Knowledge and Practices Regarding Oral Hygiene, Cariogenic Diet Intake, and Dental Check-Ups Among Registered Nurses in Nigeria: A Pilot Study

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Abstract

Objectives To investigate the knowledge and practices of registered nurses in Nigeria concerning oral hygiene, cariogenic diets, and dental check-ups through a pilot study.

Methods This study was an online survey of 129 registered nurses in Nigeria. Data were collected via the WhatsApp social media using an electronic questionnaire (Google form). Data analysis was done using the SPSS version 26 software (IBM Corp, New York, USA).

Results The response and completeness rates of this pilot study were 41.7% (129/311) and 96.9% 9125/129), respectively. The majority (62.2%) of the respondents were females. The majority (89.1%) had average/above average score on basic oral health knowledge; however, there was no significant relationship between their level of basic oral health knowledge and their sociodemographic characteristics ($p > 0.05$). The majority (66.7%) of the respondents brushed twice daily, 86.8% used a fluoridated toothpaste, and 60.5% changed their toothbrush every 3 months. Furthermore, more than half (55.8%) consumed sugary snack/drink on daily basis, while 55.0% rinsed their mouth with water immediately after taking sugary snack, and only 55.8% did floss their teeth. Among those who flossed their teeth, only 37.5% did it once daily. It is also striking that 26.4% of the respondents had never visited a dentist for a dental check-up.

Conclusion Study findings showed a high level of basic oral health knowledge and a lower level of appropriate oral self-care practices among nurses in Nigeria. However, there is a need for a nationally representative study of nurses in Nigeria to further establish these findings.

Keywords
- oral hygiene
- knowledge
- practice
- nurse
- Nigeria

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Introduction

The mouth is the gateway, window, and mirror of the human body.[1] Healthy practices, such as good oral hygiene measures, regular dental check-ups, and healthy diets play a very crucial role in good oral health maintenance.[2–17] Oral hygiene measures such as daily tooth brushing, interdental cleaning, and tongue scraping help to remove oral plaque, pathogenic microbial load, and halitosis, and massage the salivary glands and gingivae.[5–9] Regular dental check-ups enhance the early detection and prompt prevention and treatment of oral diseases (oral cancer, dental caries, etc.).[14–17] Healthy diets nourish the body and protects the body from chronic nutrition-related diseases, which have devastating oral disease manifestations.[18] Foods rich in appropriate quantities of micronutrients, vitamins, and proteins build the body immunity against oral infections and enhance the growth, development, functioning, and repair of oral tissues.[18]

However, in a situation where the hygienic condition of the mouth is poor, the oral cavity and the body systems stand at higher risk of acquiring diseases.[3,10–12] For example, local oral infections—such as dental caries, periodontitis, and oral cancer—and systemic diseases—such as infective endocarditis, and cerebrospinal meningitis—have been strongly associated with poor oral hygiene.[10–12]

Also, the frequent consumption of cariogenic diets such as chocolates, candies, and sugar drinks cause dental caries.[13]

It has been observed that people's understanding and behaviors toward oral health plays a very crucial role in determining their oral health status.[19–28] In Nigeria, several studies have been conducted amongst different population groups to explore their knowledge, attitudes, practices, and status (KAPS) concerning oral hygiene, cariogenic diet, and dental check-up[19–28]; however, only very few of these studies were conducted among nurses.[26–28] From these few studies, it was observed that the prevalence of dental caries experience and poor oral hygiene practices is significantly high among nurses.[26–28] For example, in a hospital-based survey in Jos City (North-central Nigeria), by Idowu et al,[26] the prevalence of dental caries among nurses was 43.8%.[26] Also, only a minority of them had good oral hygiene status (22.7%), flossed their teeth (10.4%), used medium-textured toothbrush (33.1%), and brushed twice per day (31.9%).[26] In another hospital-based survey of nurses in Benin City (South-southern Nigeria), by Azodo et al,[27] only 28.1% of the surveyed nurses had good knowledge of common oral diseases. Pertinently, to the best of the authors' knowledge, none of these studies investigated the KAPS of nurses in Nigeria concerning issues pertaining to cariogenic diets and dental check-ups.[26] Also, all the known literature were reports of single center studies.

Nurses are frontline healthcare workers in Nigeria, and they are being consulted by people, particularly at the community level, for oral health care. This shows that the importance of a nurse's KAPS concerning oral health care cannot be overemphasized—as they are expected to stay healthy and be at the frontline delivery healthcare services to the populations.[29,30] It is therefore imperative to know the KAPS of nurses concerning oral healthcare, particularly on cariogenic diets and dental check-ups, as this knowledge will provide insights concerning these issues among nurses in Nigeria.

To date, there is no known multi-center study on the KAPS concerning oral health among nurses in Nigeria. There is a need to investigate this phenomenon among nurses at a large scale, involving multiple centers. To achieve this, it is intuitive to first conduct a pilot multi-center study. Pilot studies helps to determine/test the feasibility of participant recruitment process and data collection and analysis approaches to be used for a bigger research project.[31] It also helps to identify beforehand a broad range of issues and challenges associated with a research design.[31] Therefore, this current research—an online multi-center pilot study—aims to investigate the knowledge and practices of registered nurses in Nigeria concerning oral hygiene, cariogenic diets, and dental check-ups. Importantly, the findings obtained from this pilot study will provide deep insights and inform the planning and implementation of larger surveys on the KAPS concerning oral health among nurses in Nigeria.

Methods

This pilot study was an online survey of registered nurses in Nigeria; this study also forms a part of a wider collaborative research projects of the Cephas Health Research Initiative Inc., Nigeria.[29,30] Approval to conduct the project was obtained from the Research Committee, Department of Community Health, Aminu Musa Habib College of Health Science and Technology, Yauri, Nigeria.

The study instrument was an anonymous electronic-based questionnaire (a Google form) which was adapted from an existing questionnaire.[32] The questionnaire was then assessed by the research team and other public health experts for face validity, and then tested on five dental surgeons before its use in this pilot study. The questionnaire had three sections. The first section obtained information about their sociodemographic characteristics. The second section assessed their knowledge on oral health (focusing on oral hygiene, cariogenic diets, and dental check-up) through a set of 14 structured questions (►**Table 1**).[2,32–44] Lastly, the third section obtained information concerning their oral health practices.

Being a pilot study, a convenient sample size of 120 registered nurses was considered appropriate for the study.

A total of 311 registered nurses were invited electronically, via a link posted on their WhatsApp chat groups, to participate in this study. They were all informed about the aims and objectives of the study; they were also informed that their participation was completely anonymous and voluntary. Only 129 registered nurses responded to the questionnaire, they all gave their informed consent, electronically, before participation. Their participation was completely voluntary and anonymous.

The data collected were analyzed using the Statistical Package for Social Sciences (SPSS) version 26 software (IBM Corp, New York, USA). Descriptive statistics was used to

Table 1 Questions used to test the respondents' knowledge of oral health

S/N	Oral Health Knowledge Questions	Correct Response
1	Oral hygiene is a set of practices aimed at keeping one's mouth clean and free of disease and other problems	True[33]
2	How many times should the teeth be brushed in a day	After meals[34–36]
3	How often should a toothbrush be changed	Every 3 months[40]
4	What kind of toothbrush is suitable for healthy people?	Medium texture[42]
5	At what age should dental flossing commence?	As soon as there is contact between the teeth[32]
6	When should flossing be done during the day?	After meals[32]
7	What should be done after eating refined carbohydrates?	Brush teeth[36]
8	How often is checkup for dental caries necessary?	Once a year[41]
9	Concerning the efficacy of brushing, which of these statements is correct?	Tooth brushing alone is not enough, use dental floss[33]
10	Do you know that poor oral hygiene is a risk factor of oral cancer?	Yes[2]
11	Do you know that poor oral hygiene is a risk factor of rheumatic heart disease?	Yes[37]
12	Do you know that poor oral hygiene is a risk factor of halitosis (bad breath)?	Yes[38]
13	Do you know that poor oral hygiene is a risk factor of periodontal diseases (e.g., gingivitis, pregnancy epulis, etc.)?	Yes[39]
14	Do you know that poor oral hygiene is a risk factor of pre-eclampsia?	Yes[43,44]

summarize all sociodemographic and outcome variables. Particularly, the assessment of the respondents concerning their knowledge of oral health was determined using knowledge scores. A score of one was given to each of the correct responses provided by the respondents to those questions assessing their oral health knowledge (►**Table 1**). The cumulative scores of each respondent were determined. The highest obtainable score was 14 while 0 was the lowest obtainable score. A cumulative score below 7 was considered to be below average score, while a cumulative score of 7 or above was considered to be an average or above average score. Bivariate analysis of variables was done using Chi-square and Fisher's exact tests. The findings obtained from the statistical analysis were presented in texts, tables, and a chart.

Results

This study had a response rate of 41.7% (129/311) and a completeness rate of 96.9% (125/129). The majority (77.5%) of the respondents were Christians, 64.3% were single, 62.2% were females, 43.4% were in the age range of 25 to 29 years, 51.9% were practicing in a public setting, and 89.9% were within their first to ninth years of nursing practice (►**Table 2**).

Ninety-one percent (91%) of the respondents had received oral health training (►**Fig. 1**). The majority (89.1%) of the respondents had average/above average score in their oral health knowledge assessment (►**Table 3**). There was no statistically significant relationship between oral health knowledge and the respondents' sociodemographic characteristics and status on oral health training history (►**Table 3**).

The majority (66.7%) of the respondents brushed twice daily, 46.5% brushed in the morning before meal, 86.8% used a fluoridated toothpaste, and 60.5% changed their toothbrush every 3 months. Furthermore, a little above half (55.8%) of the respondents consumed sugary snack/drink on daily basis, 55.0% rinsed their mouth with water immediately after taking sugary snack, and only 55.8% flossed their teeth. Among those who flossed their teeth, only 37.5% did it once daily. Also, 26.4% of the respondents had never visited a dentist for a dental check-up. From the bivariate analysis, there was no statistically significant relationship between the participants' gender and their oral hygiene and dietary practices (►**Table 4**).

Discussion

The findings obtained in this study are interesting and of dental public health importance. To start with, the response and completeness rates recorded in this study were low. However, this is not too surprising because online surveys, unlike paper-based surveys, usually have lower response and higher completeness rates.[45] Based on existing evidence, it can be suggested that the low response rate in this study may be because the nurses invited for the study were very busy, not interested in participating, or not highly digitally savvy.[46,47]

The majority of the respondents reported that they had received training on oral health. However, from the assessment of their basic oral health knowledge, it was observed that an history of oral health training did not have any significant impact on their basic knowledge of oral health. Furthermore, from the inter-group comparison of those who

Table 2 Sociodemographic characteristics of respondents

Variables ($N = 129$)	Frequency	Percentage (%)
Age (y)		
20–24	17	13.2
25–29	56	43.4
30–34	36	27.9
35–39	13	10.1
40 & above	7	5.4
Gender		
Male	49	48.0
Female	80	62.0
Marital status		
Single	83	64.3
Married	45	34.9
Divorced	1	0.8
Religious inclination		
Christianity	100	77.5
Islam	27	20.9
Atheist/others	2	1.6
Years of practice		
1–9 years	116	89.9
$\geq$ 10 years	13	10.1
Place of practice		
Public sector	67	51.9
Private sector	47	36.4
Not currently practicing	15	11,6

had oral health training and those who had not, it was found that some of those who claimed to have such training scored below average in the assessment. Many factors might be responsible for this; it might be possible that those who scored below the average mark received such training long time ago and they had forgotten or the training they received was of poor quality.[27,48] Therefore, it is recommended that more needs to be done in ensuring the frequency and quality of basic oral health training received by nurses is of consistent and good.

The oral hygiene practices among nurses are still an issue of deep problematic concern,[26,28–30] and the findings obtained in this present study corroborates this fact. Although many of the surveyed nurses surveyed reported good oral hygiene practices, the proportion with poor oral hygiene practices is still significant—although not statistically significant—when viewed from the lens of dental public health. For example, close to four-tenth of the participating nurses in this survey only brushed their teeth once a day; this prevalence is relatively lower than that reported (40.9%) among a sample of surveyed nurses in Israel.[49]

Furthermore, only a minority (46.5%) of the respondents brushed in the morning, before meal, and in the night, before bed. This interprets that many of them did not follow the ideal oral care practice.[33–36] Meanwhile, on the contrary, a whooping proportion of them used fluoridated toothpaste, which is very impressive. A fluoridated toothpaste is a known protective agent used for dental caries prevention.[33,50] Unfortunately, the reported prevalence rate of dental caries (>60%) and poor toothbrushing practices (>40%) among Nigerian nurses is high.[26,28] Based on the available evidence, it can be affirmed that nurses in Nigeria constitute a high-risk population group[26,28]; therefore, it is

Fig. 1 History of oral health training among the respondents.

Table 3 Respondents' background characteristics and knowledge of oral health

Variables ($N = 129$)	<Average score** (%)	≥Average score*** (%)	X^2/Fisher exact test (p-Value)
	14 (10.9)	**115 (89.1)**	
Age (y)			1.86* (0.764)
20–24	1 (5.9)	16 (94.1)	
25–29	5 (8.9)	51 (91.1)	
30–34	5 (13.9)	31 (86.1)	
35–39	2 (15.4)	11 (84.6)	
40 and above	1 (14.3)	6 (85.7)	
Gender			0.16 (0.691)
Male	6 (12.2)	43 (87.8)	
Female	8 (10.0)	72 (90.0)	
Marital status			3.98* (0.181)
Single	6 (7.2)	77 (92.8)	
Married	8 (17.8)	37 (82.2)	
Divorced	0 (0.0)	1 (100.0)	
Religious status			0.93* (1.000)
Christianity	10 (10.0)	90 (90.0)	
Islam	3 (11.1)	24 (88.9)	
Atheist/others	0 (0.0)	1 (100.0)	
Years of practice			0.15 (1.000)
1–9 years	13 (11.2)	103 (88.8)	
≥ 10 years	1 (7.7)	12 (92.3)	
Place of practice			1.53 (0.466)
Public service	9 (13.4)	58 (86.6)	
Private practice	3 (6.4)	44 (93.6)	
Not currently practicing	2 (13.3)	13 (86.7)	
Received oral health training			2.74 (0.098)
Yes	11 (9.4)	106 (90.6)	
No	3 (25.0)	9 (75.0)	

*Fisher exact test value.
**Scores below 7, out of a total score of 14.
***Scores equal to 7 or above, out of a total score of 14.

recommended that oral health education focusing on the benefits of a fluoridated toothpaste use should be targeted at the nursing population in Nigeria, as this may enhance the uptake of the use of such toothpastes among them.

The consumption of sugary snacks and drinks are dental caries risk factors.[13] However, this risk reduces if appropriate preventive measures such as mouth rinsing and toothbrushing are done immediately after their consumption.[51] In this study, most of the respondents consumed sugared snacks and drinks on daily basis, while over one-third of them did nothing that is caries-preventive after consuming such substances. Unfortunately, these poor habits predispose them to dental caries[51]; therefore, it is recommended that tailored interventions that discourage frequent consumption of sugared snacks and drinks should be implemented among nurses.

Dental flossing involves the use of a floss to remove debris from the interproximal surfaces of a teeth.[33,52] Dental flossing helps to protect oral health through the removal of plaque, calculus, food debris, and other foreign bodies from the teeth surfaces.[33,52] However, less than six-tenth of the respondents in this study reported to use dental floss, out of which roughly one-third of them rarely use it.

It is also noteworthy that the majority of the respondents had rarely/never visited a dentist for check-up. This finding is similar to that reported among a sample of nursing students in Nigeria.[30] This suggests that the habit of regular dental visit is uncommon among nurses in Nigeria.

However, this study was a pilot study—which is a limitation to the findings.[53] Being a pilot study, it will be difficult to make unguided generalizations based on the study data.[53] Therefore, there is a need for a bigger study, probably a

Table 4 Tooth brushing and food intake practices, across gender, among respondents

Variables	Male (%)	Female (%)	Total (%)	X^2	*p*-Value
How often do you brush your teeth in a day? (*n* = 128)				4.217	0.239
Once	14 (41.2)	20 (58.8)	34 (26.4)		
Twice	31 (36.5)	54 (63.5)	85 (66.7)		
Thrice	0 (0.0)	3 (100.0)	3 (2.3)		
After every meal	4 (66.7)	2 (33.3)	6 (4.7)		
When do you usually brush your teeth (*n* = 129)				3.233	0.520
morning before meal	15 (48.4)	16 (51.6)	31 (24.0)		
morning after meal	4 (44.4)	5 (55.6)	9 (7.0)		
morning before meal and night before bed	19 (31.7)	41 (68.3)	40 (46.5)		
morning after meal and night before bed	11 (39.3)	17 (60.7)	27 (21.7)		
no regular pattern	0 (0.0)	1 (100.0)	1 (0.8)		
Do you use fluoride containing toothpaste (*n* = 129)				3.935	0.140
Yes	43 (38.4)	69 (61.6)	112 (86.8)		
No	4 (66.7)	2 (33.3)	6 (4.7)		
Not sure	2 (18.2)	9 (81.8)	11 (8.5)		
How often do you change your toothbrush? (*n* = 125)				1.640	0.802
Every 2 months	4 (44.4)	5 (55.6)	9 (7.0)		
Every 3 months	29 (37.2)	49 (62.8)	78 (60.5)		
Every 6 months	9 (45.0)	11 (55.0)	20 (15.5)		
Depends on the time taken for brush to loose efficacy	5 (27.8)	13 (72.2)	18 (14.0)		
How often do you take sugar containing snack or drink in a day? (*n* = 129)				8.116	0.087
Once	21 (29.6)	51 (70.8)	72 (55.8)		
Twice	17 (47.2)	19 (52.8)	36 (27.9)		
Thrice	3 (33.3)	6 (66.7)	9 (7.0)		
more than thrice	5 (71.4)	2 (28.6)	7 (5.4)		
Never	3 (60.0)	2 (40.0)	5 (3.9)		
After having a sugary snack, what do you do often? (*n* = 129)				6.212	0.102
I do nothing	19 (43.2)	25 (56.8)	44 (34.1)		
rinse my mouth with water immediately	22 (36.6)	45 (63.4)	71 (55.0)		
rinse my mouth with mouthwash immediately	1 (10.0)	9 (90.9)	10 (7.8)		
brush my teeth immediately	3 (75.0)	1 (25.0)	4 (3.1)		
Do you floss your teeth? (*n* = 129)				1.496	0.221
Yes	24 (33.8)	48 (66.7)	72 (55.8)		
No	25 (43.9)	32 (56.1)	57 (44.2)		
If yes[a], how often do you floss your teeth (*n* = 72)				2.805	0.246
once a day	6 (22.2)	21 (77.8)	27 (37.5)		
after every meal	11 (44.0)	14 (56.0)	25 (34.7)		
Rarely	7 (28.0)	13 (72.0)	20 (27.8)		
How often do you go for dental checkup? (*n* = 129)				5.090	0.165
Once in six months	12 (40.0)	18 (60.0)	30 (23.3)		
Once in a year	7 (43.8)	9 (56.2)	16 (12.4)		
Rarely	13 (26.5)	36 (73.5)	49 (38.0)		
Never	17 (50.0)	17 (50.00	34 (26.4)		

[a]Only those that responded "*yes*" to "*Do you floss your teeth?*" were analyzed.

paper-based type, to ensure that a nationally representative sample of nurses are represented. Also, the data reported in this study were based on self-reports of the participants; therefore, there is a possibility of recall bias.[54] To reduce the bias possibility, a structured questionnaire was used for the study.[55]

Notwithstanding this limitation, this study is believed to be the first internet-based study to investigate the knowledge and practices concerning oral hygiene, cariogenic diet intake, and dental check-ups among Nigerian nurses—a rarely investigated health profession population in Nigeria. Also, this study adds new information to the existing body of knowledge on the dental public health conditions of nurses in Nigeria.

In conclusion, this online pilot study recorded a low response rate with the obtained findings showing a high level of basic oral health knowledge and a lower level of appropriate oral self-care practices among nurses in Nigeria. There is a need for a nationally representative study of nurses in Nigeria, preferably a paper-based one, to further establish these findings.

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Conflict of Interest
None declared.

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References

1 Azatyan V, Yessayan L, Khachatryan A, et al. Assessment of pathomorphological characteristics of the oral mucosa in patients with HBV, HCV and HIV. J Infect Dev Ctries 2021;15(11): 1761–1765
2 Deng Q, Yan L, Lin J, et al. A composite oral hygiene score and the risk of oral cancer and its subtypes: a large-scale propensity score-based study. Clin Oral Investig 2022;26(03):2429–2437
3 Severino M, Caruso S, Ferrazzano GF, et al. Prevalence of early childhood caries (ECC) in a paediatric italian population: an epidemiological study. Eur J Paediatr Dent 2021;22(03):189–198
4 Grimaldi R, Yonel Z, Chapple I, et al. Randomised methodology development study to investigate plaque removal efficacy of manual toothbrushes. J Dent 2022;116:103830
5 Ng C, Tsoi JKH, Lo ECM, Matinlinna AJP. Safety and design aspects of powered toothbrush-a narrative review. Dent J 2020;8(01):15
6 Amarasena N, Gnanamanickam ES, Miller J. Effects of interdental cleaning devices in preventing dental caries and periodontal diseases: a scoping review. Aust Dent J 2019;64(04):327–337
7 Verma SK, Dev Kumar B, Chaurasia A, Dubey D. Effectiveness of mouthwash against viruses: 2020 perspective. A systematic review. Minerva Dent Oral Sc 2021;70(05):206–213
8 Jassoma E, Baeesa L, Sabbagh H. The antiplaque/anticariogenic efficacy of Salvadora persica (Miswak) mouthrinse in comparison to that of chlorhexidine: a systematic review and meta-analysis. BMC Oral Health 2019;19(01):64
9 Dudzik A, Sozkes S, Michalak E, Olszewska-Czyz I. Efficacy of a zinc lactate mouthwash and tongue scraping in the reduction of intra-oral halitosis: a single-blind, controlled, crossover clinical trial-a pilot study. J Clin Med 2021;10(23):5532
10 Salim NA, Alamoush RA, Al-Abdallah MM, Al-Asmar AA, Satterthwaite JD. Relationship between dental caries, oral hygiene and malocclusion among Syrian refugee children and adolescents: a cross-sectional study. BMC Oral Health 2021;21(01):629
11 Mehta P, Bhavasar R, Ajith NA, et al. Assessing the effect of curcumin on the oral mucosal cytomorphometry and candidal species specificity in tobacco users: a pilot study. Healthcare (Basel) 2022;10(08):1507
12 Del Giudice C, Vaia E, Liccardo D, et al. Infective endocarditis: a focus on oral microbiota. Microorganisms 2021;9(06):1218
13 Cruz Cardoso J, Ferreira D, Assis R, et al. *Streptococcus oralis* meningitis. Eur J Case Rep Intern Med 2021;8(05):002349
14 McGeown M, Fitzpatrick P. Dental attendance among adults at high risk for oral cancer. Oral Health Prev Dent 2017;15(01): 49–55
15 Field EA, Morrison T, Darling AE, Parr TA, Zakrzewska JM. Oral mucosal screening as an integral part of routine dental care. Br Dent J 1995;179(07):262–266
16 Fleming E, Singhal A. Chronic disease counseling and screening by dental professionals: results from NHANES, 2011-2016. Prev Chronic Dis 2020;17:E87
17 Mühlemann A, von Felten S. Evaluation of a caries prevention programme for preschool children in Switzerland: is the target group being reached? BMC Oral Health 2021;21(01):609
18 Scardina GA, Messina P. Good oral health and diet. J Biomed Biotechnol 2012;2012:720692
19 Onyejaka NK, Olatosi OO, Ndukwe NA, Amobi EO, Okoye LO, Nwamba NP. Prevalence and associated factors of dental caries among primary school children in South-East Nigeria. Niger J Clin Pract 2021;24(09):1300–1306
20 Folayan M, Sowole A, Kola-Jebutu A. Risk factors for caries in children from south-western Nigeria. J Clin Pediatr Dent 2008;32 (02):171–175
21 Onwuka C, Onwuka CI, Iloghalu EI, et al. Pregnant women utilization of dental services: still a challenge in low-resource setting. BMC Oral Health 2021;21(01):384
22 Lawal FB, Ibiyemi O, Taiwo JO, Oke GA. Dental care seeking behaviour of children in a rural Nigerian community. Afr J Med Med Sci 2016;45(02):143–149
23 Popoola BO, Onyejaka N, Folayan MO. Prevalence of developmental dental hard-tissue anomalies and association with caries and oral hygiene status of children in Southwestern, Nigeria. BMC Oral Health 2016;17(01):8
24 Kolawole KA, Folayan MO, Agbaje HO, et al. Digit sucking habit and association with dental caries and oral hygiene status of children aged 6 months to 12 years resident in semi-urban Nigeria. PLoS One 2016;11(02):e0148322
25 Folayan MO, El Tantawi M, Oginni AB, Alade M, Adeniyi A, Finlayson TL. Malnutrition, enamel defects, and early childhood caries in preschool children in a sub-urban Nigeria population. PLoS One 2020;15(07):e0232998
26 Idowu AE, Fakuade BO, Taiwo OO, Majekodunmi JO, Alufohai OO, Sandabe FK. Dental caries prevalence, restorative needs and oral hygiene status in adult population: a cross-sectional study among nurses in Jos University Teaching Hospital, Jos, Nigeria. Niger J Basic Clin Sci 2021;18:35–41
27 Azodo CC, Ezeja EB, Ehizele AO, Ehigiator O. Oral assessment and nursing interventions among Nigerian nurses-knowledge, practices and educational needs. Ethiop J Health Sci 2013;23(03): 265–270
28 Ibrahim ZF, Teslim LO, Aliyu I. Oral hygiene practices of non-dental nurses in a tertiary hospital in North-West Nigeria. SRM J Res Dent Sci 2017;8:105–109

29 Kanmodi KK, Kanmodi PA. A call for the inclusion of a course on basic oral healthcare practice into the Nigerian nursing and midwifery education curriculum. Polish Ann Med. 2021;28(02): 256–258

30 Sulaiman AO, Kanmodi KK. Awareness of restorative dental treatment as shown by nursing students in Ibadan. J Stoma. 2016;69(06):667–673

31 Hassan ZA, Schattner P, Mazza D. Doing A Pilot Study: Why Is It Essential? Malays Fam Physician 2006;1(2-3):70–73

32 Jegede AT, Oyedele TA, Sodipo BO, Folayan MO. Oral health knowledge and practices of dentists practicing in a teaching hospital in Nigeria. Indian J Dent Res 2016;27(02):137–144

33 GOV.UK. Chapter 8: Oral hygiene. Published: 09 November 2021. Accessed May 16, 2022, at: https://www.gov.uk/government/publications/delivering-better-oral-health-an-evidence-based-toolkit-for-prevention/chapter-8-oral-hygiene

34 Kumar S, Tadakamadla J, Johnson NW. Effect of toothbrushing frequency on incidence and increment of dental caries: a systematic review and meta-analysis. J Dent Res 2016;95(11): 1230–1236

35 Kobayashi D, Takahashi O, Shimbo T. Frequency of daily tooth brushing and development of any type of malignancy. Anticancer Res 2019;39(08):4415–4421

36 Attin T, Hornecker E. Tooth brushing and oral health: how frequently and when should tooth brushing be performed? Oral Health Prev Dent 2005;3(03):135–140

37 Que YA, Moreillon P. Infective endocarditis. Nat Rev Cardiol 2011; 8(06):322–336

38 Bicak DA. A current approach to halitosis and oral malodor- a mini review. Open Dent J 2018;12:322–330

39 Lertpimonchai A, Rattanasiri S, Arj-Ong Vallibhakara S, Attia J, Thakkinstian A. The association between oral hygiene and periodontitis: a systematic review and meta-analysis. Int Dent J 2017; 67(06):332–343

40 American Dental Association. Toothbrushes [Internet]. Published: 26 February 2019. Accessed May 22, 2022, at: https://www.ada.org/resources/research/science-and-research-institute/oral-health-topics/toothbrushes

41 Australian Dental Association New South Wales (ADA NSW) ADA NSW fact sheet on how you should see a dentist. Accessed December 28, 2022, at : https://www.adansw.com.au/About/ADA-NSW-Fact-Sheet-How-Often-You-Should-See-a-Dent.aspx#:~:text=Most%20dentists%20recommend%20a%20routine%20dental%20check-up%20every,will%20advise%20how%20often%20a%20check-up%20is%20required

42 Kolawole KA, Oziegbe EO, Bamise CT. Oral hygiene measures and the periodontal status of school children. Int J Dent Hyg 2011;9 (02):143–148

43 Varshney S, Gautam A. Poor periodontal health as a risk factor for development of pre-eclampsia in pregnant women. J Indian Soc Periodontol 2014;18(03):321–325

44 Breedlove G. Prioritizing oral health in pregnancy. Kans Nurse 2004;79(10):4–6

45 Kongsved SM, Basnov M, Holm-Christensen K, Hjollund NH. Response rate and completeness of questionnaires: a randomized study of Internet versus paper-and-pencil versions. J Med Internet Res 2007;9(03):e25

46 Kanmodi KK, Evbuomwan O, Nwafor NJ, Omoruyi E. Healthcare practitioners' experience and perceptions on ICT-related training programs: an online survey. Egypt J Med Educ 2020;5:2

47 Ezenwaji IO, Eseadi C, Okide CC, et al. Work-related stress, burnout, and related sociodemographic factors among nurses: Implications for administrators, research, and policy. Medicine (Baltimore) 2019;98(03):e13889

48 Chebib N, Waldburger TC, Boire S, et al. Oral care knowledge, attitude and practice: Caregivers' survey and observation. Gerodontology 2021;38(01):95–103

49 Ashkenazi M, Yaish Y, Yitzhak M, Sarnat H, Rakocz M. The relationship between nurses' oral hygiene and the mouth care of their patients. Spec Care Dentist 2013;33(06):280–285

50 Carey CM. Focus on fluorides: update on the use of fluoride for the prevention of dental caries. J Evid Based Dent Pract 2014;14 (Suppl):95–102

51 Tanner T, Harju L, Päkkilä J, Patinen P, Tjäderhane L, Anttonen V. Consumption of snacks and dental caries among Finnish young men: a cross-sectional epidemiological study. Odontology 2020; 108(03):486–492

52 Hujoel PP, Cunha-Cruz J, Banting DW, Loesche WJ. Dental flossing and interproximal caries: a systematic review. J Dent Res 2006;85 (04):298–305

53 Leon AC, Davis LL, Kraemer HC. The role and interpretation of pilot studies in clinical research. J Psychiatr Res 2011;45(05):626–629

54 Coughlin SS. Recall bias in epidemiologic studies. J Clin Epidemiol 1990;43(01):87–91

55 Althubaiti A. Information bias in health research: definition, pitfalls, and adjustment methods. J Multidiscip Healthc 2016; 9:211–217

56 Kanmodi KK, Fagbule OF, Ogbeide ME, et al. Knowledge of senior secondary school students in Nigeria about head and neck cancer: Implications on prevention strategies. Malawi Med J 2022;34(03):162–169

57 Kanmodi KK, Nwafor JN, Salami AA, et al. A SCOPUS-based bibliometric analysis of global research contributions on milk fluoridation. Int J Environ Res Public Health 2022;19(14):8233

58 Kanmodi KK, Ojo TO, Nnyanzi LA, Alimi OD. A bibliometric analysis of epidemiological studies investigating the relationship between community fluoridated water consumption and human cancers. Adesh Univ J Med Sci Res 2022;4(01):25–32

59 Salami A, Kanmodi KK, Nnyanzi LA. Re-emphasizing the roles of general medical and dental practitioners regarding oral cancer eradication in Nigeria. Acta Medica Martiniana 2021;21(03):90–102

60 Kanmodi KK, Nnebedum N, Bello M, Adesina M, Fagbule OF, Adesoye O. Head and neck cancer awareness: a survey of young people in international communities. Int J Adolesc Med Health 2019;33(04):20180231

61 Kanmodi K, Kanmodi P, Ogbeide M, Nwafor J. Head and neck cancer literacy in Nigeria: A systematic review of the literature. Ann Public Health Issues 2021;1:25–49

62 Kanmodi K, Fagbule O, Ogunniyi K, et al. Determinants of sexual practices among secondary school students in Nigeria: Focusing on socio-cultural and school-related factors. Rwanda Med J 2020; 77(04):32–37

63 Kanmodi KK. Dentists' role in clinical tobacco cessation interventions: The status in Nigeria. Popul Med 2020;2:37