

Review Article

Head and Neck Cancer Literacy in Nigeria: A systematic Review of the Literature

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Abstract

Introduction: Head and neck cancer (HNC), oral cancer inclusive (OC), is one of the major causes of cancer-related deaths globally, especially in Nigeria – a developing African country. Public literacy about HNC plays a very crucial role in HNC prevention. **Aim:** This study aimed to systematically review existing literature on literacy of HNC in Nigeria. **Methods:** We searched the PubMed, Google Scholar and AJOL databases for all relevant English articles published on HNC literacy in Nigeria from January 2000 till October 2020. Only relevant articles were included for the study. Quality assessment of the full text of the included articles was done using the Appraisal Tool for Cross-Sectional Studies (AXIS); also, relevant data were extracted from these articles and analyzed thematically. **Results:** A total of 21 articles (19 surveys and 2 interventional studies), which studied a total population of 7,883 people, were included in the study. All the included articles were rated “excellent” (70 – 100%), regarding quality. The awareness rates of HNC/OC, as documented in the included studies, ranged from 0% to 100%; however, the rate recorded in the majority of these studies was <50%. In-depth knowledge of HNC/OC was found to be generally poor among the surveyed population groups; however, education intervention was found to improve in-depth knowledge of HNC and attitudes toward peer and non-peer education about HNC among Nigerians. **Conclusion:** The level of knowledge regarding HNC, in Nigeria, is low. The use of relevant health education programs to boost knowledge about HNC among the Nigerian public is highly recommended.

Keywords Head and neck cancer, oral cancer, literacy, awareness, knowledge, Nigeria

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Background

Head and neck cancer (HNC) is a deadly disease that has been bedeviling humankind for several centuries [1,2]. Globally, Nigeria inclusive, about 300,000 people die of HNC and about 55,000 people are newly diagnosed of the disease on yearly basis [3]. The average five-year survival rate of HNC after diagnosis is 65.9% [4].

Head and neck cancer is a malignant neoplasm affecting the upper aero-digestive tract [5-8]. There are five types of HNC; they are named based on where they develop from. They are: laryngeal and hypopharyngeal cancer, nasal cavity and paranasal sinus cancer, nasopharyngeal cancer, oral and oropharyngeal cancer, and salivary gland cancer [9,10]. The etiological/risk factors of HNC include alcohol use, tobacco use, oral sex/human papillomavirus (HPV), poor oral hygiene, occupational exposure to carcinogenic chemicals and substances, consumption of certain preserved or salted foods during childhood, genetic factor, Epstein-Barr virus, and others [11-29]. However, the three major HNC etiological/risk factors are alcohol use, tobacco use, and HPV [9,10].

In Nigeria, the national burden of HNC is unknown due to the lack of an all-inclusive data on HNC in Nigeria, and most studies available are limited to hospital-based data. Also, there is no population-based database on HNC, and available studies were delimited to few places/tribes/population groups, and most of them are retrospective studies [30,31]. However, from the review of existing literature, HNC had been reported in Nigeria among persons aged between 9 months to >80 years [31]. Also, there is a rising prevalence trend of the disease among young people [31].

The prevalence of the three major HNC etiological/risk factors among Nigerians is an issue of serious concern [34-37]. Research has shown that at least one out of every ten to twenty Nigerians smokes tobacco, drinks alcohol, and/or engage in risky sexual practices including oral sex (carcinogenic strains of HPV can be transmitted through oral sex) [35-37]. This is an issue of serious public health concern; with this current situation, there is a very high possibility that the burden of HNC in Nigeria will be high in future, if the current prevalence trend of HNC risk factors persists among Nigerians.

Worrisomely, most of the cases of HNC seen in Nigeria are detected lately [31,38-40], and the treatment outcomes of HNC in Nigeria is poor due to high drop-out rate among HNC patients in Nigeria [31,41,42]. Poverty, ignorance, and poor access to comprehensive HNC are the factors implicated to be the cause of late presentation and high drop-out rates among HNC patients in Nigeria [31,41,42].

Individuals who have adequate knowledge of a disease and its preventive measures stand a higher chance of getting the occurrence of such disease prevented. Many HNC patients in Nigeria lack adequate knowledge of the disease; as ignorance of the

disease has been implicated to be a major factor contributing to late presentations of HNC patients in Nigerian hospitals [31].

After extensive literature search, we found that there is no nationally representative study exploring the level of knowledge of HNC among Nigerians; most of the available studies were delimited to few places/tribes/population groups [43-63]. Therefore, this study aims to systematically review available studies exploring the level of knowledge of Nigerians on HNC and give an overview of the level of HNC literacy in Nigeria.

Methods

Study Design

This study was a systemic review of literature written on HNC literacy in Nigeria. The study protocol follows the recommendations established by PRISMA statement [64].

Table 1. Domains of search terms

Domains	Search Key Words (MeSH terms and synonyms)
Population	Nigeria, Nigerians
Knowledge	Knowledge, awareness, literacy
Head and neck cancer	Head and neck cancer, oropharyngeal cancer, nasopharyngeal cancer, pharyngeal cancer, nasal cancer, oral cancer, laryngeal cancer, of salivary gland cancer, tonsil cancer, lip cancer, gum cancer
Head and neck cancer risk factors	Poor oral health, human papillomavirus, HPV, tobacco, smoking, alcohol, oral sex, risk factors

Search Strategy

Between October 1, 2020, and October 31, 2020, we conducted a filtered search of articles published from the year 2000 till October 2020 on three international research databases: PubMed, Google Scholar and AJOL. The search terms used were relevant Medical Subject Headings (MeSH) keywords and their synonyms which were developed along these four domains: a) Nigerian population; b) knowledge; c) HNC; d) and HNC risk factors (Table 1). We adopted the use of these keywords and their synonyms in our search strategy, as shown in Table 2.

Table 2. Search keywords

Multiple Combinations of Search Keywords
'Nigeria' OR 'Nigerians' AND 'knowledge' OR 'awareness' OR 'literacy' OR 'awareness' AND 'head and neck cancer' OR 'oropharyngeal cancer' OR 'nasopharyngeal cancer' OR 'pharyngeal cancer' OR 'nasal cancer' OR 'oral cancer' OR 'laryngeal cancer' 'salivary gland cancer' OR 'tonsil cancer' OR 'lip cancer' OR 'gum cancer' AND 'poor oral health' OR 'human papillomavirus' OR 'HPV' OR 'tobacco' OR 'smoking' OR 'alcohol' OR 'oral sex' OR 'risk factors'

Selection Criteria

A set of 6 criteria was used to determine the eligibility of a searched article for inclusion in the systematic review (Table 3). Only those articles that met all the criteria were considered eligible.

Table 3. Selection criteria of publications

Selection criteria of publications
Articles that are available online
Peer reviewed journal articles
Articles written in English
Articles written on Nigerian population
Articles written on head and neck cancer (or any cancer that is classified under head and neck cancer e.g. oral cancer) literacy
Articles with access to their full texts

Article Sorting

A total of 1,348 publications (hits) were obtained from our database search. Out of the 1,348 publications, 1326 publications, which comprised non-relevant and duplicate publications, were excluded based on the selection criteria set for the study (Table 3). Hence, only 21 journal articles were considered relevant and included in the study (Figure 1, Table 4).

Quality Assessment

The included articles (n = 21) were assessed for quality using the Appraisal Tool for Cross-Sectional Studies (AXIS) (Table S1 [Supplementary file]) [65]. The AXIS was used to grade each article on a scale of 0 – 100%. The AXIS is made up of 20 questions (Qs). A response to each Q (Q1 – Q20) in the AXIS attracts a grade point of zero point or five points. A response of 'a' (Yes) attracts 5 points each for all Qs except for Q13 and Q19 where it attracts zero point. A response of 'b' (No) attracts zero point each for all Qs except for Q13 and Q19 (a response of 'b' for Q13 or Q19 attracts 5 points each). A response of 'c' (Do not know/comment) attracts a zero point for all Qs except for Q14 where it attracts 5 points. The cumulative point obtained by an article is calculated this way:

$$(((\text{number of points} \times \text{satisfactory grading per Q1}) + [\text{number of points} \times \text{satisfactory grading per Q2}] \dots [\text{number of points} \times \text{satisfactory grading per Q20}]) / 100) \times 100$$

Based on the percentage generated from the calculation, the quality of each article was graded as excellent (if it was $\geq 70\%$); very good (if within the range of 60-69%); good (if within the range of 51-59%); average (if it was 50%); and poor (if it was $< 50\%$).

Data Extraction

Relevant data including authors' names, article title, study location, year of data collection, study aims, study design, nature of study participants, article accessibility, and major findings of the study, were extracted from each of the included articles.

Results**List of Included Articles**

Table 4 shows the list of the 21 articles included for the study.

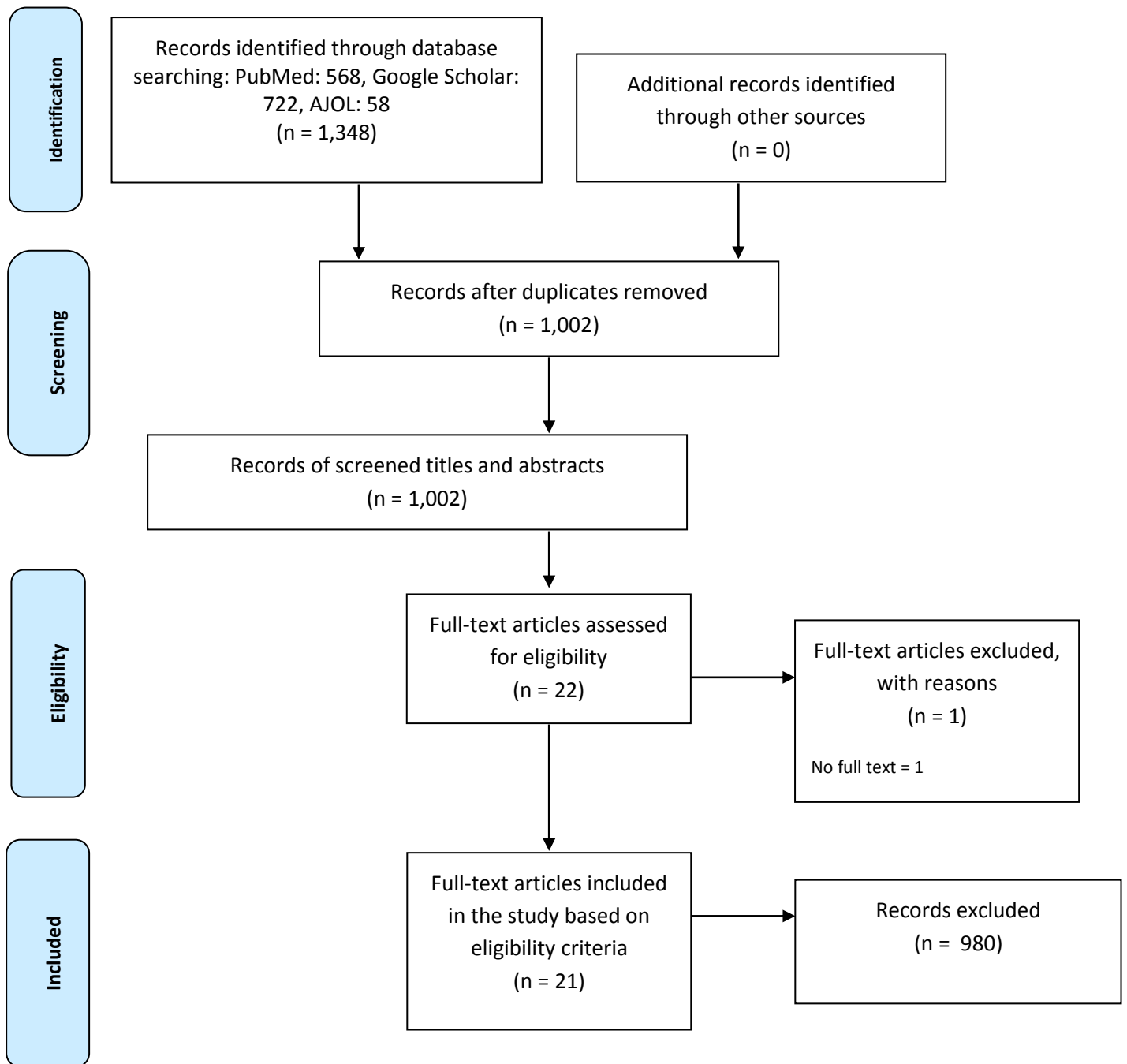


Figure 1. Diagram on data sorting

Table 4. Summary of included articles

Article number	Author(s), Year of publication	Article title	Study location(s) (State(s)); Year of data collection	Study aim(s)	Study design	Nature and size of participants (in Nigeria)	Access to article
1	Adebola et al, 2013 [43]	Awareness of oral cancer in a northwestern Nigerian state: assessing the knowledge, opinion, and practice of traditional healers and herbalists	Kano; not specified	To assess the awareness of oral cancer among the study participants	Cross-sectional	21 traditional healers and herbalists	Open access
2	Adebola et al, 2014 [44]	Awareness and knowledge of oral cancer amongst dental therapists in Nigeria: A pilot study	Not specified; 2013	No access	Cross-sectional	104 dental therapists	Not open access; author supplied us a copy of the article
3	Lawal & Bankole, 2014 [45]	Oral health awareness and practices of primary school teachers in Ibadan, Nigeria	Oyo; not specified	To investigate the oral health awareness and practices of the study participants	Cross-sectional	309 primary school teachers	Open access
4	Ogundipe et al, 2015 [46]	Predictors of knowledge of risk factors of oral cancer among patients seeking dental treatment in a Nigerian tertiary institution	Ondo; 2014-2015	To assess the study participants' level of awareness and knowledge of risk factors of oral cancer	Cross-sectional	103 dental patients	Open access
5	Gbotolorun et al, 2015 [47]	Knowledge, opinions, and practices about oral cancer among general medical practitioners in Lagos, Nigeria	Lagos; not specified	To evaluate the knowledge and practices of the study participants towards oral cancer	Cross-sectional	120 general medical practitioners	Open access

6	Abiodun-Solanke et al, 2016 [48]	Awareness of dental diseases and oral health behaviour among dental and medical students of a Nigerian university	Not specified; not specified	screening To assess the effects of change in curriculum on the oral health knowledge and behaviour among the study participants, and their use of dental services	Cross-sectional	237 medical and dental students	Open access
7	Oyapero et al, 2016 [49]	Knowledge and awareness about oral cancer: A descriptive study in Lagos State	Lagos; not specified	To determine the awareness level about oral cancer among the study participants	Cross-sectional	100 dental patients	Open access
8	Abah & Oyapero, 2017 [50]	Knowledge of predisposing factors to oral cancer among health workers in tertiary health institutions in Lagos, Nigeria- A pilot study	Lagos; not specified	To determine the knowledge of oral cancer among the study participants	Cross-sectional	138 health workers from tertiary health institutions	Open access
9	Adeniyi et al, 2017 [51]	Knowledge of the health consequences of tobacco smoking among Nigerian smokers: A secondary analysis of the Global Tobacco Survey	Not specified (secondary data from the National Bureau of Statistics); 2012	To identify the knowledge and perceived risks of the health consequences of smoking with regard to cancer among the study participants	Cross-sectional	429 adult smokers	Open access
10	Kanmodi et al, 2017 [52]	Oral cancer and oral sex: awareness and practice among nursing students in Ibadan metropolis, Nigeria	Oyo; not specified	To determine the prevalence of oral sex, and explore the level of awareness on oral cancer among the study participants	Cross-sectional	158 nursing students	Not open access; author supplied us a copy of the article
11	Kanmodi &	Does head and	Osun; 2016	To evaluate	Interventional	103	Not

	Fagbule, 2018 [53]	neck cancer (HNC) education have impact on adolescents' knowledge and attitudes towards HNC and HNC peer-education? An example from Nigeria		the impact of HNC school education program on the study participants': knowledge of HNC; and attitudes towards HNC peer education	study	secondary school students	open access; author supplied us a copy of the article
12	Kanmodi et al, 2018 [54]	Prevalence of shisha (waterpipe) smoking and awareness of head and neck cancer among secondary school students: A preliminary survey	Osun; 2016	To determine the prevalence of shisha smoking and also explore the awareness of HNC among the study participants	Cross-sectional	198 secondary school students (in grades 7-12)	Not open access; author supplied us a copy of the article
13	Kanmodi et al, 2019 [55]	Head and neck risk factors among a pilot sample of Nigerian shisha smokers: focus on oral sex, tobacco, alcohol, and knowledge of head and neck cancer	Kebbi; not specified	To determine the prevalence of oral sex and alcohol drinking among the study participants. To also explore the participants' knowledge of HNC and their attitudes toward HNC	Cross-sectional	45 shisha smokers	Open access
14	Lawal & Fagbule, 2019 [56]	Knowledge of school-going adolescents about the oral effects of tobacco usage in Ibadan, Southwest Nigeria	Oyo; not specified	To determine the knowledge of the study participants about the effect of tobacco usage on oral health	Cross-sectional	1,465 secondary school students	Not open access; author supplied us a copy of the article
15	Kanmodi et al, 2019 [57]	Head and neck cancer awareness: a survey of young	Online; not specified	To: determine the level of awareness of HNC;	Cross-sectional	801 youths	Not open access; author

		people in international communities		determine the prevalence of HNC risk factors; and explore the knowledge of HNC risk factors, HNC symptoms, as well as family history of HNC among the study participants			supplied us a copy of the article
16	Kanmodi et al, 2019 [58]	Do college freshmen know about head and neck cancer and its risk factors? Experience from Gwadabawa, Nigeria	Sokoto; 2017	To explore the knowledge level of participants on HNC disease and its risk factors	Cross-sectional	224 first-year health science students in a monotechnic	Open access
17	Kanmodi et al, 2019 [59]	Knowledge of HPV, HPV-induced cancers, and HPV vaccine among a sample of freshmen in a northwestern Nigeria monotechnic	Sokoto; 2017	To explore the knowledge of participants on HPV, HPV-induced cancers and HPV vaccines	Cross-sectional	224 first-year health science students in a monotechnic	Open access
18	Oluwole et al, 2019 [60]	Knowledge, attitude and uptake of human papillomavirus vaccination among female undergraduates in Lagos State, Nigeria	Lagos; not specified	To assess the knowledge, attitude and uptake of HPV vaccine among the study participants	Cross-sectional	384 female polytechnic students	Open access
19	Fagbule et al, 2020 [61]	Knowledge of HPV and HPV vaccine among senior secondary school students in Nigeria: implications on cancer prevention	Osun, Oyo, Bauchi, Sokoto, Edo, Benue; 2016-2018	To determine the prevalence and predictors of knowledge of participants on HPV and HPV vaccines	Cross-sectional	2,530 senior secondary school students	Open access

20	Kanmodi et al, 2020 [62]	strategies, the CHANCE study Knowledge of HPV, HPV-induced cancers , and HPV vaccine among university students in medical laboratory science disciplines: Nigerian study	Kebbi; 2018-2019	To assess the knowledge of HPV, HPV-induced cancers , and HPV vaccine among participants	Cross-sectional	150 laboratory science students in a public university	Open access
21	Kanmodi et al, 2020 [63]	Impact of head and neck cancer (HNC) education on HNC knowledge and attitudes toward HNC peer and non-peer education: a school-based pilot study	Kebbi; not specified	To assess the impact of HNC education on the study participants': knowledge of HNC; and attitudes toward HNC peer and non-peer education	Interventional study	40 senior secondary school students	Not open access; author supplied us a copy of the article
Total	N/A	N/A	N/A	N/A	N/A	7,883	N/A

*Articles which authors only had access to the abstract; N/A – Not applicable

Quality Assessment Outcome

All the included articles were rated "excellent" (70 – 100%), after assessing their quality (Table 5).

Article Types

Of the 21 included articles, 19 were cross-sectional studies while 2 were interventional studies (Table 4). Also, 12 articles were written on oral cancer (OC) while 9 were on head and neck cancer (HNC) (Tables 4 and 6).

Characteristics of the Studied Population Groups

The included articles studied a diverse Nigerian population groups totaling 7,883 people. Two articles surveyed smokers (age range: 15 – 64 years) [51,55], 2 surveyed dental patients (age of majority: 18 – 64 years) [46,49], one surveyed traditional healers and herbalists (age range: 37 – 72 years) [43], 6 surveyed secondary school students (age of majority: <18 years) [53,54,56,61,63], 1 surveyed school teachers (mean (±SD) age: 48.7 (± 5.94) years) [45], 5 surveyed tertiary school students (age of majority: 15 – 30 years) [48,52,58,59,60,62], 1 surveyed youth (age of majority (91%): 12 – 24 years) [57], and 3 surveyed health workers (age: >18 years) [44,47,50] (Table 6).

Awareness Rate of HNC/OC

Only 16 (out of 21) articles determined the awareness rate of HNC/OC among their study participants. The awareness rates of HNC/OC, as recorded in these articles were diverse; the rate was 33.3% (OC) among traditional healers and herbalists [43], 35.5% (OC) among primary school teachers [45], 72.8 – 100% (OC) among clinical science students [48,52], 47.5% (HNC) among secondary school students [54], 30.4% (HNC) among monotechnic freshmen in health science disciplines [58], 0 – 84.5% (OC) among health personnel [44,50], 53.4% – 66% (OC) among dental patients [46,49], 17.8% (HNC) among shisha smokers [55], and 49% (HNC) among the youth [57] (Tables 6 and 7).

Major Sources of Information on HNC/OC

Only 4 articles explored the sources of information regarding HNC/OC among Nigerians. These 4 articles studied diverse population groups (Table 6). The findings from these articles are stated below:

Among Dental Patients: Only two studies (the study by Ogundipe et al. [46] and Oyapero et al. [49]) explored the sources of information on HNC among dental patients; these studies focused on OC. The top three group of sources of information on OC, according to these studies were dental clinic, mass media (television, radio, and bill board), and academic sources (books and lectures).

Among Tertiary School Students: Only one study explored the sources of information on HNC among tertiary school students. The study was conducted among nursing students, by Kanmodi et al. [52], and it focused on OC. In the study, newspaper, lectures, and books were the top three sources of information on OC among nursing students.

Among Health Workers (in General): Only one study explored the sources of information on HNC among health workers. The study was conducted by Abah & Oyapero [50] and it focused on OC. In the study, close to half (44.2%) of the surveyed health workers knew about OC through a dental surgeon.

Knowledge of Risk Factors and Clinical Features of HNC/OC

Overall, the knowledge of HNC/OC risk factors and/or clinical features among the studied population groups was poor. However, the level of knowledge of these thematic areas varies across population groups (Table 6). The findings obtained from these articles are stated below:

Among Traditional Healers and Herbalists: Only one study examined the knowledge of OC risk factors and clinical features among traditional healers and herbalists in Nigeria; the study was conducted by Adebola et al. [43]. The top three OC risk factors known to this category of people, according to Adebola et al. [43], were spiritual/demonic attack (100%), tobacco use (28.6%), and regular consumption of alcohol (28.6%). However, the top three oral

Table 5. Quality assessment of included articles using the Appraisal Tool for Cross-Sectional Studies (AXIS)

Article number	Author(s), Year of publication	Q 1	Q 2	Q 3	Q 4	Q 5	Q 6	Q 7	Q 8	Q 9	Q1 0	Q1 1	Q1 2	Q1 3	Q1 4	Q1 5	Q1 6	Q1 7	Q1 8	Q1 9	Q20	TP
1	Adebola et al, 2013 [43]	a	a	a	a	a	A	a	a	a	a	a	a	a	a	a	a	a	b	c	b	80%
2	Adebola et al, 2014 [44]	a	a	b	a	a	A	b	a	a	a	a	a	c	c	b	a	a	b	c	a	70%
3	Lawal & Bankole, 2014 [45]	a	a	a	a	a	A	a	a	a	a	a	a	c	a	a	a	a	b	b	a	90%
4	Ogundipe et al, 2015 [46]	a	a	a	a	a	a	a	a	a	a	a	a	c	c	a	a	a	b	c	a	85%
5	Gbotolorun et al, 2015 [47]	a	a	b	a	a	a	b	a	a	a	a	a	c	c	a	a	a	b	b	a	85%
6	Abiodun-Solanke et al, 2016 [48]	a	a	a	a	a	a	b	a	b	a	a	a	c	c	a	a	a	b	c	a	90%
7	Oyapero et al, 2016 [49]	a	a	a	a	a	a	a	a	a	a	a	a	c	c	b	a	a	b	b	a	100%
8	Abah & Oyapero, 2017 [50]	a	a	a	a	a	a	a	a	a	a	a	a	c	c	b	a	a	b	b	a	85%
9	Adeniyi et al, 2017 [51]	a	a	a	a	a	a	a	a	a	a	a	a	b	c	a	b	a	b	b	c	85%
10	Kanmodi et al, 2017 [52]	a	a	a	a	a	a	a	a	a	b	a	a	b	b	a	a	a	a	b	a	90%
11	Kanmodi & Fagbule, 2018 [53]	a	a	b	a	a	a	a	a	b	a	a	a	b	a	a	a	a	b	b	a	90%
12	Kanmodi et al, 2018 [54]	a	a	a	a	a	a	b	a	b	a	a	a	b	c	a	a	a	a	b	a	95%
13	Kanmodi et al, 2019 [55]	a	a	a	a	a	a	a	a	a	a	a	a	b	b	a	a	a	a	b	a	95%
14	Lawal & Fagbule, 2019 [56]	a	a	a	a	a	a	b	a	a	a	a	a	c	c	a	a	a	a	b	a	90%
15	Kanmodi et al, 2019 [57]	a	a	a	a	a	a	b	a	b	a	a	a	c	c	a	a	a	a	b	a	85%
16	Kanmodi et al, 2019 [58]	a	a	a	a	a	a	a	a	a	a	a	a	b	a	a	a	a	a	b	a	100%
17	Kanmodi et al, 2019 [59]	a	a	b	a	a	a	a	a	b	c	b	a	b	c	a	b	a	a	b	a	80%
18	Oluwole et al, 2019 [60]	a	a	a	a	a	a	c	a	b	a	a	a	c	c	a	a	a	a	b	a	85%
19	Fagbule et al, 2020 [61]	a	a	a	a	a	a	a	a	b	a	a	a	b	b	a	a	a	a	b	a	90%
20	Kanmodi et al, 2020 [62]	a	a	a	a	a	a	b	a	a	a	a	a	b	b	a	a	a	a	b	a	90%
21	Kanmodi et al, 2020 [63]	a	a	a	a	a	a	a	a	b	a	a	a	b	c	a	a	a	a	b	a	95%

'a' – Yes (5 points each for all 'a's except for Q13 and Q19; zero point each for Q13 and Q19 if 'a'); 'b' – No (zero point each for all 'b's except for Q13 and Q19; 5 point each for Q13 and Q19 if 'b'); 'c' – Do not know/comment (zero point for all 'c's except for Q14 where it carries 5 points); Q1 – Q20 represents the questions in the Appraisal Tool for Cross-Sectional Studies (see Table 5); *Articles which authors only had access to the abstract; TP – Total points scored in percentage (≥70% – Excellent; 60-69% – Very good; 51-59% – Good; 50% – Average; <50% – Poor)

cancer signs and symptoms known to them were burning sensation (33.3%), bleeding and non-healing oral sore (28.6%), and lump/thickening in the cheek that could be felt with the tongue (28.6%). The levels of educational status among this category of people was the only socio-demographic factor, out of other socio-demographic factors (such as age, gender, marital status, ethnicity, and nationality), that was significantly associated with their knowledge of OC: those with informal education

had significantly lesser knowledge of oral cancer than that of their counterparts who had formal education (61.9% versus 19.0%) ($P = 0.012$).

Among Dental Therapists: Only one study examined the knowledge of OC risk factors and clinical features among dental therapists in Nigeria; the study was conducted by Adebola et al [44]. Hot beverages and foods (94.2%), tobacco use (89.4%), and alcohol use (77.9%) were the top three OC risk factors known to this category of people, according to Adebola et al [44]. The top three OC signs and symptoms known to them were bleeding and non-healing oral sore (76.0%), numbness of the tongue/other area of the mouth (72.1%), and white or red oral patch (69.2%). Only 56.3% of them knew about the OC diagnostic procedures, 65.4% felt that their knowledge of OC is insufficient, and 59.6% of the respondents would like to receive a lecture on OC.

Among Primary School Teachers: Only one study examined the knowledge of OC risk factors and clinical features among primary school teachers in Nigeria; the study was conducted by Lawal & Bankole [45]. In their study, only 0.3% of their respondents knew at least one OC risk factor.

Among Dental Patients: Only two studies examined the knowledge of OC risk factors among Nigerian patients; and these two studies were conducted among dental patients. In the study of Oyapero et al. [49], the top three OC risk factors known to dental patients were marijuana smoking (73%), smoking of cigarette, cigar or pipe (72%), and human papillomavirus (55%). Also, only 28% of these patients were categorized to have 'high' knowledge of OC risk factors.

Ogundipe et al. [46] explored the predictors of having good knowledge of OC among dental patients. In their study, they found that 'exposure to tertiary school education', 'being a current non-smoker', and 'having correct belief about OC' were positive predictors of having good knowledge of OC.

Among General Medical Practitioners (GMPs): Only one study explored the knowledge of a specific group of health workers in Nigeria on OC risk factors and clinical features. The study was conducted among GMPs by Gbotolorun et al [47]. In their study, oral sex (99%), age ≥ 45 years, and smoked tobacco (96.1%) were the top three OC risk factors known to the respondents. The majority (81.1%) of them identified the floor of the mouth and the tongue as the most common sites of OC. Also, 75.6% of them identified leukoplakia as an OC precursor. Only 0.8% of them had a consistent high score in the 2 indexes used in grading their knowledge of the risk factors and clinical features of OC.

Among Health Workers (in General): Only one study examined the knowledge of OC risk factors among a mixed population of health workers. The study was conducted by Abah & Oyapero [50]. In their study, cigarette smoking, pipe smoking, and family history of OC were the top three OC risk factors known to them. Dentists, when

compared with other groups, were found to have higher mean scores in most of the domains explored for OC risk factors.

Among Tertiary School Students: Only five studies examined the knowledge of HNC/OC risk factors and clinical features among tertiary students. These articles were conducted by Kanmodi et al. [52], Kanmodi et al. [58], Kanmodi et al. [59], Kanmodi et al. [62], and Oluwole et al. [60].

In the study conducted among nursing students [52], it was found that hereditary factor (33.3%), cigarette smoking (26.2%), and mouth sore (26.2%) were the three most commonly known OC risk factors among them. Furthermore, the three most commonly known OC symptoms among those of them that were aware of OC were ulcer/sore (86.1%), mouth swelling/lump (74.8%), and soft tissue discoloration (64.3%)

Two studies were conducted on monotechnic freshmen [58,59]. In the first study [58] conducted among monotechnic freshmen in health science disciplines, it was found that human papillomavirus (36.8%), smoking (23.5%) and poor tooth brushing (23.5%) were the top three HNC etiological/risk factors known to those among them that were aware of HNC. Furthermore, 39.7% (27/68) of them erroneously believed that HNC is a contagious disease while 16.2% (11/68) erroneously believed that early diagnosis of HNC does not improve recovery from HNC. However, in the second study [59] conducted among monotechnic freshmen in health science disciplines, it was found that only 29.0% of these freshmen have heard of HPV, of which the majority (72.3%) of them believed that HPV can cause HNC.

In the study conducted by Kanmodi et al. [62] on students in medical laboratory science disciplines in a Nigerian university, only 45.3% (68/150) of this category of participants were aware of HPV. Among this category of respondents, only 20.6% knew that HPV causes HNC.

In the study conducted by Oluwole et al. [60] on female undergraduates in a Nigerian polytechnic, only 6.3% of the participants knew that HPV can cause OC

Among Secondary School Students: Only two survey articles (cross-sectional studies) examined the knowledge of HNC/OC risk factors among secondary school students in Nigeria. These studies were conducted by Lawal & Fagbule [56], and Fagbule et al. [61]. In the study by Lawal & Fagbule [56], only 0.1% (2/1465) of their survey respondents knew that tobacco can cause OC. However, in the study by Fagbule et al. [61], only 23.0% (583/2530) of the survey respondents were aware of HPV (HPV is an etiological factor of HNC), of which only 48.9% (285/583) of them knew that HPV can cause HNC.

Among Youth: Only one study specifically examined the knowledge of HNC risk factors and clinical features among the Nigerian youth. The study was conducted by Kanmodi et al. [57]. In the study, only 66% of the surveyed youth whom were aware

Table 6. Key findings (on head and neck cancer literacy) of included articles

Article number	Author(s), Year of publication	Key findings of included articles, with relevance to head and neck cancer
1	Adebola et al, 2013 [43]	a) The age of the surveyed traditional healers and herbalists ranged from 37 to 72 years with a mean ($\pm$SD) of 49.4 ($\pm$9.8) years b) Awareness rate of OC among the respondents was 33.3%. None of the respondents was aware of OC examination c) The top three OC risk factors known to the respondents were spiritual/demonic attack (100%), tobacco use (28.6%), and regular consumption of alcohol (28.6%). d) The top three OC signs and symptoms known to the respondents were burning sensation (33.3%), bleeding and non-healing oral sore (28.6%), and lump/thickening in the cheek that could be felt with the tongue (28.6%) e) The levels of respondents' educational status was the only socio-demographic factor, amidst other socio-demographic factors (such as age, gender, marital status, ethnicity, and nationality) that was significantly associated with their knowledge of OC f) Respondents with informal education had significantly lesser knowledge of OC than that of their counterparts who had formal education (61.9% versus 19.0%) ($P = 0.012$).
2	Adebola et al, 2014 [44]	a) The age of the surveyed dental therapists ranged from 20 to 55 years, with a mean ($\pm$SD) of 31.5 ($\pm$8.84) years b) None of the respondents had ever heard of OC c) The top three oral cancer signs and symptoms known to the respondents were bleeding and non-healing oral sore (76.0%), numbness of the tongue/other area of the mouth (72.1%), and white or red oral patch (69.2%) d) Hot beverages and foods (94.2%), tobacco use (89.4%), and alcohol use (77.9%) were among the three oral cancer risk factors known to the respondents e) Only 56.3% of the respondents knew about the OC diagnostic procedures they were asked about f) 65.4% of the respondents felt that their knowledge of OC is insufficient g) 59.6% of the respondents would like to receive a lecture on OC
3	Lawal & Bankole, 2014 [45]	a) The mean ($\pm$SD) age of the surveyed primary school teachers was 48.7 ($\pm$ 5.94) years b) Only 35.5% of the respondents had ever heard of OC c) Only 0.3% of them knew at least one OC risk factor
4	Ogundipe et al, 2015 [46]	a) The mean ($\pm$SD) age of the surveyed dental patients was 35 ($\pm$13.4) years b) Only 53.4% of the respondents had ever heard of OC c) Dental clinic (32.7%), television (29.1%), and radio (9.1%) were the top three sources of information on OC among those respondents who were aware of oral cancer d) The predictors of having good knowledge of OC among those respondents who were aware of oral cancer were 'exposure to tertiary school education', 'being a current non-smoker', and 'having correct belief about oral cancer'
5	Gbotolorun et al, 2015 [47]	a) The age of the surveyed general medical practitioners ranged from 22 to 61 years, with the mean ($\pm$SD) of 36.1 ($\pm$7.97) years b) Only 8.7% of the respondents had received training on OC screening after bagging a medical degree c) All of them had received training on oral cancer while in medical school d) Oral sex (99%), age $\geq$45 years, and smoked tobacco (96.1%) were the top three OC risk factors known to the respondents e) 81.1% of them identified the floor of the mouth and the tongue as the most

		common sites of OC
		f) 75.6% of them identified leukoplakia as an OC precursor
		g) Only 0.8% of them had a consistent high score in the 2 indexes used in grading their knowledge of the risk factors and clinical features of OC
6	Abiodun-Solanke et al, 2016 [48]	a) The surveyed dental and medical students ranged from 19 to 30 years with a mean ($\pm$ SD) of 21.5 ($\pm$ 2.2) years
		b) 100% and 94.7% of the surveyed dental and medical students, respectively, knew about OC
7	Oyapero et al, 2016 [49]	a) The age of the majority (83%) of the surveyed dental patients ranged from 18 to 64 years
		b) 66% of the surveyed dental patients had heard of OC before. Only 18.2% had heard of OC test
		b) Bill board (38%), newspaper (24%), and television (14%) were the top three sources of information on OC among the respondents who were aware of OC
		c) The top three OC risk factors known to the respondents were marijuana smoking (73%), smoking of cigarette, cigar or pipe (72%), and human papillomavirus (55%)
		d) Only 28% of the respondents were categorized to have 'high' knowledge of OC risk factors
8	Abah & Oyapero, 2017 [50]	a) The age of the majority (97.1%) of the surveyed health workers ranged from 21 to 60 years
		b) Only 84.5% of the respondents had heard of OC before. 44.2% of the surveyed health workers got this information from a dentist
		c) Cigarette smoking, pipe smoking, and family history of OC were the top three OC risk factors known to the respondents
		d) Dentists were found to have higher mean scores in most of the domains explored for OC risk factors
9	Adeniyi et al, 2017 [51]	a) The age of the majority (95.1%) of the surveyed smokers ranged from 15 to 64 years
		b) Only 34% of the respondents knew that tobacco smoking can cause OC
		c) Bivariate analysis showed that gender was the only analyzed socio-demographic characteristic that was statistically significant with the respondents' knowledge of tobacco smoking as an OC risk factor. A higher proportion of the male smokers knew of this risk factor when compared with their female counterparts
10	Kanmodi et al, 2017 [52]	a) The age of the majority (92.4%) of the surveyed nursing students ranged from 15 to 35 years
		b) The majority (72.8%, n=115) of them were aware of OC; lectures (52.2%), books (43.5%), and newspapers (20.0%) were the top three sources of information regarding OC among them. Furthermore, hereditary factors (33.3%), cigarette smoking (26.2%), and mouth sore (26.2%) were the three most commonly known OC risk factors among this category of respondents
		c) The three most commonly known OC symptoms among those respondents that were aware of oral cancer (n=115) were ulcer/sore (86.1%), mouth swelling/lump (74.8%), and soft tissue discoloration (64.3%)
11	Kanmodi & Fagbule, 2018 [53]	a) The mean ($\pm$ SD) age of the studied secondary school students was 13.89 ($\pm$ 1.01) years
		b) HNC education significantly improved the mean knowledge scores of the studied subjects on HNC etiology/risk factors and HNC symptoms
		c) HNC education significantly increased the number of the subjects who showed willingness to educate their peers about HNC
		d) 92.2% of the studied subjects enjoyed the HNC education session – the

		intervention offered to them
12	Kanmodi et al, 2018 [54]	a) The majority (95.9%) of the surveyed secondary school students were aged ≤ 18 years b) Only 47.5% of the respondents had heard of HNC before c) The majority (81.8%) of the respondents would like to receive a comprehensive education on how to prevent HNC in future
13	Kanmodi et al, 2019 [55]	a) The mean ($\pm$ SD) age of the surveyed shisha smokers was 25.8 ($\pm$ 5.5) b) Only 17.8% of the surveyed respondents had heard of HNC c) The majority (73.3%) of the respondents would like to receive a comprehensive education on HNC
14	Lawal & Fagbule, 2019 [56]	a) The mean ($\pm$ SD) age of the surveyed school-going adolescents was 15.2 ($\pm$ 1.4) years b) Only 0.1% (2/1465) of the survey respondents knew that tobacco can cause OC
15	Kanmodi et al, 2019 [57]	a) The majority (91%) of the surveyed youths were within the age range of 12 – 24 years b) Only 49% of the survey respondents had ever heard of HNC c) Among those respondents that were aware of HNC, 66% of them knew that HNC is not a contagious disease; 69% believed that early diagnosis improves recovery from head and neck cancer; 24% believed that HNC is more common among people aged >40 years d) The majority (76%) of the survey respondents were positively disposed towards knowing more about HNC disease
16	Kanmodi et al, 2019 [58]	a) The mean ($\pm$ SD) age of the surveyed monotechnic freshmen was 22.04 ($\pm$ 3.42) years b) Only 30.4% of the surveyed respondents were aware of HNC; human papillomavirus (36.8%), smoking (23.5%) and poor tooth brushing (23.5%) were the top three HNC etiological/risk factors known to this category of respondents (i.e. those that were aware of HNC). Furthermore, 39.7% (27/68) of them were found to erroneously believe that HNC is a contagious disease while 16.2% (11/68) were found to erroneously believe that early diagnosis of HNC does not improve recovery from HNC c) Only 12.9% of the surveyed respondents had ever received education on HNC self-examination
17	Kanmodi et al, 2019 [59]	a) The mean ($\pm$ SD) age of the surveyed monotechnic freshmen was 22.04 ($\pm$ 3.42) years b) Only 29.0% of the respondents have heard of HPV, of which the majority (72.3%) of them believed that HPV can cause HNC
18	Oluwole et al, 2019 [60]	a) The age of all the surveyed female polytechnic undergraduates ranges from 17 to 25 years, and their mean ($\pm$ SD) age was 21.3 ($\pm$ 2.0) years b) Only 6.3% of the respondents knew that HPV can cause OC
19	Fagbule et al, 2020 [61]	a) The age of the majority (93.7%) of the surveyed senior secondary (high) school students ranged from 10 to 19 years with mean ($\pm$ SD) age of 16.4 ($\pm$ 2.0) years b) Only 23.0% (583/2530) of the survey respondents were aware of HPV (HPV is an etiological factor of HNC). Among this category of respondents, only 48.9% (285/583) of them knew that HPV causes HNC
20	Kanmodi et al, 2020 [62]	a) The majority (96.7%) of the surveyed university students (in medical laboratory science disciplines) were within the age range of 15 to 29 years b) Only 45.3% (68/150) of the respondents were aware of HPV (HPV is an etiological factor of HNC). Among this category of respondents, only 20.6% knew that HPV causes HNC
21	Kanmodi et al, 2020 [63]	a) The mean ($\pm$ SD) age of the studied senior secondary school students was 17.13 ($\pm$ 1.604) years

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- b) HNC education was found to largely improve the subjects' knowledge (of HNC etiology and symptoms) and attitude toward peer (schoolmates, friends, and siblings) and non-peer (parents) education on HNC
 - c) The majority (92.5%) of the study subjects reported that they gained new knowledge about HNC from the HNC education they received while 95% reported that were enthusiastic toward attending the next HNC education program to be held in their school in future
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OC – Oral cancer; HNC – Head and neck cancer; HPV – Human papillomavirus

of HNC knew that HNC is not a contagious disease, 69% of them believed that early diagnosis improves recovery from HNC, and 24% believed that HNC is more common among people aged >40 years

Among Smokers: Only one study specifically examined the knowledge of OC risk factors among Nigerian smokers. The study was conducted by Adeniyi et al. [51]. In their study, only 34% of their respondents knew that tobacco smoking can cause OC. Bivariate analysis showed that gender was the only socio-demographic characteristic that was statistically significant with the respondents' knowledge of tobacco smoking as an OC risk factor: a higher proportion of the male smokers knew of this risk factor when compared with their female counterparts.

Education on HNC/OC: History of Receipt, Attitude towards its Receipt, and Impact of its Receipt

Only 6 studies explored the aspects of HNC/OC education among Nigerians. The aspects explored were: history of receipt of HNC/OC education (2 articles); attitude towards the receipt of HNC education (5 articles); and impact of the receipt of HNC education among Nigerians (2 articles). These studies were conducted among GMPs, secondary school students, shisha smokers, and youth (Table 6).

History of Receipt of HNC/OC Education: The two studies that explored the history of receipt of HNC/OC education among Nigerians were conducted by Gbotolorun et al. [47] and Kanmodi et al. [58], among GMPs and monotechnic freshmen, respectively. Among the surveyed GMPs, only 8.7% of them had received training on OC screening after bagging a medical degree while all had received training on oral cancer while in medical school. Meanwhile, among the surveyed monotechnic freshmen, only 12.9% of them had ever received education on HNC self-examination.

Attitude towards the Receipt of HNC Education: Of the 5 studies exploring the attitudes of Nigerians towards the receipt of HNC education, 3 were surveys while 2 were interventional studies. Three studied secondary school students, one studied shisha smokers, and one studied the youth.

The two interventional studies were conducted among secondary school students, and they were conducted by Kanmodi & Fagbule [53], and Kanmodi et al. [63]. In the first study [53], it was observed that HNC education significantly increased the number of the subjects who showed willingness to educate their peers about HNC, and 92.2% of the studied subjects enjoyed the HNC education session – the

intervention offered to them. However, in the second study [63], HNC education was found to largely improve the subjects' attitude toward peer (schoolmates, friends, and siblings) and non-peer (parents) education on HNC. Also, 95% of their subjects reported that were enthusiastic toward attending the next HNC education program to be held in their school in future.

Table 7. Awareness rate of HNC/OC per specific population group

Specific population group	Awareness rate of HNC/OC
Traditional healers and herbalists	33.3% (OC) [43]
Primary school teachers	35.5% (OC) [45]
Monotechnic students (in health science disciplines)	30.4% (HNC) [58]
Dental students	100% (OC) [48]
Medical students	94.7% (OC) [48]
Nursing students	72.8% (OC) [52]
Secondary school students	47.5% (HNC) [54]
Health workers	84.5% (OC) [50]
Dental therapists	0% (OC) [44]
Dental patients	53.4% – 66% (OC) [46,49]
Shisha smokers	17.8% (HNC) [55]
Youth	49% (HNC) [57]

OC – Oral cancer; HNC – Head and neck cancer

The three surveys were conducted among youth, shisha smokers, and secondary school students by Kanmodi et al. [57], Kanmodi et al. [55], and Kanmodi et al. [54], respectively. Majority (76%) of the surveyed youth were positively disposed towards knowing more about HNC disease; majority (73.3%) of the surveyed shisha smokers reported that they would like to receive a comprehensive education on HNC; and majority (81.8%) of the surveyed secondary school students would like to receive a comprehensive education on how to prevent HNC in future.

Impact of Receipt of HNC Education on Knowledge of HNC: Only two studies explored the impact of HNC education among Nigerians; these two studies were interventional studies conducted among secondary school students, by Kanmodi & Fagbule [53], and Kanmodi et al. [63]. The first study, by Kanmodi & Fagbule [53], observed that HNC education significantly improved the mean knowledge scores of the studied subjects on HNC etiology/risk factors and HNC symptoms. The second study, by Kanmodi et al. [63], observed that HNC education was found to largely improve the subjects' knowledge (of HNC etiology and symptoms). Furthermore, the majority (92.5%) of the study subjects reported that they gained new knowledge about HNC from the HNC education they received while 95% reported that they were enthusiastic toward attending the next HNC education program to be held in their school in future.

Discussion

Due to many unfavorable factors, such as high level of ignorance on HNC among the public (i.e. HNC illiteracy), high prevalence rate of major HNC risk factors, late

presentation of HNC patients at hospitals, presence of co-morbidities among those living with HNC, dearth of experts in the field of HNC research, prevention and cure, lack of effective national policies on HNC prevention and control, etc., the burden of HNC has been persistently heavy on Nigeria [31, 38-42,66-71]. There is an urgent need to proffer workable and sustainable public health solutions towards the eradication of HNC burden in Nigeria. One of the very laudable and economical public health approaches that can be adopted in reducing this burden is through HNC education [66-69]. However, before this can be done, it will be very needful to first assess the level of knowledge of the Nigerian public on HNC; pertinently, there is no nationally representative survey data that has explored this thematic area – HNC literacy – in Nigeria. A panacea to this data problem is to conduct a systematic review of existing literatures on HNC literacy in Nigeria. The above issues birthed this study.

Our study findings are noteworthy. Majority of the studies reviewed were focused on HNC general; the remaining other studies were specific – they focused on OC. The majority of the people surveyed on HNC/OC were within the 2nd and 6th decades of life. This shows that the populations studied were somewhat well-representative. Based on 2019 statistics, about 64.5% of the total Nigerian population is within the 2nd and 6th decades of life [72]. On a general note, the awareness rate of HNC/OC among the surveyed Nigerians was low. However, we found that the awareness rates on HNC/OC among the health workers and trainees, with the exception of dental therapists, to be fairly higher than that recorded among the lay public. It is quite very surprising that none of the surveyed dental therapists was aware of OC. The oral cavity is the primary area of jurisdiction of dental therapists, as per clinical care of patients. The training of dental therapists in Nigeria spans a minimum period of 4 years. In the course of their training, they are taught on the biology and pathology of the mouth; hence, they are supposed to be aware of OC.

The major sources of information regarding HNC/OC among Nigerians were the mass media, academic sources, and the dentists. This suggests that the major sources of information on HNC/OC available to Nigerians are quite genuine. However, not all sources of information on HNC/OC, available to Nigerians, may be genuine especially during this current era of information technology where diverse information “fly” online [73,74].

The knowledge of HNC/OC etiological/risk factors and clinical features among Nigerians was found to be generally low and inadequate. In fact, some Nigerians were found to have misconceptions about OC etiological/risk factors, as some of them implicated spiritual factor to be an OC etiological/risk factor. However, tobacco use and oral sore were found to be the most commonly known HNC/OC etiological/risk factors and clinical features, respectively, among Nigerians. Importantly, we found that having higher educational status is closely associated with having knowledge about OC. This suggests that the Nigerian population with lower educational status is more likely to be unaware of HNC. Based on this finding, we

recommend that intense efforts should be made towards educating the Nigerian population with more focus on the less literate population.

Only very limited data is available on the educational history of Nigerians regarding HNC/OC. However, available studies suggest that health professionals and trainees in Nigeria, at some point in their training, have been educated on HNC/OC. Among the lay public, studies had shown that many of them are enthusiastic towards receiving an education on HNC/OC – this is a very positive observation among Nigerians that must be utilized judiciously. Hence, we recommend that massive HNC educational programs should be launched and implemented in Nigeria so as to achieve 100% HNC literacy in Nigeria. Meanwhile, there had been laudable reports of the impact of school-based HNC education programs conducted by some researchers in Nigeria. In these reports, it was found that HNC education was a very interesting intervention enjoyed by students; also, it was reported that such intervention significantly improved students' knowledge about HNC as well as their attitude towards educating others (peers and non-peers) about HNC. Based on these observations, it can be recommended that similar approaches used in educating the school communities should be adopted to educate other community types on HNC.

However, this study has its limitations. First, this study only reviewed online articles in which the author has access to their full texts. Data from prints-only articles were not captured in the study. Second, many of the reviewed studies did not deeply explore the knowledge of their study participants on the etiological/risk factors and clinical features of HNC.

Notwithstanding these limitations, this study is believed to be the first systematic review on HNC literacy in Nigeria. Also, this study gives an overview on HNC literacy in Nigeria and provided noteworthy insights needed for the planning and implementation of proper HNC education campaigns in Nigeria.

Conclusion

The level of knowledge regarding HNC, in Nigeria, is low; however, many people are willing to know more about the disease. Hence, the use of relevant health education programs to boost public knowledge about HNC is highly recommended.

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