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Oral health condition and practices as indicators of need for oral health promotion among elderly individuals in two rural communities in Ibarapa, Nigeria

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Abstract
*Background:*Targeting oral health promotion among elderly individuals in rural settings requires baseline information on their oral health condition and practices as oral conditions are highly influenced by behavioral factors, which are culturally related in such settings.
Aim: To determine the association between oral health condition and practices of elders in two rural communities in southwestern Nigeria.
Materials and methods: A total of 357 residents aged 60 years or older participated in this cross-sectional survey conducted in randomly selected clusters in Igboora and Idere in Ibarapa, Southwest Nigeria. Information on sociodemographic characteristics, oral health practices (tooth cleaning material, frequency of tooth cleaning, utilization of dental services) and oral hygiene status was obtained using interviewer-administered questionnaire. Information on oral conditions such as dental caries experience, tooth mobility and number of teeth present were obtained by conducting oral examination. Data obtained were analyzed with the Statistical Package for Social Sciences (SPSS).
Results: Of 357 participants, 183 (51.3%) had missing tooth/teeth, 157 (44.0%) had mobile tooth/teeth, 114 (31.9%) had decayed tooth/teeth and 343 (96.1%) had poor oral hygiene. About a third 122 (34.2%) of the participants had consulted a dentist previously, out of whom 120 (98.4%) reported that pain was the main reason for doing so. The main reason for not visiting the dentist was: "no problem with me as tooth problems and its eventual loss occur with ageing" 178 (75.7%). Less frequent tooth cleaning and poor oral hygiene were associated with presence of mobile tooth/teeth and incomplete dentition ($p<0.05$). Presence of mobile (OR=1.80, 95%CI:1.09,2.98, p=0.023), decayed (OR=1.81, 95%CI:1.09,3.00, p=0.022) or missing teeth (OR=5.24, 95%CI:3.05,8.98, $p<0.001$) were predictors of previous dental consultation.
*Conclusion:*Poor oral hygiene was highly prevalent among elders in the rural communities. Less frequent tooth cleaning and poor oral hygiene were associated with presence of mobile tooth/teeth and incomplete dentition. Presence of mobile teeth, decayed teeth and missing teeth were significant predictors of previous dental consultation.

Keywords: *Dental visits; elders; oral health practices; oral health promotion; oral hygiene*

Résumé
Contexte: Le ciblage de la promotion de la santé bucco-dentaire chez les personnes âgées en milieu rural nécessite des informations de base sur leur état de santé bucco-dentaire et leurs pratiques, car les conditions bucco-dentaires sont fortement influencées par des facteurs comportementaux, qui sont culturellement liés dans ces milieux .
Objectif: Pour déterminer l'association entre l'état de santé bucco-dentaire et les pratiques des aînés dans deux communautés rurales du sud-ouest du Nigéria.
Matériel et méthodes : Un total de 357 résidents âgés de 60 ans ou plus a participé à cette enquête transversale menée dans des grappes sélectionnées aléatoirement d'Igboora et d'Idere à Ibarapa, dans le sud-ouest du Nigéria. Des informations sur les caractéristiques sociodémographiques, les pratiques de santé bucco-dentaire (matériel de nettoyage des dents, fréquence de nettoyage des dents, utilisation des services dentaires) et l'état d'hygiène bucco-dentaire ont été obtenues à l'aide d'un questionnaire administré par intervieweur. Des informations sur l'état buccal telles que l'expérience de la carie dentaire, la mobilité dentaire et le nombre de dents présentes ont été obtenues en procédant à un examen oral. Les données obtenues ont été analysées avec le progiciel statistique pour les sciences sociales (SPSS).
Résultats : Sur 357 participants , 183 (51,3%) avaient des dents / dents manquantes, 157 (44,0%) avaient des dent / dents mobiles, 114 (31,9%) avaient des dents / dents cariées et 343 (96,1%) avaient une mauvaise hygiène buccale. Environ un tiers 122 (34,2%) des participants avaient consulté un dentiste auparavant, parmi lesquels 120 (98,4%) ont indiqué que la douleur était la principale raison de le faire. La

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principale raison de ne pas rendre visite au dentiste était: «aucun problème avec moi car les problèmes dentaires et sa perte éventuelle surviennent avec le vieillissement» 178 (75,7%) . Un nettoyage des dents moins fréquent et une mauvaise hygiène buccale étaient associés à la présence de dents mobiles et d'une dentition incomplète (p <0,05). Présence de dents mobiles (OR = 1,80, IC à 95%: 1,09 - 2,98, p = 0,023), cariées (OR = 1,81, IC à 95%: 1,09-3,00, p = 0,022) ou manquantes (OR = 5,24, IC à 95% : 3,05-8,98, p <0,001) étaient des prédicteurs d'une consultation dentaire antérieure.

Conclusion: Une mauvaise hygiène buccale était très répandue chez les aînés des communautés rurales . Un nettoyage des dents moins fréquent et une mauvaise hygiène bucco-dentaire étaient associés à la présence de dents mobiles et d'une dentition incomplète. La présence de dents mobiles, de dents cariées et de dents manquantes étaient des prédicteurs importants de la consultation dentaire précédente.

Mots-clés: *visites dentaires; aînés; pratiques de santé bucco-dentaire; promotion de la santé bucco-dentaire; hygiène buccale*

Introduction

The elderly population is an important target for oral health promotion because of vulnerability occasioned by disadvantages in accessing oral health care [1,2]. Worrisome though, is the high prevalence of periodontal diseases, which are common causes of tooth loss among elders in Nigeria [3] and absence of oral health promotion programme put in place for them. In addition, many of these elders require a form of dental treatment or the other [3]. Similar findings on the high need for dental treatment have been documented in Poland [4] and among Brazilian elders [5].Elders in these countries and in the developed world may resort to homes and health institutions to take over their health care and oral health can be promoted among them. On the other hand, in Nigeria, very few homes and institutions for older people exist in rural communities, translating to most of the elders being responsible for their up keep and oral health. Promoting oral health at the community level, therefore, becomes important and mandates baseline information about the oral health of elders, which is sparse in our environment.

Accessible population based studies were conducted about the oral health status of elders over a decade ago in semi urban and urban regions of the country [3,6,7].The studies [3,7] showed that poor oral hygiene and periodontal disease were highly prevalent among elderly individuals. Other studies [8,9] assessed the oral health practices of the elderly and found that chewing stick was the main tooth cleaning aid [8,9] and 59.9% cleaned their teeth more than once daily [9]. In addition, 61% of the elders used traditional tooth cleaning agent which could have adverse effects on oral tissues [8] and many (65.7%) had not consulted the dentist [9]. None of these studies [3,7-9] associated the oral health practices with the oral conditions of the elders thus necessitating this study. This becomes important as oral conditions have been found to be highly influenced by the behavioral factors, which are beliefs and culture related [7]. In addition, healthy oral practices have been documented as a strong factor in preserving oral health [10]. In view of the prevalent periodontal disease among the Nigerian populace it becomes important to investigate how oral health practices to oral conditions of elders as baseline information for planning oral health promotion programmes among them.

Some studies [4,11,12] in other parts of the world have however, reported that suboptimal oral health practices were associated with poor oral health status and consequential higher prevalence of edentulism. It is not known if this is the case in our environment especially in rural communities.

Although suboptimal oral health practices were reported among the elders in urban settings [9,13,14] sparse information is available on the older people resident in rural Nigeria. Focusing on the elders in rural communities and promoting oral health among them may help to reduce health inequalities prominent in the region. This will go a long way in reducing the prevalence of oral diseases and invariably tooth loss; conditions associated with poor economic status and low literacy level [15]. Invariably, poor socioeconomic and educational levels are typical attributes of a rural community. This study therefore determined the association between oral health condition and practices of elders in two rural communities in southwestern Nigeria.

Materials and methods

The study sites for the cross-sectional study were Igboora and Idere, the two rural communities in Ibarapa Central Local Government of Oyo State, Nigeria with a total population of 103,243 [16]. The population of elders in this LGA as at the 2006 population census was 6,742 [16]. Igboora is the headquarters of Ibarapa Central Local Government of Nigeria in which exists a community oral health clinic to serve the residents of this community and its environs. Idere is an adjacent town whose residents patronize the community oral health clinic at Igboora. The sample size for this study was calculated using a power of 90%, an accepted degree

of error of 5% and a prevalence of 33.6% of good oral hygiene practice exhibited by elders in a study conducted previously in the same Oyo state [9].A minimum sample size of 172 was obtained per study site and served as the basis of recruitment of study participants in each of the study sites. The Ibarapa Central LGA comprises 10 political wards which were considered as clusters; the sampling unit for this study. The list of wards within each LGA served as the sampling frame. There are seven wards in Igboora and three in Idere. The elders recruited for this study were selected from two randomly selected clusters each from the two communities by balloting using sealed envelopes.All (361) the elders (residents aged 60 years or older) residing in the houses within the selected clusters were approached for the study. Included in this study were 357 consenting elders, who had no form of communication barrier and in whom oral examination could be performed. Excluded from the study were elders who were ill or those who were not available at the time of the study. Ethical approval for the study was obtained from the joint University of Ibadan and University College Hospital (UI/UCH) Institutional Ethical Review Board.

Data collection

Data for the study was collected using structured interviewer administered questionnaires translated into Yoruba, the local language of the community, by an independent bilingual expert whose first language was English. The questionnaire was back translated into English language independently by a team of experts versed in both English and Yoruba languages. All confusing questions were modified and a pretest of the questionnaire was conducted among 40 elderly residents of the two communities in a cluster not selected for the main study.

The questionnaire assessed information on the socio-demographic characteristics, oral hygiene measures of the participants and their utilization of dental services. The socio-demographic characteristics obtained included age, gender, marital status, religion and occupation. The dates of birth of the participants who were not literate were estimated based on major events that had occurred within the community and in Nigeria. Occupation was categorized as skilled workers, unskilled workers and dependents according to a modification of the Office of Population Census and Surveys (OPCS) classification, which had been modified for our environment [17]. Oral hygiene measure was assessed by questions on tooth cleaning aid and frequency of tooth cleaning. Utilization of dental services was evaluated by asking if they had ever been to the dentist. If they answered affirmatively, they were asked for the reasons why they consulted the dentist. If they had not visited a dentist, they were asked why they had not done so. Other questions asked related to their use of tobacco and if they had ever experienced tooth exfoliation without any history of trauma.

Two trained research assistants, one being an indigene, administered the questionnaires. Two trained and calibrated dentists conducted oral examinations using sterile plain mouth mirrors and World Health Organisation (WHO) probes. Tooth mobility was assessed with Millers mobility index [18] and oral hygiene was assessed with the Simplified Oral Hygiene Index of Greene and Vermillion [19]. Assessment of dental caries was done according to the World Health Organization basic oral health survey [20]. Presence or absence of dentures or other dental prostheses was charted as present or absent. Oral examinations were conducted with the participants seated on benches or chairs outside their houses and natural lighting served as source of illumination. The participants with oral complaints were referred appropriatelyto the Community Oral Health Care Centre located within the General Hospital, Igboora. All participants were educated on good oral hygiene practices after data collection. Duplicate examinations were conducted on twenty consenting elders to determine the inter examiners' variability.

Data management

Data collected was entered into a computer and analyzed using the Statistical Package for Social Sciences (SPSS) version 22. For the purpose of data analysis, age, marital status and educational level were recoded into binary variables to reduce the number of empty cells. Age was regrouped into three: 60 – 64 years, 65 – 74 years and $\geq$75 years. Marital status was recoded as "married" or "others". The category "others" included participants who were divorced and those who were separated or single. Educational level was dichotomized as "no form of formal education" and "at least primary education"; which is also regarded as "at least sixth grade". Primary school education was used being the basic form of education in the country.

Quantitative variables were summarized using means and standard deviations while frequencies were generated for categorical variables. Chi square statistics was used to evaluate associations between categorical variables. Logistic regression was done to identify predictors of frequency of tooth cleaning and consultation with the dentist. Only significant variables at the bivariate analysis were entered into the analysis with dental

Table 1: Association between socio-demographic characteristics and frequency of tooth cleaning of the elders

Socio-demographic characteristics	Frequency of daily tooth cleaning n (%)		Total n (%)	P value
	< Twice	≥ Twice		
Sex n = 357				
Men	113 (70.2)	48 (29.8)	151 (100.0)	0.789
Women	135 (68.9)	61 (31.1)	196 (100.0)	
Age (years) n = 357				
60-64	89 (57.1)	67 (42.9)	156 (100.0)	< 0.001*
65-74	85 (72.6)	32 (27.4)	117 (100.0)	
75-100	74 (88.1)	10 (11.9)	84 (100.0)	
Marital status n = 357				
Married	142 (63.7)	81 (36.3)	223 (100.0)	0.002*
Others	106 (79.1)	28 (20.9)	134 (100.0)	
Educational qualification n = 357				
At least sixth grade	77 (48.1)	83 (51.9)	160 (100.0)	< 0.001*
None	171 (86.8)	26 (13.2)	197 (100.0)	
Occupation n = 357				
Skilled	14 (29.8)	33 (70.2)	47 (100.0)	< 0.001*
Unskilled	165 (76.0)	52 (24.0)	217 (100.0)	
Dependents	69 (74.2)	24 (25.8)	93 (100.0)	
Religion n = 349				
Christianity	61 (67.8)	29 (32.2)	90 (100.0)	0.876
Islam	182 (70.5)	76 (29.5)	258 (100.0)	
Others	0 (0.0)	1 (100.0)	1 (100.0)	

*statistically significant

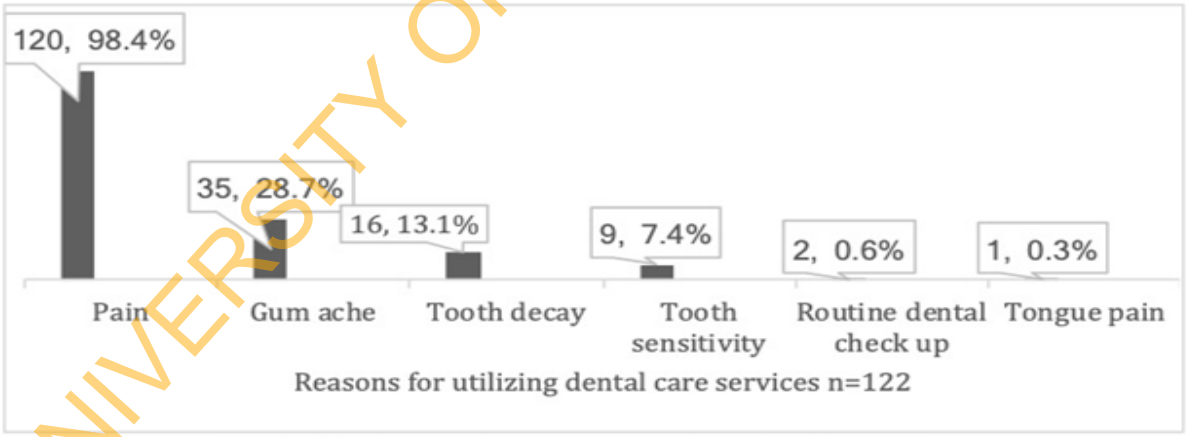

Figure 1: Reasons for utilizing dental care services mentioned by the elders

consultation as dependent variable and positive history of previous dental visit as reference. Frequency of tooth cleaning was the dependent variable and twice or more cleaning of the teeth used as reference in the logistic regression for predictors of frequency of tooth cleaning. Level of significance was at a cut off level of < 5%. Kappa statistics was used to assess inter examiners' variability.

Results

Table 1 shows that of the 357 participants, 196 (54.9%) were females. The age of the participants ranged from 60 to 100 years and the mean (SD) age was 68.4 (± 9.0) years. Many, 223 (62.5%), were married and 258 (72.3%) were Muslims. The participants were mainly unskilled workers or dependents. Inter examiners' variability for the oral

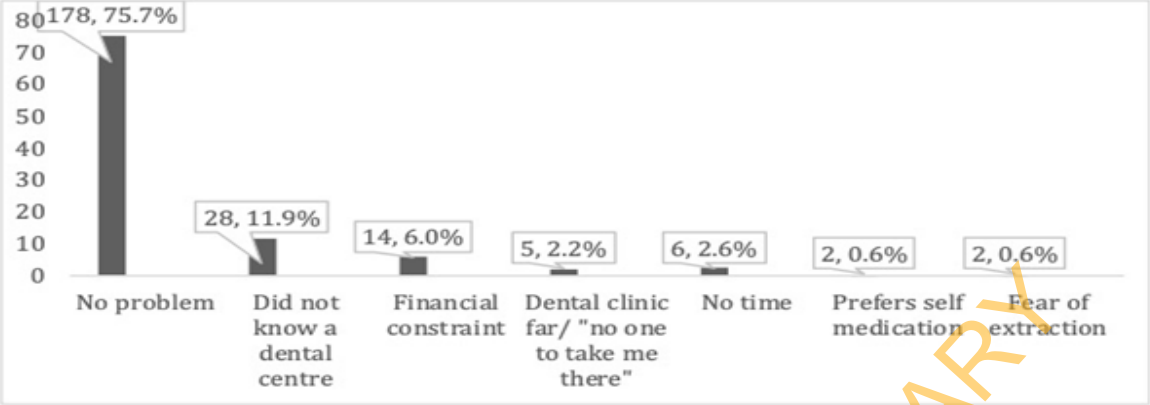

Figure 2: Reasons for non-utilization of dental services mentioned by the elders

Table 2: Association between socio-demographic characteristics and oral examination findings

Socio-demographic characteristics	Mobile tooth/teeth		Missing tooth/ teeth		Decayed tooth/teeth	
Sex	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
Men	78 (48.4)	83 (51.6)	76 (47.2)	85 (52.8)	57 (35.4)	104 (64.6)
Women	79 (40.3)	117 (59.7)	107 (54.6)	86 (45.4)	57 (29.1)	139 (70.9)
	$X^2 = 2.378$	p = 0.123	$X^2 = 1.931$	p = 0.165	$X^2 = 1.625$	p = 0.202
Age (years)						
60-64	50 (32.1)	106 (67.9)	58 (37.2)	98 (62.8)	61 (39.1)	95 (60.9)
65-74	59 (50.4)	58 (49.6)	63 (53.8)	54 (46.2)	30 (25.6)	87 (74.4)
75-100	48 (57.1)	36 (42.9)	62 (73.8)	22 (26.2)	23 (27.4)	61 (72.6)
	$X^2 = 16.891$	p < 0.001*	$X^2 = 28.685$	p < 0.001*	$X^2 = 6.621$	p = 0.036*
Marital status						
Married	82 (36.8)	141(63.2)	102 (45.7)	121 (54.3)	69 (30.9)	154 (69.1)
**Others	75 (56.0)	59 (44.0)	81 (60.4)	53 (39.6)	45 (33.6)	89 (66.4)
	$X^2 = 12.523$	p < 0.001*	$X^2 = 7.247$	p = 0.007*	$X^2 = 0.268$	p = 0.604
Educational qualification						
None	99 (50.3)	98 (49.7)	121 (61.4)	76 (38.6)	45 (22.8)	152 (77.2)
At least sixth grade	58 (36.3)	102 (63.7)	62 (38.8)	98 (61.3)	69 (43.1)	91 (56.9)
	$X^2 = 7.028$	p = 0.008*	$X^2 = 18.164$	p < 0.001*	$X^2 = 16.710$	p < 0.001*
Occupational class						
Skilled	13 (27.7)	34 (72.3)	12 (25.5)	35 (74.5)	21 (44.7)	26 (55.3)
Unskilled	93 (42.9)	124 (57.1)	111 (51.2)	106 (48.8)	66 (30.4)	151 (69.6)
Dependents	51 (54.8)	42 (45.2)	60 (64.5)	33 (35.5)	27 (29.0)	66 (71.0)
	$X^2 = 9.643$	p = 0.008*	$X^2 = 18.994$	p < 0.001*	$X^2 = 4.104$	p = 0.128

**Statistically significant; ** Elders who were either divorced, separated or single*
X^2 – Chi square

examination was 0.81 to 0.90 (OHI-S – 0.81, tooth mobility – 0.88 and dental caries – 0.90) indicating almost perfect agreement between the examiners [20].

Tooth cleaning aids used by the participants included: chewing sticks, 197 (55.2%), toothbrushes, 94 (26.3%), both chewing sticks and tooth brushes, 58 (16.2%) and hands/fingers, 8 (2.3%). Many, 200 (56.0%), cleaned their teeth once daily, 109 (30.6%)

did so twice or more often and 48 (13.4%) participants did not clean their teeth regularly. Twenty-one (5.9%) participants presently use tobacco in any form.

consulting the dentist are as shown in Figure 1. Only two participants consulted the dentist for routine dental checkup.

Figure 2 shows the reasons provided by the participants who did not visit the dentist, with the

Table 3: Association between frequency of tooth cleaning, previous dental visits and oral condition

Variables	Frequency of daily toothcleaning		P value	Previous dental visit		P value
	Once or less n (%)	Twice or more n (%)		Yes n (%)	No n (%)	
Mobile tooth						
Yes	125 (79.6)	32 (20.4)	< 0.001*	75 (47.8)	82 (52.2)	< 0.001*
No	123 (61.5)	77 (38.5)		47 (23.5)	153 (76.5)	
Decayed teeth						
Yes	76 (66.7)	38 (33.7)	0.431	53 (46.5)	61 (53.5)	< 0.001*
No	172 (70.8)	71 (29.2)		69 (28.4)	174 (71.6)	
Missing teeth						
Yes	146 (79.8)	37 (20.2)	< 0.001*	97 (53.0)	86 (47.0)	< 0.001*
No	102 (58.6)	72 (41.4)		25 (14.4)	149 (85.6)	
Oral hygiene						
Poor	242 (69.7)	105 (30.3)	0.510	118 (34.0)	229 (66.0)	0.694
Fair	6 (60.0)	4 (40.0)		4 (40.0)	6 (60.0)	

Table 4: Logistic regression analysis of relationship between previous dental consultation and oral examination findings

Variable	Categories of variable	ß	OR	95% CI	p value
Mobile teeth	Yes**	0.586	1.80	1.09 - 2.98	0.023*
	No				
Decayed teeth	Yes**	0.591	1.81	1.09 - 3.00	0.022*
	No				
Missing teeth	Yes**	1.655	5.24	3.05 - 8.98	<0.001*
	No				

**Statistically significant, ** - Reference category for comparison, OR – Odds ratio, CI – Confidence Interval, ß - beta coefficient, Nagelkerke R^2- 0.254.*

Table 5: Logistic regression analysis of relationship between frequency of tooth cleaning and oral examination findings

Variable	Categories of variable	ß	OR	95% CI	pvalue
Mobile teeth	Yes**	0.611	1.84	1.10 – 3.08	0.020*
	No				
Missing teeth	Yes**	0.820	2.27	1.38 – 3.74	0.001*
	No				

**Statistically significant, ** - Reference category for comparison, OR – Odds ratio, CI – Confidence Interval, ß - beta coefficient, Nagelkerke R^2- 0.094.*

A total of 122 (34.2%) participants had consulted a dentist previously and pain was the main reason (120, 98.4%) for doing so. Other reasons for

main reason being “no problem with me as tooth problems and its eventual loss occur with ageing”, 178 (75.7%). Others reasons included”did not know

of any dental center", financial constraint and "no one to take me there" distance.

A total of 183 (51.3%) participants had at least a missing tooth and 2 (1.1%) were completely edentulous. The mean (SD) number of missing teeth was 6.4 (± 7.2) among edentulous participants. Only 7 (3.8%) of the edentulous elders had partial denture. A total of 163 (45.7%) participants reported self-exfoliation of at least one tooth. Also, noted on oral examination was that 157 (44.0%) participants had mobile tooth/teeth. The number of mobile teeth ranged from 1 to 10 teeth with a mean (SD) of 1.4 (±2.2) mobile teeth per participant. One hundred and fourteen (31.9%) had at least a decayed tooth. The number of decayed teeth ranged from 1 to 9 and the mean (SD) was 0.7 (±1.4). Many (343; 96.1%) of the participants had poor oral hygiene.

The proportion of participants aged 60-64 years who cleaned their teeth at least twice a day was higher than that of participants aged 65 years or older with the same frequency of tooth cleaning ($p < 0.001$) (Table 1). A higher proportion of elders currently married cleaned their teeth regularly compared to elders in other marital classes i.e. divorced, separated or single ($p = 0.002$) (Table 1). Table 1 also showed that participants with a minimum of sixth grade level of education cleaned their teeth more frequently than those without any form of formal education, $p < 0.001$. Participants who were skilled workers also cleaned their teeth more frequently than unskilled participants and dependents (70.2% vs. 24.0% vs. 25.8%, $p<0.001$) (Table 1).

Higher proportions of participants aged at least 75years had mobile teeth (57.1% vs. 50.4% vs. 32.1%, $p<0.001$), and missing teeth (73.8% vs. 53.8% vs. 37.2%, $p = 0.007$) than participants in the two other age groups (Table 2). Mobile tooth/teeth ($p < 0.001$) and missing tooth/teeth ($p = 0.007$) were more frequently found in elders who were divorced, separated or single compared to those who were married (Table 2). Higher proportions of elders with no formal education had mobile andmissing teeth compared to others but a lower proportion of the former had decayed teeth (Table 2).

Less frequent tooth cleaning was associated with presence of mobile tooth/teeth ($p < 0.001$) and incomplete dentition, $p < 0.001$ (Table 3). Previous consultation with the dentist was associated with presence of mobile tooth/teeth ($p < 0.001$), decayed teeth ($p < 0.001$) and missing teeth, $p < 0.001$ (Table 3).

More participants with mobile teeth ($p = 0.028$) and decayed teeth ($p = 0.028$) had poor oral hygiene compared to those without those oral conditions. Participants who had missing teeth were five times more likely to have consulted a dentist previously than those without missing tooth (OR = 5.24, 95%CI: 3.05, 8.98, $p < 0.001$). Other predictors of previous dental consultation were presence of mobile tooth/teeth (OR = 1.80, 95%CI: 1.09, 2.98, $p = 0.023$) and decayed tooth/teeth (OR = 1.81, 95%CI: 1.09, 3.00, $p = 0.022$) (Table 4).

Table 5 shows that participants who engaged in twice or more daily tooth cleaning were less likely to have mobile teeth ($p = 0.020$) or have incomplete dentition ($p = 0.001$)

Discussion

The findings of this study showed that the elders in the two rural communities had suboptimal oral health status and oral hygiene practices. It also established that poor oral hygiene practices were significantly associated with poor oral health status. The biodata of the studied elders revealed that three-quarters of the elders had no formal education and most belonged to either the unskilled or dependent occupational classes. This finding is similar to previous biodata noted among residents of a rural community [14].This study, which was conducted in a rural community, is the first major attempt at documenting the association between oral health status and oral hygiene practices of elders in such region of the country. The method was cross-sectional, which allowed a snapshot of the oral hygiene practices of the older people in the community. A major limitation of the study, however, was the inability to screen the participants for systemic diseases. These diseases could be confounders in the overall oral health status of the participants. Participants who were ill were excluded, however, those without symptoms, which is typical in diseases like hypertension could have been included in the study.

Many of the elders used chewing stick as their tooth cleaning aid, in agreement with previous studies in Nigeria [8,9]. The perceived benefits of chewing sticks, which has been centuries long in many African countries as well as the scientific confirmation of its beneficial effects [21] may explain the consistency in findings. On the other hand, contrasting reports have been reported in Cameroun [4] and India [13] where toothbrushes and fingers were the major tooth cleaning aids respectively [4,13]. Differences in the studies may be attributed to the varying perceptions and beliefs of the studied population.

Only a third of the elders engaged in the recommended minimum of twice daily tooth cleaning as similarly reported by Taiwo *et al*. [9] in Nigeria and also by authors in other countries [4,13,14]. The proportion of the elders engaging in twice or more frequent daily cleaning of their teeth noted in the present study (30.5%) was however higher than that noted in Cameroun (4.9%) [4] and India (2.3% - 10.8%) [13,14]. A higher proportion (34.7%) was however, reported in Poland [12] a more developed country. In agreement with other findings [22], elderly individuals who were older than 75 years and those without formal education cleaned their teeth less frequently. Formal education and younger age have been documented as significant factors influencing good oral health practices [22]. Observed in this study was the small proportion (5.9%) of the study participants that used tobacco in any form, which is similar to findings by other authors [14]. This is a probable reflection of lifestyle from adulthood that lingered into old age.

Over 90% of the elders examined in this study had poor oral hygiene as similarly reported in the sub urban region of the state where the present study was conducted [3]. Contrasting findings was reported in Cameroun where 41.4% had obvious plaque and 12.7% had abundant plaque [4]. Furthermore, almost half of the study participants had mobile teeth and reported self-exfoliation of their teeth without history of trauma.All the aforementioned are signs and symptoms of periodontal disease, a common cause of tooth loss in the elderly population [13]. Not surprising, almost one half of the participants in the present study had at least a missing tooth similar to findingsin urban Nigeria (47.7%) [23]. Lower prevalence rate than this have been observed in Spain (20%) [11] while a higher rate (over 90%) was reported among the elders in Poland [12]. Only a few of the elders with tooth loss had denture to replace the missing teeth and none of those that were completely edentulous had one. The reason for this will have to be investigated but may be related to the poor education, socio-economic status and oral health awareness of the cohort. In addition, accessibility to dentures and other tooth replacement options should be considered in these communities.

It is worrisome that there is a high prevalence of tooth loss as well as signs of periodontal disease in the present study.The probable factor could be suboptimal frequency of tooth cleaning that is contributory to the features of periodontal disease in this study. In addition, the wrong use of chewing sticks could have been an important causative factor [9].This is most likely, as a previous study [9] noted, because chewing of the sticks was given more prominence by users rather than the actual tooth cleaning process that removes plaque in a population where chewing sticks were the predominant tooth cleaning aids [9]. Also observed is the significant association between the poor oral hygiene and tooth mobility, missing teeth and decayed teeth. The significant association between poor oral hygiene practices and presence of oral diseases further corroborated this. This is in agreement with previous reports by others [11,12]. Thus, the findings from the present study further adds to the body of knowledge on the role of poor oral hygiene as causative factor of many oral conditions. This clearly shows an overwhelming need for oral hygiene prophylaxis and health promotion among the elders in view of the prevalent symptoms and signs of periodontal disease among them.

Almost 35% of the elders in this study had been to the dentist, similar to report from previous studies [9,14]. A much lower proportion (19.8%) was documented by Agrawal *et al.* [13] in Madhya Pradesh, India. The location of a Community Oral Health Care Centre within this community may be responsible for the "seemingly fair" utilization of dental care services by the elders in this study. However, in developed countries such as Poland, over 70% of the elders were observed to have consulted the dentist within a year preceding the study [24].

Pain was the main reason for utilizing dental services in agreement with other studies [14,24], but different from reports by Agrawal *et al*. [13] where dental prosthesis was the major reason for the consultation. Not perceiving a need was the main reason for non-utilization of dental services as the elders associated having dental problem to presence of pain. This association of dental utilization and dental pain has been reported by others [9].

Furthermore, those who had not been to the dentist also believed that tooth problems and eventual loss were normal occurrences associated with aging, which is noteworthy and consistent with what others had found [9,12]. This perception may have affected the elders' meticulousness with routine oral hygiene measures, consequentially, predisposing them to periodontal disease. In addition, the erroneous beliefs may have played a significant role in the non-utilization of dental services, which was only accessed when there was a problem.

This became more apparent with the fact that oral diseases were significant predictors of dental consultation in this study. An explanation for this could be the perception that dental consultations take place only in the presence of oral diseases as well as the strong belief that oral diseases occur with age. These two factors coupled with pain being a major reason for dental consultation is suggestive that without complication of oral diseases, this group of elderly individuals will not seek dental consultation.

These findings have provided baseline information illustrating the need for oral health promotion among the elderly individuals in the rural community. In addition, it highlighted the need for oral prophylaxis due to the prevalent symptoms and signs of periodontal disease, a highly preventable disease in this community. Moreover, subsidizing the cost of this procedure for the elders at the Community Oral Health Care Center as well as provision of mobile dental services should be considered. Further studies into how oral diseases impact on the quality of life of elders in rural communities will be of enormous benefit in addition to this baseline information for holistic planning, monitoring and evaluation of any intervention. In addition, further studies utilizing periodontal probes to determine attachment loss and pathological periodontal pocketing, which were not assessed in the present study, will be advantageous.

Conclusion

Poor oral hygiene was highly prevalent among elders in the rural communities. Less frequent tooth cleaning and poor oral hygiene were associated with presence of mobile tooth/teeth and incomplete dentition. Presence of mobile teeth, decayed teeth and missing teeth were significant predictors of previous dental consultation.

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