseases	Prevalence of periodontal diseases	Study conclusions
1	Onigbinde et al., 2014 [33]	Cross-sectional	Lagos	415	20–44 years (23, 5.5%)	Community periodontal index of treatment needs	94.0%	The age group 20–24 years had the highest score for healthy gingivae. The highest prevalence of bleeding and lowest prevalence of calculus was in the first trimester and amongst those who had a history of dental visits.
2	Opeodu et al., 2015 [34]	Cross-sectional	Ibadan	345	18–45 years (93, 5.5%)	Community periodontal index of treatment needs	100.0%	The significant reduction in deep pockets postpartum indicates a pregnancy-related effect on periodontal tissues. No statistically significant relationship was found between the mean worst CPITN score, the number of previous live births, and the use of oral contraceptives.
3	Lasisi et al., 2018 [35]	Cohort	Ibadan	81	< 25 - ≥35 years (23, 5.5%)	Community Periodontal Index	89.6%	There are clinically significant periodontal and gingival diseases in pregnant women.
4	Adesina et al., 2018 [36]	Case-control	Ilorin	225 pregnant women; 166 non-pregnant controls	< 20 - >40 (63, 28%)	No measurement identified	45.8%	Gingivitis was more common among pregnant women than non-pregnant women. Among the 103 pregnant women with gingivitis, 1.94% were in the first trimester, 25.2% were in the second trimester, and the majority (72.8%) were in the third trimester of pregnancy. There was no significant relationship between gingivitis and the gestational age at presentation.

first trimester [33] and a reduction in deep pockets postpartum [35].

- Limited influence of demographic and behavioral factors:** While age was associated with healthier gingivae in the 20–24 age group [33], other factors such as parity and oral contraceptive use showed no significant relationship with periodontal health [34].
- Progressive gingivitis in pregnancy:** Gingivitis was more prevalent in pregnant women than in non-pregnant women, with its prevalence increasing across trimesters [36]. However, there was no significant relationship between gingivitis and gestational age [36].

Discussion

The current scoping review identified no study focused on the prevalence and risk factors for periodontal diseases among pregnant adolescents and young adults in Nigeria. We, however, adopted the approach by Crystal et al. [37] and reported on four articles that showed links between the two variables identified during the search: studies that included adolescents and young adults in the data of studies on periodontal diseases in pregnant

women in Nigeria. These studies highlighted that pregnant adolescents and young adults in Nigeria may have healthier gingivae than older pregnant women; the prevalence of gingivitis increases with gestational age; and the history of prior live births or oral contraceptive use were not significant risk factors for gingivitis in pregnant women in Nigeria.

The strengths of our study include the registration and adherence to a strict protocol aligned with recognized guidelines. Furthermore, an inter-rater reliability assessment was conducted, yielding a high score that indicated strong consistency and agreement among the raters, thereby enhancing the credibility and reproducibility of our findings. In addition, a team of 13 authors from different ethnic backgrounds and work settings critically appraised and discussed the findings, bringing in diverse perspectives. Furthermore, the reported measure of periodontal health was the same for three of the four studies that reported on their clinical measurement parameters.

A limitation of this study is the lack of research specifically addressing the oral health of adolescents and young adults in Nigeria, which impacts the applicability of the findings to these groups. Furthermore, there are

indications that the gingival health profile of the study population may differ from that of older pregnant women in Nigeria [33]. In addition, the data on the risk factors for periodontal diseases in pregnancy analysed in this study was not comprehensive as the search was limited to address this study's research question. Despite these limitations, the study highlighted a few significant findings.

First, there seems to be a poor recognition of the peculiar oral health needs of young people, especially for populations like pregnant adolescents and young adults in Nigeria. Pregnant adolescents and young adults are special populations due to their unique physiological and psychological challenges. They face higher risks of pregnancy complications [38], emotional stress [39], and nutritional deficiencies [40, 41]. In addition, hormonal changes increase their vulnerability to poor oral health [42, 43]. Poor oral health in pregnancy is linked with the risk of a poorer quality of life [44] and a risk for adverse pregnancy outcomes [4]. For these reasons, priority attention must be given to the oral health of pregnant adolescents and young adults.

The need for prioritizing this population in Nigeria is urgent due to the significant mortality and morbidity associated with pregnancy, which poor oral health may exacerbate. Nigeria accounts for 10% of global maternal deaths, with a maternal mortality rate of 576 per 100,000 live births—the fourth highest in the world. In addition, approximately 262,000 newborns die annually at birth, representing the second-highest national total globally [45]. Adolescents significantly contribute to these figures, with about one-fifth of adolescent girls in Nigeria having begun childbearing [46] and facing a high risk of mortality during pregnancy or childbirth [47]. The high prevalence of poor oral health among pregnant women in Nigeria [48] combined with a high rate of mild to severe gingivitis among adolescents (65.7%) [49] underscores the likelihood of a high prevalence of periodontal diseases among adolescents and young pregnant women. Unfortunately, there is no study focusing on the critical systemic healthcare needs of pregnant young people in Nigeria.

One of the articles included in the current scoping review suggests that adolescents and young adults may have better baseline periodontal health [33]. This may be due to fewer cumulative risk factors or shorter exposure to oral health challenges during their lifetime. The concept that pregnancy can transiently exacerbate periodontal conditions is reinforced by the findings in the current review: early pregnancy hormonal changes may disproportionately affect periodontal tissues, as suggested by the report on the highest prevalence of gingival bleeding and the lowest prevalence of calculus in the first trimester [33], as well as the significant reduction in deep pockets postpartum [34]. However, the report on the progression

of gingivitis across trimesters, with the majority of cases in the third trimester [36], supports the hypothesis that hormonal and vascular changes of the gingiva intensify as pregnancy advances [50] with elevated progesterone and estrogen levels at this period, and the altering of the oral taxa like *Porphyromonas gingivalis* and *Prevotella melaninogenica* [51].

One study identified a non-statistically significant relationship between gingivitis and gestational age [36]. This suggests that gingivitis may not be a direct predictor of preterm birth or gestational age. However, this finding does not negate the importance of periodontal health during pregnancy, as other factors may have a more pronounced impact on the health of the periodontium during pregnancy. Pregnant women with inadequate oral hygiene are more likely to develop pregnancy gingivitis, which, if left untreated, can progress to more severe periodontal disease [52]. In addition, pregnant women from lower levels of education and income may face barriers to accessing preventive dental care [53], which can exacerbate periodontal issues [52]. Furthermore, smoking is a well-established risk factor for periodontal disease, impairs the immune response, reduces blood flow to the gums [54], and increases the likelihood of bacterial infections. Pregnant women who smoke are at a higher risk of developing periodontal disease [52]. Obesity and high BMI have been linked to systemic inflammation [55], which can exacerbate periodontal disease. During pregnancy, excessive weight gain and obesity may further increase the risk of periodontal problems due to the combined effects of hormonal changes and systemic inflammation [52]. None of these possible risk factors for poor periodontal health during pregnancy were studied.

Yet, there are evidences suggesting that pregnant adolescents and young women in Nigeria are likely to have lower levels of education and income [56]; there is an increase in the prevalence of young women smoking in the country [57–59]; and there is a growing crisis of obesity and high BMI among female adolescents in Nigeria [60]. There is a need for more studies to explore these and other potential risk factors, including culturally relevant risk factors, for poor periodontal health in this population.

Although one of the studies identified no statistical link between periodontal diseases and gestational age [36], however, the presence of clinically significant periodontal and gingival diseases in pregnant women underscores the need for targeted preventive care during pregnancy. The high prevalence of periodontal diseases in pregnant women highlighted in the current study indicates the need for oral clinical interventions for pregnant women. Dental visits and uptake of dental care by pregnant women may result from professional evaluations, as identified in one of the studies [33]. This highlights the need

for routine screening of pregnant women to facilitate their access to clinical dental care.

The findings collectively emphasize the dynamic impact of pregnancy on periodontal health, driven by hormonal and physiological changes suggesting that pregnancy has a transient but impactful effect on periodontal tissues; that gingivitis progression during pregnancy may be influenced by other factors, such as hormonal changes or oral hygiene practices; and that demographic and behavioural factors may play a limited role in pregnancy-related periodontal changes. These suggestive findings highlight the importance of early dental care in mitigating pregnancy-related periodontal risks. The study, however, is unable to provide a map of evidences on the link between periodontal health and pregnancy among adolescents and young adults in Nigeria that can inform tailored interventions for these special need groups. This is a research gap area. Future studies are needed to identify potential contributors to poor periodontal health of pregnant adolescents and young adults in Nigeria, to be able to effectively mitigate the risks for poor pregnancy outcomes among this group with a high risk for maternal mortality and morbidity in Nigeria.

Conclusions

Despite the high pregnancy rates and poor pregnancy outcomes linked to poor periodontal health among adolescents in Nigeria, there is a lack of data on the risk factors for periodontal diseases in the population. The analysis of the few proxy studies highlights the complex interplay of pregnancy, demographic factors, and periodontal health. The findings underscore the need for targeted oral health interventions during pregnancy, particularly in addressing trimester-specific changes and the progressive nature of gingivitis. Future studies are needed to fill this gap, guiding policies and programs for this population. These studies should cover all six geopolitical zones in Nigeria and identify specific risk factors for gingivitis in this group.

Abbreviations

PRISMA-ScR	Preferred reporting items for systematic review and meta-analysis extension for the scoping review
MeSH	Medical subject headings
IRR	Inter-rater reliability
CPITN	Community periodontal index of treatment needs

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12903-025-06004-3>.

Supplementary material 1

Acknowledgements

Not applicable.

Author contributions

SAI conceptualised the study and drafted the first the first version of the paper. SAI, OAA and MOF conducted the data extraction. OAA, MOF, RO, AC, AD, FON, AOS, TA G-B, FJO, FTA, GUE, and OCE critically revised the manuscript for important intellectual content and contributed to the interpretation of data for the work. All the authors gave their final approval and agreed to be accountable for all aspects of the work.

Funding

This study was financially supported by the Oral Health Initiative, Nigeria Institute of Medical Research, Nigeria, grant number [OHI/COH2023/0003].

Data availability

All data and materials are publicly accessible.

Declarations

Ethics approval and consent to participate

This study was registered with the Open Science framework (DOI <https://doi.org/10.17605/OSF.IO/HVCD5>).

Consent for publication

Not applicable.

Competing interests

Morenike Oluwatoyin Folayan is a member of the Board of BMC Oral Health. Other authors have no competing interest to declare.

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Received: 21 January 2025 / Accepted: 15 April 2025

Published online: 06 June 2025

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