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Systematic review and meta-analysis of the prevalence of oral cancer in Nigeria

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Abstract

Introduction Oral cancer is ranked among the ten most common cancers in the world and is a growing public health concern in Nigeria. However, the extent of the burden of oral cancer in Nigeria is poorly understood. A better understanding of the prevalence of oral cancer will inform the development and implementation of efficient and effective oral cancer prevention and management strategies. This systematic review and meta-analysis aimed to estimate the prevalence of oral cancer in Nigeria to guide relevant oral health interventions and policies.

Methods We searched PubMed, Embase, Scopus, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Web of Science for studies published from 1990 until August 15, 2023. We included cohort, cross-sectional, case-control, descriptive, and interventional studies that reported prevalence data for oral cancer in Nigeria. The primary outcome was the pooled prevalence of oral cancer. Meta-analysis was performed using the random effect model. The Higgins inconsistency index -I^2 index was used to evaluate heterogeneity. The quality of the studies was assessed using the Joanna Briggs Institute Critical Appraisal Checklist.

Results In total, 3025 articles were screened, and data from 7 studies with a total sample size of 9188 (1702 oral cancer cases) were included in the meta-analysis. Participants age ranged from 0 to 100 years. Oral cancer prevalence varied across the studies, ranging from 7.5% to 41%. The pooled prevalence of oral cancer in Nigeria was 20% (95% confidence interval, CI:0.11–0.28, $I^2 = 99\%$, $P < 0.0001$). An estimate of the total variation between studies revealed substantial heterogeneity ($I^2 = 99\%$). The prevalence rate differed between gender populations, with more predilection to males (11%) than females (7%).

Conclusions The current analysis indicates an overall pooled oral cancer prevalence of 20% in Nigeria. The high burden of oral cancer in Nigeria highlights a need for public health interventions and policies to promote the prevention and early detection of oral cancer. The analysis also shows a higher prevalence of oral cancer among men. Population-based studies are necessary to better understand individual differences in oral cancer.

Keywords Oral Cancer, Prevalence, Meta-analysis, Nigeria

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Introduction

Globally, oral cancer ranks amongst the ten most common types of cancer [1] and accounts for 90% of malignancies affecting the oral and maxillofacial region [2], making it a growing public health problem associated with significant morbidity and mortality [3]. Additionally, and similar to other cancers, oral cancer brings about huge financial and psychological burden to those affected, their families, and the country at large [4–6]. According to the 2020 Global Cancer Observatory-GLOBOCAN estimates, there were approximately 530,000 new cases of oral cancer and 248,000 oral cancer-related deaths globally in 2020 (ICD10 C00-C10- cancers occurring in the oral, lip, salivary glands, and oropharynx regions) [1].

Oral cancer is characterized as any malignant neoplasm occurring in the mouth and pharynx, including cancers of the lips, tongue, floor of the mouth, palate, gingiva, alveolar mucosa, tonsils, uvula, oropharynx, or salivary glands [7, 8]. The majority of the new cases of oral cancer are currently reported in developing countries[2]; and there is a growing trend in the burden of oral cancer among young people and individuals in low and middle-income countries [9]. In Nigeria, despite the paucity of conclusive statistics, hospital-based data from Nigeria show rising cases of oral cancer in the country [10, 11].

The major risk factors for oral cancer include tobacco use (both smoked and smokeless) [12, 13], alcohol consumption [12, 13], poor diet and nutrition [14], and poor oral hygiene [14]. In addition to these modifiable risk factors, there is a growing concern about the role of human papillomavirus (HPV) infections, especially HPV-16 and HPV-18, as emerging risk factors for oral cancer [14, 15]. The burden of HPV is high in Nigeria, with prevalence ranging between 16.1% to 68.8% in various populations [16–18]. High-risk HPV is responsible for a significant proportion of HPV-related cancers [19]. Oral cancer is also associated with a depression of the cell-mediated immune response [20]. Hence, immunosuppressive therapy in individuals with kidney, bone marrow, heart, or liver transplants, as well as people living with HIV, are prone to an elevated risk of the development of oral malignancies [14]. Growing evidence shows a rising prevalence of oral cancer risk factors such as tobacco use, alcohol use, and HPV,17,18 among Nigerians.

Early detection and prompt treatment are the most effective strategies to reduce morbidity and mortality associated with oral cancer [21, 22]. The survival rate for oral cancer is approximately 80%–90% when detected in the early phases [23]. However, the challenge lies in that approximately 50% of oral cancers are left undiagnosed until advanced stages (stages III and IV) because most patients are asymptomatic in the early stages [3]. Patients typically seek medical attention only after experiencing symptoms such as pain, bleeding, or the presence of masses in the mouth or neck, which are symptoms more commonly associated with later stages of oral cancer [3]. This trend is notably evident in settings such as Nigeria, where dental care and other preventive services are underutilized [24, 25].

In light of this, there is a need to promote oral cancer prevention in Nigeria. However, preventive efforts are hampered by the lack of robust estimates of the prevalence and burden of oral cancer in Nigeria. Empirical evidence on the state of oral cancer in Nigeria can provide valuable insights for policymakers in developing guidelines to address this growing public health burden. In addition, such estimates can inform the development of interventions and programs for oral cancer management. Overall, this review seeks to shed light on critical aspects of oral cancer in Nigeria and contribute to informed decision-making and intervention development. This systematic review and meta-analysis provide a pooled prevalence estimate of oral cancer in Nigeria. Furthermore, subgroup analyses were performed to understand variations by available sociodemographic factors.

Methods

This systematic review protocol was registered with the International Prospective Register of Systematic Reviews (PROSPERO registration number: CRD42022356995) and reported according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines [26]. See Additional File 1 for the PRISMA checklist. To avoid duplication, before registering the protocol, a careful review of the PROSPERO and Cochrane Review was performed to verify if similar systematic reviews and meta-analyses existed.

Search strategy and selection criteria

A comprehensive electronic search was conducted in PubMed, Embase, Scopus, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Web of Science databases. The search strategy consisted of a combination of keywords relating to oral cancer, prevalence, and Nigeria. We also scanned through the reference lists of included studies, previous systematic reviews, and meta-analyses of published articles and conducted "Related Searches" in Google Scholar and Africa Journals Online to identify additional relevant studies.

Eligibility criteria

The PICOS of the study were Population (adults, adolescents, and children), Intervention (none), Comparison (none), Outcome (prevalence of oral cancer), and Setting (Nigeria). Studies were included based on the following

criteria: (1) observational studies (cross-sectional, cohort, case–control, descriptive, and prospective studies) and interventional studies, (2) studies that reported on the prevalence of oral cancer or provided data for calculating prevalence rate, and (3) studies carried out in Nigeria, without language restriction.

Studies were excluded if they (1) were carried out using individuals with drug-related autoimmune disorders; (2) did not report the prevalence of oral cancer in children, adolescents and adults living in Nigeria; (3) did not report sample size; (4) were conducted outside Nigeria; (5) had duplicated samples; (6) did not estimate correct sample size; or (7) reported only on pharyngeal cancer. In addition, review articles, letters to the editor, editorials, commentaries, expert opinions, case studies, case series, and brief reports were excluded.

Study screening and selection

The results of the searches were merged using EndNote software (version 20), and duplicate articles were removed. The remaining articles were uploaded to Covidence (www.covidence.org), where a second duplicate check was performed. Three authors (UN, CO, SU) independently screened the retrieved article titles and abstracts according to the inclusion and exclusion criteria. Articles deemed eligible following title and abstract were included for the full-text review using the inclusion and exclusion criteria.

Data extraction

Two authors (UN, SU) independently extracted data using Microsoft Excel, using a predesigned form. The extracted data included descriptive information about the article, the first author's name and year of publication, study setting, study design and methods, participants' characteristics (age, sample size), period of participants' recruitment, region of recruitment, oral cancer site, setting, mean or median age, age range, oral cancer prevalence.

Data synthesis and analysis

The primary outcome of the systematic review and meta-analysis was the estimated prevalence of oral cancer. A meta-analysis was performed using a random-effects model to combine prevalence rates across studies. Pooled prevalence and 95% confidence intervals (CIs) for oral cancer were calculated using a random-effects model to allow for between-study variability. The pooled proportions were calculated using an inverse-variance weighting model.

Study heterogeneity was evaluated using the Higgins inconsistency index (I^2), with substantial heterogeneity indicated by an I^2 value greater than 50%. High heterogeneity (e.g., $I^2 = 50\%$ and above) suggests significant differences between the included studies, which may affect the generalizability of the pooled estimate. Studies may vary based on population, interventions, outcomes, or methodologies. Publication bias was also investigated visually using Begg's funnel plots and statistically using Egger's linear regression method ($p < 0.1$ is considered significant). In addition, sensitivity analyses were conducted to test the reliability of combined results, evaluating each study's influence on the final estimations for each meta-analysis performed.

All statistical analyses were performed using R-software version 4.3.2. The *"meta"* package produced pooled estimates, forest plots, and publication bias assessment. The *"metafor"* package was used for the meta-regression using restricted maximum likelihood estimation.

Risk of bias assessment

Two authors (UN, CO) independently assessed the risk of bias for each study using the Joanna Briggs Institute Critical Appraisal Checklist for Prevalence Studies [27]. Persisting disagreements were resolved by consulting a third author. The assessment tool consists of nine parameters for the targeted population: (1) appropriate sampling frame, (2) proper sampling technique, (3) adequate sample size, (4) study subject and setting description, (5) sufficient data analysis, (6) use of valid methods for the identified conditions, (7) valid measurement for all participants, (8) using appropriate statistical analysis, and (9) adequate response rate and managed appropriately [27, 28]. Satisfying each of these parameters was scored as 1; if not met, it was scored as 0. The quality of the studies was classified as low (0–3), moderate (4–6), or high (7–9). None of the articles were excluded based on the quality assignment. Each reviewer (UN, CO) assigned scores based on the reporting of each quality parameter in the manuscript. The reviewers then discussed their scores until a consensus was reached for any discrepancies.

Results

Study selection

The study selection process is displayed with a PRISMA flowchart in Fig. 1. The electronic literature database searches yielded 3025 records. After 167 duplicates were removed, 2858 papers were screened by title and abstract. Of these, 143 studies underwent full-text review, and 7 met the inclusion criteria for the review after 136 articles were excluded for not reporting oral cancer prevalence, including a denominator to calculate prevalence ($n = 100$), studies not focused on Nigeria ($n = 17$), report on benign tumors and not cancers ($n = 16$), review papers ($n = 2$), and a case report ($n = 1$).

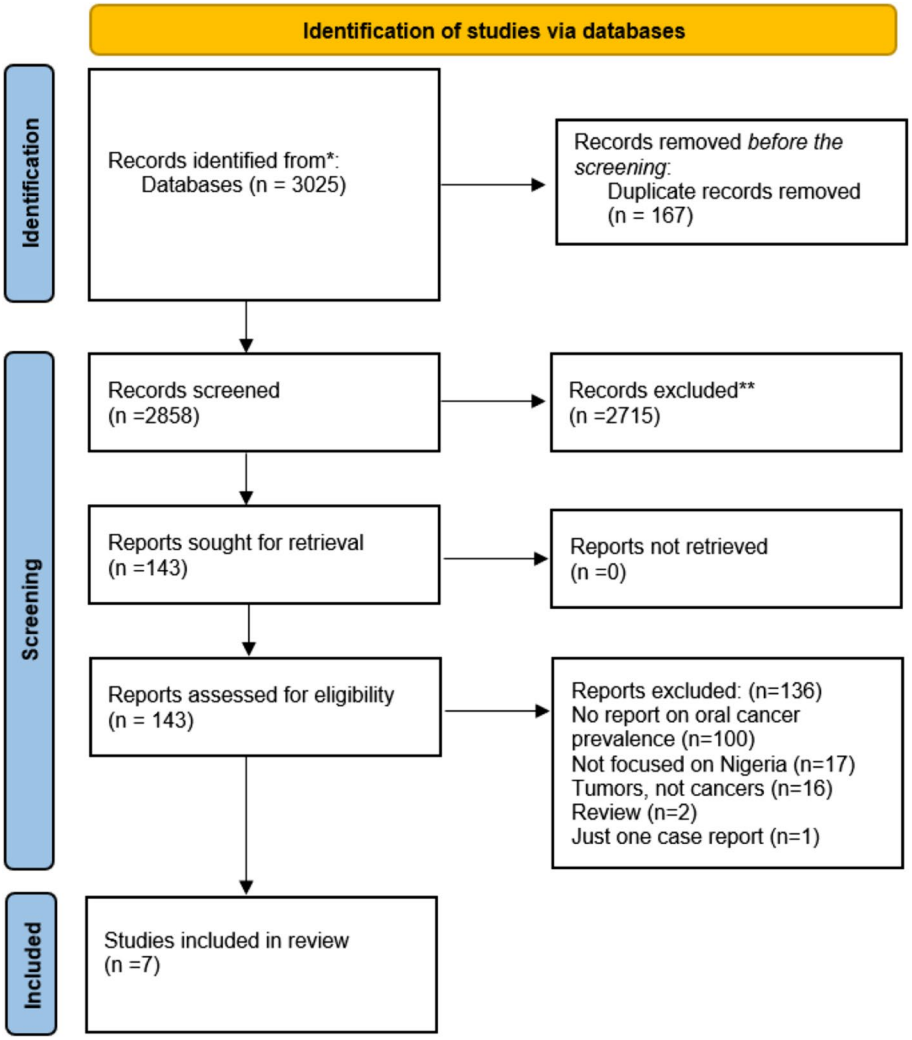

Fig. 1 PRISMA flow diagram of study inclusion

Quality of included studies

Scores on the quality of the studies based on Joanna Briggs Institute Critical Appraisal Checklist for Prevalence Studies [27] are reported in Table 1. Five studies had a moderate quality score (4–6) [11, 29–32] and two high-quality scores (7–9) [33, 34]. In most of the included studies, it was unclear if the sample frame was adequate, given that the majority of the studies were limited to single hospital data (5/7, 71.4%), and one study [31] obtained data from population-based registries, limiting the representative of the data sources. In all the studies, the sample size was 100 or more. This sample size was considered adequate to determine the prevalence rate, although none of the studies conducted a power calculation to justify the sample size. In addition, the presence of oral cancer was ascertained in all the studies, with the majority through biopsies and hospital records. In addition, given the retrospective nature of the data obtained, we were unable to ascertain the response rate for any of the studies.

Characteristics of included studies

The characteristics of the included studies are summarized in Table 2. The seven studies were published in peer-reviewed journals between 2005 and 2018; three were between 2005 and 2010[25, 26, 30],; and four were between 2011 and 2018[11, 27–29].

Most of the studies were based on data collected in the southwestern part of Nigeria and a few other regions. Five of the studies utilized data obtained from one location (Ile-Ife[11], Lagos[25, 26], Benin[28], and Maiduguri[30]). Two studies had data from a combination of multiple sites: the study from Odutola et al., 2017 [31] reported data from Abuja and Enugu; Lawal et al., 2017 [33] reported data from Lagos, Ile-Ife, Ibadan, and Zaria.

Table 1 Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Prevalence Studies Scores for the seven studies included in the review

Author, Year	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Total	Quality
Adesina et al., 2018 [11]	0	0	1	1	0	1	1	1	0	5	Moderate
Ajayi et al., 2007 [29]	0	0	1	1	0	1	1	1	0	5	Moderate
Effiom et al., 2008 [30]	0	0	1	1	0	1	1	1	0	5	Moderate
Lawal et al., 2017 [33]	1	1	1	1	0	1	1	1	0	7	High
Odutola et al., 2017 [31]	1	1	1	0	1	0	1	1	0	6	Moderate
Okoh et al., 2015 [32]	0	0	1	1	0	1	1	1	0	5	Moderate
Otoh et al., 2005 [34]	0	1	1	1	1	1	1	1	0	7	High

Note: *The quality of the studies were classified as either low (total score, 0 to 3), moderate (total score, 4–6) or high (total score, 7–9).* Q1 = Was the sample frame appropriate to address the target population? Q2 = Were study participants sampled appropriately? Q3 = Was the sample size adequate? Q4 = Were the study subjects and the setting described in detail? Q5 = Was the data analysis conducted with sufficient coverage of the identified sample? Q6 = Were valid methods used for the identification of the condition? Q7 = Was the condition measured in a standard, reliable way for all participants? Q8 = Was there appropriate statistical analysis? Q9 = Was the response rate adequate, and if not, was the low response rate managed appropriately?

The age of participants varied among the studies, ranging from 0 to 100 years. Five studies reported participants' mean age (42.2 to 55.5 years)[11, 25, 28–30]. The sample sizes of the included studies ranged from 317 [11] to 2154. [30], with a total sample size of 9,188.

Data were generated through retrospective studies of biopsy records in health facilities[11, 25, 26, 30], hospital records[28, 29], and data extracted from a population-based registry [27]. All the biopsy records were those of tertiary health facilities (teaching hospitals). The intervals for the data collection range 3 years[27] to 10-[11], 11-[26],,12–[25] 16-[30], 25[28], and 45 years[29].

Oral cavity sites

Table 3 shows the oral cancer sites reported in the included studies. The buccal mucosa (6/7), lip (6/7), and tongue (5/7) were the frequently reported site of oral cancer across the studies.

Prevalence of oral cancer

Based on a random-effects model-based meta-analysis conducted on all data points, the pooled prevalence of oral cancer was estimated as 20% (95% confidence interval, CI:0.11–0.28), with a heterogeneity index of $I^2 = 99\%$ ($P < 0.0001$), which confirmed substantial heterogeneity among the included studies (See Fig. 2). In the seven studies included in the meta-analysis, the prevalence of oral cancer ranged from 7.5% [31] to 41% [33].

Prevalence of oral cancer for male and female

Male participants had a pooled prevalence of 11% (95% CI: 0.05–0.17) (Fig. 3), while female participants had a pooled prevalence of 7% (95% CI: 0.04–0.11) (Fig. 4).

Subgroup analysis of oral cancer prevalence

Table 4 presents the prevalence of oral cancer in subgroups based on study quality rating, publication year, region of study, 95% CI, assessment of heterogeneity, and differences between subgroups. The prevalence of oral cancer was slightly higher in studies that scored high, 25% (95% CI: 0.0042- 0.54) in the quality assessment compared to those that scored moderate, 17% (95% CI: 0.094–0.24). However, this difference was not statistically significant. Although not statistically significant, based on sample size, studies with a sample size of 1000 or less had a slightly higher prevalence rate of 21% (95% CI: 0.64–0.36) compared to those with a sample size of 1000 or more with a prevalence rate of 19%, (95% CI: 0.077 – 0.31). The one study published in 2018 had the highest prevalence rate of 29% (95% CI: 0.24–0.34) compared to the other studies. This difference was statistically significant ($P < 0.0001$) Table 4.

Publication bias

The included studies were assessed for potential publication bias using Egger's test. However, due to the insufficient sample size, we could not obtain a *p*-value on publication bias analyses for the prevalence of oral cancer for Egger's test. Nonetheless, the funnel plot in Fig. 5 depicts a slight asymmetry by comparing the standard error of each study and the prevalence rate logit. The asymmetry of the funnel plot further shows evidence of publication bias.

Sensitivity analysis

A sensitivity analysis using one-by-one elimination of studies, and a random effect model reported a pooled prevalence rate of 20% (95% CI: 0.11 −0.28), similar to the analysis with all the studies (Fig. 6).

Table 2 Characteristics of the Included Studies

Author, Year	Study Location, Region	Data Source	Study Setting/Type of Study	Sample size	Age (Range. Mean) in Years	Oral Cancer Prevalence Rate
Adesina et al., 2018 [11]	Ile-Ife, South-West	Biopsy records [2008-2017] Patients with orofacial malignancies seen at the Oral Pathology Unit of Dental Hospital, Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife	Health facility/Retrospective study	375	Range: 4–94 Mean: 48.7; SD: 19.3	0.29
Ajayi et al., 2007 [29]	Lagos, South-West	Biopsies [1992–2003] Department of Oral Pathology and Biology, Lagos University Teaching Hospital	Health facility/Retrospective study	1451	Range: 2.5 to 85 Mean: 42.2; SD: 21.5	0.18
Effiom et al., 2008 [30]	Lagos, South-West	Biopsies [1995–2005] Department of Oral Pathology and Biology, Lagos University Teaching Hospital and the Oral Pathology Service, Lagos State General Hospitals	Health facilities/Retrospective study	2154	Range: 3 to 86 Mean: NR	0.11
Lawal et al., 2017 [33]	Lagos, South-West Ile-Ife, South-West Ibadan, South-West Port Harcourt, South-South Zaria, North-Central	Hospital records [1970–2014] University Teaching Hospitals of Lagos, Ile-Ife, Ibadan, Port Harcourt and Zaria	Health facilities/Retrospective study	1560	Range: 0 to 100 Mean: 55.5; SD:17	0.41
Odutola et al., 2017 [31]	Abuja, North-Central Enugu, South-East	Population-based registries [2012- 2014] Abuja Cancer Registry and Enugu Cancer Registry	Registries	1808	NR	0.075
Okoh et al., 2015 [32]	Benin, South-South	Clinical and histopathology records and slides of histopathological diagnosed orofacial lesions [1990 –2014] Department of Oral Pathology and Medicine, University of Benin Teaching Hospital	Health facility/Retrospective study	1523	Range: 2 to 94 Mean: 51; SD:17.9	0.19
Otoh et al., 2005 [34]	Maiduguri, North-East	Biopsies [1987–2002] University of Maiduguri Teaching Hospital	Health facility/Retrospective study	317	Range: 2 to 94 Mean: 51.2; SD:15.6	0.14

Note: NR- not reported

Discussion

Oral cancer poses an increasing public health challenge, as it is associated with high mortality rates [2]. However, limited representative data on oral cancer in many settings, especially in African countries like Nigeria, makes addressing this growing burden challenging [35]. To address the gap in evidence, this review provides the first systematic review and meta-analysis of empirical evidence on the prevalence of oral cancer in Nigeria. The pooled prevalence of 20% suggests that 1 in 5 Nigerians

Table 3 Oral cancer sites reported in the seven studies included in the review

Oral Cancer Site	Adesina et al., 2018 [11]	Ajayi et al., 2007 [29]	Effiom et al., 2008 [30]	Lawal et al., 2017 [33]	Odutola et al., 2017 [31]	Okoh et al., 2015 [32]	Otoh et al., 2005 [34]
Buccal mucosa	X	X	X	X		X	X
Floor of mouth			X	X		X	X
Gingiva			X	X		X	
Gum/palate	X			X		X	X
Lip	X	X	X	X		X	X
Oral cavity/mouth					X		
Pharynx					X		
Tongue	X		X	X		X	X
Tonsils							
Salivary glands	X						
Unspecified							X

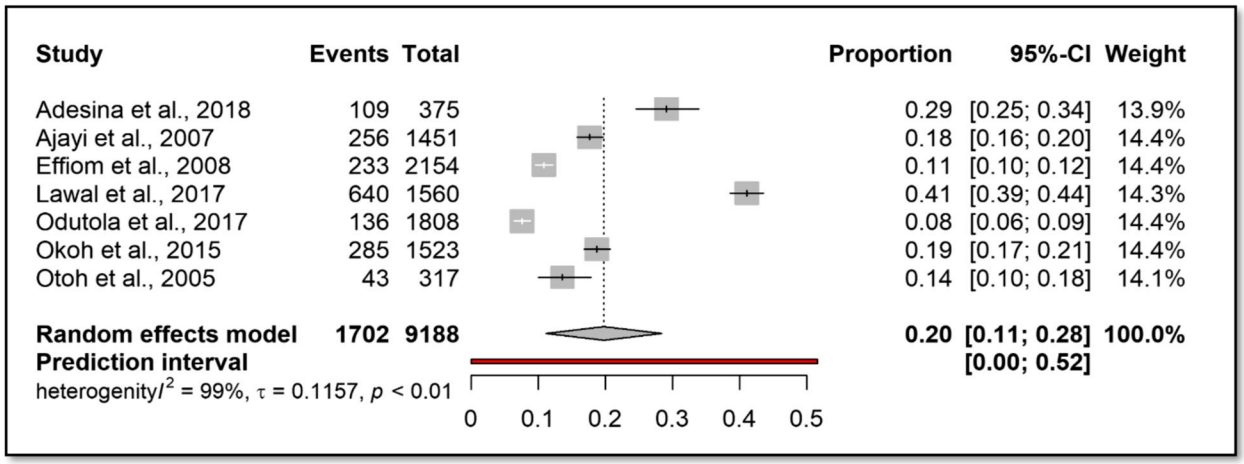

Fig. 2 Forest plot representing analysis of the pooled prevalence of oral cancer in Nigeria, based on the seven studies included in the meta-analysis

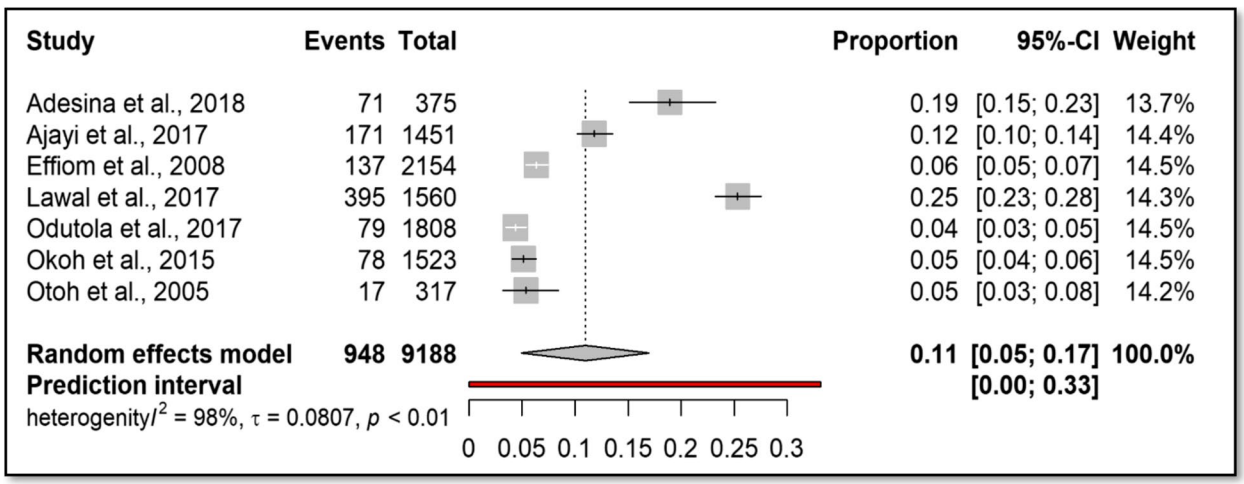

Fig. 3 Forest Plot of pooled prevalence of oral cancer for men across the seven studies included in the meta-analysis

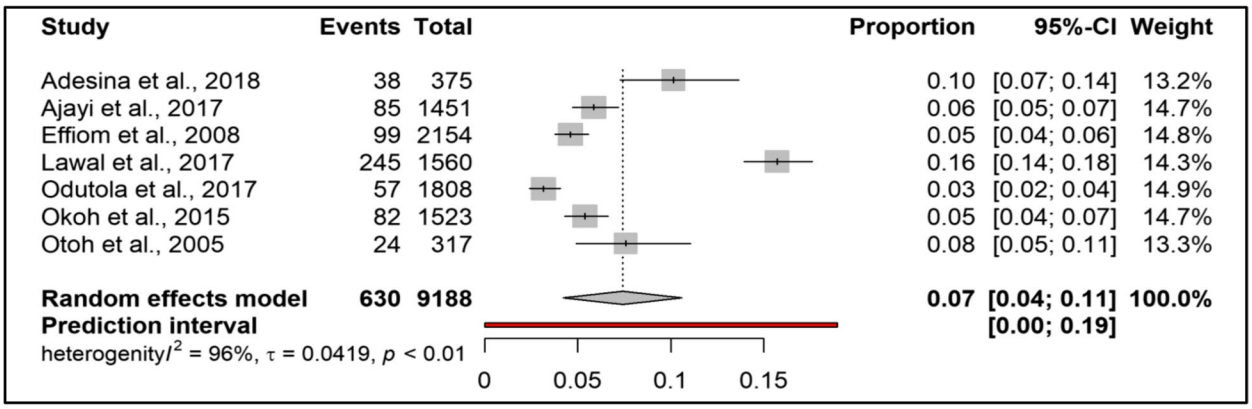

Fig. 4 Forest Plot of pooled prevalence of oral cancer for women across the seven studies included in the meta-analysis

Table 4 Subgroup analysis of studies reporting the prevalence of oral cancer by study quality rating, publication year, and region of study

Sub-group characteristics	Category	Included studies	Prevalence	95% CI	I^2	*p*-subgroup
Study quality rating	Moderate	5	0.17	0.094–0.237	97.8	0.45
	High	2	0.27	0.0042- 0.54	99.3	
Publication year	2005	1	0.14	0.09—0.17	NA	0.0001
	2007	1	0.18	0.16—0.19	NA	
	2008	1	0.11	0.095- 0.12	NA	
	2015	1	0.19	0.17–0.21	NA	
	2017	2	0.24	0.00–0.57	99.8	
	2018	1	0.29	0.24 -0.34	NA	
Region	South-West	3	0.19	0.087–0.29	97.4	0.12
	South-South	1	0.19	0.17–0.21	NA	
	North-East	1	0.14	0.98–0.17	NA	
	Combination*	2	0.24	0.00–0.57	99.8	
Total sample size	1000 or less	2	0.21	0.64–0.36	96.2	0.83
	1000 or more	5	0.19	0.077 – 0.31	99.4	

I^2 was not generated for all categories in publication year and region given the limited studies (reporting only 1 study per category); *Studies reporting data from more than one region were labeled as a combination

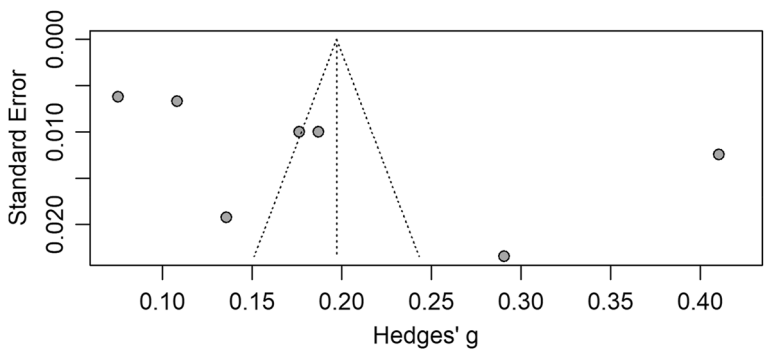

Fig. 5 A bias assessment funnel plot of all included studies reporting oral cancer prevalence in Nigeria

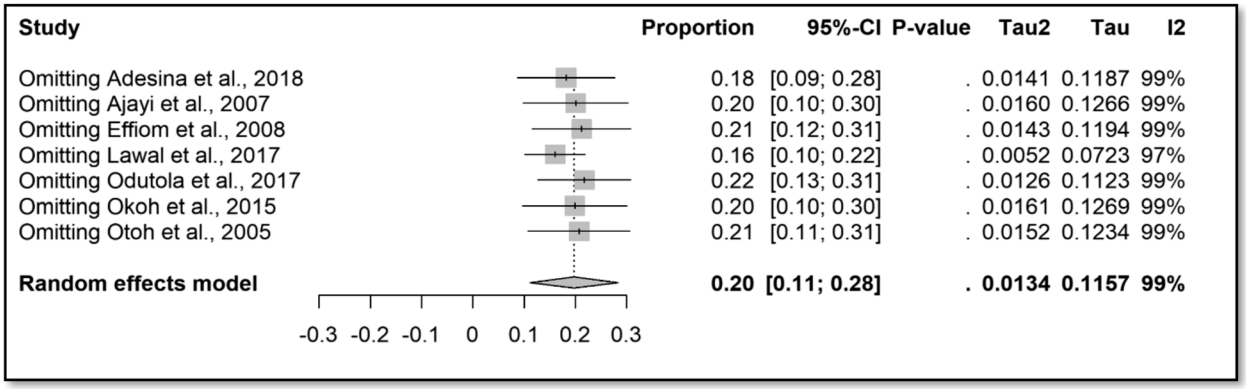

Fig. 6 Forest Plot of pooled prevalence of oral cancer with one-by-one elimination of studies

may have oral cancer, with a slightly higher prevalence among men.

The inclusion of only seven studies in this review reveals a dearth of studies focused on oral cancer in Nigeria, with no significant increase in publications over the study period. In addition, the studies included were limited to data generated in teaching hospitals, and the data collection location was skewed to southwestern Nigeria, with few multi-center studies. Data collection intervals, sample sizes, and age ranges varied substantially, contributing to high heterogeneity.

A strength of this review lies in its comprehensive and robust search strategy. However, the study has some limitations worth noting. One such limitation is the degree of between-study heterogeneity. Although we conducted sensitivity and subgroup analyses, there are potential residual factors (e.g., ethnicity and risk factors) we could not account for, as they were rarely reported in all the studies. Variations in the demographic and clinical characteristics of the study populations can affect the risk of oral cancer, influencing the heterogeneity of the studies and posing a challenge in generalizing the pooled results.

Although we conducted sensitivity analyses with available variations, the lack of these other pertinent variables made it impossible to evaluate them further. Nonetheless, this work serves as a launchpad for future projects, as future research can further explore the impact of these characteristics on the risk for oral cancer in Nigeria. Another limitation is that most of the studies in the meta-analysis employed retrospective biodata analysis, indicating the need for a comprehensive national-level oral cancer registry. Despite these limitations, this review is one of the first attempts to understand the landscape of oral cancer in Nigeria.

Sensitivity analysis suggests the pooled prevalence rate is robust, but high heterogeneity and variable study quality mean the results should be interpreted with caution [36]. For instance, the pooled prevalence computed in this study might be more appropriately construed as a hospital-based oral cancer prevalence rather than a population-level one, given that the data were predominantly sourced from hospital records. This may explain the higher prevalence of oral cancer reported in this study when compared with other countries like Thailand, with a prevalence of 1.3% [36] and 1.98% in Iran [37]. Although large variability in the temporal and spatial burden of oral cancer has been reported [38], Prior studies on the age-adjusted disability-adjusted life years for oral cancer had indicated that though Nigeria had one of the lowest global rates, there has been a 100–200% increase in the incident cases of oral cancer over 30 years between 1990 and 2019 [38].

The observed sex difference in the prevalence of oral cancer is consistent with findings in prior studies that have reported higher oral cancer prevalence rates among males compared to females [39]. The assumption is that males are more exposed to cancer risk factors such as smoking and drinking than their female counterparts [39]. Nonetheless, other studies have reported decreasing variations in oral cancer incidence by sex, which are partly due to similar risk patterns among males and females in other parts of the world [9, 40]. Recent studies on the use of tobacco not only show a high prevalence of smoking – electronic and cigarette smoking—by young people but no gender difference in electronic cigarette smoking in Nigeria [41]. E-cigarette use has carcinogenic potential and oral cancer risk, though it carries a lower toxin level than a combustible cigarette [42]. This observed growing prevalence in the oral use of carcinogenic agents by male and female adolescents in a country with poor regulation of the use of cigarette products [43, 44] may contribute to the growing prevalence of oral cancer with a prospect for no gender variability in its prevalence in the future.

The findings underscore the need for targeted public health policies in Nigeria. Efforts should focus on

improving data collection through a national oral cancer registry, enhancing public awareness about risk factors, and implementing preventive measures like HPV vaccination programs. Addressing these issues can help mitigate the burden of oral cancer and improve health outcomes in Nigeria. While the prevalence of oral cancer reported in this study seems to be higher than expected, it is a caution and a call for active intervention for oral cancer prevention and control management in Nigeria. Moreover, resources within the health systems are unlikely to cope with the demands associated with a high prevalence of oral cancer [45, 46]. The Nigerian health system is fragile and already burdened with additional challenges associated with communicable and non-communicable diseases [47], inadequate workforces [48], and financial constraints attributed to the lack of universal health coverage [49].

Conclusions

The current analysis indicates an overall pooled oral cancer prevalence of 20% in Nigeria, suggesting there is a high burden of oral cancer in Nigeria, contrary to prior reports. The analysis also shows variations in the prevalence of oral cancer reported by gender, with more predilection in males. The disparity in reports may be limited by the study design and data collection methodologies, which suggests that the current prevalence may be more reflective of a hospital-based than a population-based prevalence. The high prevalence of oral cancer that this study has identified emphasizes the need for public health interventions and policies that promote the prevention and early detection of oral cancer and focus on men who might be at an increased risk of disease. Future studies should focus on multi-center approaches and diverse locations and adopt consistent data collection intervals, sample sizes, and age ranges.

Data sharing

All datasets generated and analyzed, including the study protocol, search strategy, list of included and excluded studies, data extracted, analysis plans, and quality assessment, are available in the article and upon request from the corresponding author.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12903-025-05724-w.

Supplementary Material 1.

Authors' contributions

Ucheoma Nwaozuru designed the study with inputs from Morénikẹ Oluwátóyìn Foláyan. Ucheoma Nwaozuru, Chisom Obiezu-Umeh, and Somto Anthonia Uzodufa independently reviewed titles/abstracts and extracted data. Ucheoma Nwaozuru wrote the first draft of the manuscript. All authors (Chisom Obiezu-Umeh, Somto Anthonia Uzodufa, Abideen Salako, Folahanmi Tomiwa Akinsolu, Oliver Chukwujekwu Ezechi, Francisca Nwaokorie, Omolola Titilayo Alade, George Uchenna Eleje, Joanne Lusher, and Morénikẹ Oluwátóyìn Foláyan) reviewed drafts for critical content and provided permission for submission for publication. The authors read and approved the final manuscript.

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Data Availability

All datasets generated and analyzed, including the study protocol, search strategy, list of included and excluded studies, data extracted, analysis plans, and quality assessment, are available in the article and upon request from the corresponding author.

Declarations

Ethics approval and consent to participate

Ethical approval was not required for this systematic review as the research was based on information retrieved from published studies.

Consent for publication

Not Applicable.

Competing interests

The authors declare no competing interests.

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