

Assessment of the Knowledge, Attitudes, and Practices for Optimal Oral Health among Adults in Benin City, Nigeria: A Cross-sectional Study.

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ABSTRACT:

Introduction: Oral health is crucial for overall well-being, involving the maintenance of good oral hygiene to prevent diseases. Despite global progress, gaps persist in developing countries, leading to higher oral disease prevalence. Factors such as awareness, access, cultural beliefs, and dental phobia significantly impact oral health. Knowledge, attitudes, and practices also play critical roles. **Objective:** To assess the knowledge, attitudes, and practices related to the oral health of adults in Benin City, Edo State.

Methods: This cross-sectional study included 198 adults attending a dental outreach program in three local government areas (Ikpoba-Okha, Oredo, and Egor) in Benin City, Edo State. A sample size of 200 was determined using the Cochran formula. A researcher-administered proforma was used for data collection, assessing socio-demographics, oral health knowledge, attitudes, and practices. A validated questionnaire was used for knowledge assessment, and a Likert scale was employed for attitude measurement. The Simplified Oral Hygiene Index (OHI-S) and the Decayed, Missing, and Filled Teeth (DMFT) index were used for clinical examination. Data were analyzed using IBM® SPSS® Statistics version 25.

Results: The mean oral health knowledge, attitudes, and practices among respondents were 57.5%, 83.1%, and 55.0%, respectively.

Conclusion: The study revealed fair knowledge and practices but good attitudes among respondents. Notable gaps exist in oral hygiene knowledge and practices, although the positive attitudes observed may support effective oral health promotion efforts.

KEYWORDS: Adults, Oral Health, Benin City, Knowledge, Attitudes, and Practices.

INTRODUCTION

Oral health encompasses the state of the oral cavity and its associated tissues, facilitating an individual's ability to eat, speak, and socialize without experiencing active disease, discomfort, or embarrassment; it plays a role in contributing to overall health.¹ Oral health remains an important component of an individual's general health and wellbeing and involves the maintenance of good oral hygiene, as a means of keeping the teeth and gums intact.² Optimal oral health enhances both the appearance and well-being of an individual while sustaining essential oral functions.² Despite significant progress in oral health in the contemporary world, there are still existing gaps, leading to a substantial burden of oral health diseases.³ These gaps may be a result of the failure of populations to adopt healthy oral health practices that are imperative in influencing common oral diseases such as dental caries and periodontal disease, diseases hinged mainly on an individual's behaviour.³

The oral health of individuals in developing countries is said to be on the decline,⁴ and this, may be attributed to poor awareness and inappropriate access to oral health care. In these nations lacking effective oral disease awareness and prevention programs, there is a notable increase in the prevalence of dental caries, gingivitis, and periodontitis.² Other factors such as the patient's illness/health-seeking behavior, cultural/religious beliefs, myths, fallacies, and dental phobia militate against optimal oral health among Nigerians.

Knowledge is characterized as a 'familiarity, awareness, or comprehension of something, encompassing facts (descriptive knowledge), skills (procedural knowledge), or objects (acquaintance knowledge)'.⁵ Meanwhile, attitudes refer to 'a learned predisposition to think, feel, and act in a particular way towards a given object or class of objects,' while practices involve the repetitive act of

contemplating and engaging in a specified behaviour.⁶ Moreover, behaviors are the products, in the form of actions, of longstanding attitudes.⁶ Oral health knowledge is considered 'invaluable, for developing healthy behaviors' more so, there has been a lot of documentation on the association between increased knowledge and improved oral health.⁷ Health-related practices are more likely to be embraced when individuals feel a heightened sense of control over their health, coupled with a comprehensive understanding of diseases and their causes.⁷

Similar studies have been carried out on the present subject area, and in the demographic locality of the present study, however, to the best of our knowledge, no work has been done on the present study population: the general population. This study aims to assess the knowledge, attitudes, and practices, related to the oral health of the adult population in Benin City, Edo State.

MATERIALS AND METHODS

This was a cross-sectional study conducted between August and December 2021 among adult participants who presented at a dental outreach program in three local government areas [Ikpoboba-Okha, Oredo, and Egor] in Benin City, Edo State.

The sample size was calculated using the Cochran formula for single samples, as the outcome variable was a proportion. Using a type I error of 0.05 ($Z = 1.96$), an expected proportion (p) of 93.5% (Etetafia et al., 2018), and a 5% margin of error ($d = 0.05$), the minimum sample size was determined to be 93. Since this was less than 10% of the study population (1,086,882), no adjustment was needed. A larger sample size of 200 was used for this study. A convenience sampling technique was employed, and 198 adults were interviewed, as two declined participation. Persons who presented at the Dental outreach programme venue, were eighteen years of age or older, and gave informed consent were recruited into the study; meanwhile, those who did not present at the Dental outreach program venue, were less than eighteen years of age, and didn't give informed consent were excluded from the study.

The data collection instrument was a researcher-administered proforma and consisted of three sections; section A sought information on the socio-demographics of the participants. Section B assessed information on the knowledge, attitudes, and practices of participants related to oral health, meanwhile, section C involved a clinical examination of the respondents' mouths with the aid of a bright light source, dental explorer, and mouth mirror. The proforma was administered by five dental surgeons.

The decayed, missing, and filled teeth (DMFT/dmft) index was used to assess the respondents' caries experience; the index describes the number of carious lesions in an individual. It numerically expresses the caries prevalence by calculating the number of decayed, missing teeth due to caries and filled teeth.¹¹ The sum of the three figures obtained gives the DMFT/dmft value. The restorative index, a measure of restorative care for those who had experienced dental caries, was also calculated. It represents the number of filled teeth divided by the sum of filled and decayed teeth, expressed as a percentage.¹²

The oral hygiene status was assessed using the simplified oral hygiene (OHI-S) index.¹³ The OHI-S index is made up of debris and calculus components. The OHI-S score was obtained by summing the debris index and calculus index scores of a patient after examination of the

buccal and lingual surfaces of the six index teeth (the upper first molars, lower first molars, upper right central and lower left central incisors). A score of 0 – 1.2 indicates good, 1.3 – 3.0: fair, and 3.1 – 6.0: poor oral hygiene. Data generated from this study was entered, cleaned, and analyzed using the IBM® SPSS® Statistics version 25 software. Descriptive data was expressed as frequencies and percentages. The mean percentage of knowledge, attitude and practices was expressed as poor: < 50%; fair: 50% – 69.99% and good: ≥ 70%. The level of significance α was set at 0.05. The study's protocol was reviewed by the Ministry of Health, Edo State. Written informed consent was obtained from participants using the Nigerian National Health Research Ethics Code model¹⁴ verbal assent was sought and obtained from the participants.

RESULTS

Data from 198 respondents aged 18 – 74 were recorded and analyzed. The median age of the respondents was 39 (IQR: 30 – 47); the age of the respondents was not normally distributed (Kolmogorov-Smirnov statistic = 0.066, $p < 0.034$; Shapiro-Wilk's statistic = 0.981 $p < 0.008$) Meanwhile, the gender distribution was almost the same, with 96 (48.50%) of respondents being male, and 102 (51.50%) of respondents, female. Most respondents were Christians, married, had a tertiary level of education, and resided in Ikpoba-Okha local government area, meanwhile, more than two-fifths of respondents belonged to the Bini ethnic group [Table 1].

Table 1: Sociodemographic characteristics of respondents.

VARIABLE	FREQUENCY (%)
Respondent LGA of Residence	
Oredo	111 (56.1)
Ikpoboba-Okha	24 (12.1)
Egor	63 (31.8)
Ethnicity	
Bini	90 (45.4)
Esan	24 (12.1)
Urhobo	14 (7.1)
Igbo	19 (9.6)
Yoruba	14 (7.1)
Etsako	9 (4.5)
Others*	28 (14.1)
Religion	
Christianity	194 (88.0)
Islam	3 (1.5)
African Traditional religion	1 (0.5)
Marital Status	
Single	58 (29.3)
Married	136 (68.7)
Divorced/Separated	3 (1.5)
Widowed	1 (0.5)
Educational level	
Not literate	1 (0.5)
Literate	9 (4.5)
Primary	10 (5.1)
Secondary	77 (38.9)
Tertiary	101 (51.0)
TOTAL	198 (100)

*Others: Ora; Afemai; Isoko; Tan; Ika; Itsekiri; Owan; Kwale; Ijaw & Anang.

Regarding respondents' knowledge of oral health, 94 out of 198 respondents (47.5%) correctly identified bacteria as the cause of dental caries and gum disease. A substantial majority, 149 respondents (75.3%), disagreed with the notion that gum bleeding is normal when brushing teeth. Furthermore, 163 respondents (82.3%) agreed that consuming processed sugary foods could lead to tooth decay. In terms of the active ingredient in toothpaste, 111 respondents (56.1%) correctly identified fluoride. However, only 34 respondents (17.2%) recognized that it was advisable to brush one's teeth after meals. Turning to the consequences of dental caries, 91 respondents (46.0%) identified tooth pain as a possible outcome. Additionally, 145 respondents (73.2%) acknowledged that dental plaque and calculus can contribute to mouth odour, while 123 respondents (62.1%) were familiar with the term 'fluoride' [Table 2].

Table 2: Oral health knowledge of the respondents.

ORAL HEALTH KNOWLEDGE	FREQUENCY (%)
Dental caries (cavities) and gum disease are caused by?	11 (5.5)
Virus and protozoa	94 (47.5)
Bacteria	10 (5.1)
None of the above	72 (36.4)
I don't know	11 (5.6)
Infection and worms	
Is gum bleeding normal when the teeth are brushed?	29 (14.6)
Agree	149 (75.3)
Disagree	20 (10.1)
I have no idea	163 (82.3)
Can eating processed sweet foods frequently cause tooth decay?	14 (7.1)
Agree	21 (10.6)
Disagree	111 (56.1)
I have no idea	5 (2.5)
What is the active ingredient in toothpaste?	8 (4.0)
Fluoride	74 (37.4)
Chloride	
None of the above	34 (17.2)
I don't know	42 (21.2)
In relation to meals, when should one brush one's teeth?	92 (46.5)
After meals	24 (12.1)
Before meals	6 (3.0)
Before breakfast, after supper	91 (46.0)
Before breakfast only	34 (17.2)
Others*	45 (22.7)
Untreated holes/cavities may lead to	28 (14.1)
Pain in the teeth	
Holes/cavities developing in other teeth	145 (73.2)
Pain in the teeth and holes/cavities developing in other teeth	10 (5.1)
Others**	43 (21.7)
Dental plaque and calculus (tartar) can be a source of mouth odour	123 (62.1)
Agree	75 (37.9)
Disagree	
I have no idea	
Do you know what 'fluoride' is?	
Yes	
No	
Mean percentage oral health knowledge = 57.5%	
TOTAL	198 (100)

*Others: In between meals; After breakfast. **Others: Fractured teeth; I don't know.

In terms of the respondents' attitudes toward oral health, 182 out of 198 respondents (91.9%) concurred that regular check-ups with a dentist are effective in preventing dental problems. A significant majority, 193 respondents (97.5%), acknowledged the importance of their teeth. However, a minority of 23 respondents (11.6%) held the belief that the condition of one's teeth is predetermined at birth and is unrelated to self-care practices. Conversely, a substantial 186 respondents (93.9%) recognized the significance of self-care in preventing dental issues. Moreover, 45 respondents (22.7%) admitted to experiencing fear or nervousness concerning dental treatment, and 40 respondents (20.2%) expressed the view that maintaining a clean mouth is not of great importance. Additionally, 26 respondents (13.1%) agreed that smoking does not impact negatively on dental health, while 15 respondents (7.6%) asserted that dental check-ups are inconsequential and represent a waste of time [Table 3].

Table 3: Oral health attitude of the respondents.

ORAL HEALTH ATTITUDE	FREQUENCY(%)
Regular check-up by the dentist prevents dental problems	182 (91.9)
Agree	6 (3.0)
Disagree	10 (5.1)
I have no idea	
The state of my teeth is of great importance to me	193 (97.5)
Agree	1 (0.5)
Disagree	4 (2.0)
I have no idea	
The state of one's teeth is decided at birth and has nothing to do with self-care	23 (11.6)
Agree	142 (71.7)
Disagree	33 (16.7)
I have no idea	
Self-care is important for preventing dental problems	186 (93.9)
Agree	10 (5.1)
Disagree	2 (1.0)
I have no idea	
Dental treatment makes one afraid/nervous	45 (22.7)
Agree	137 (69.2)
Disagree	16 (8.1)
I have no idea	
Having a clean mouth is not very important	40 (20.2)
Agree	155 (78.3)
Disagree	3 (1.5)
I have no idea	
Smoking in any form doesn't impact negatively on one's teeth and gums	26 (13.1)
Agree	148 (74.7)
Disagree	24 (12.1)
I have no idea	
Dental check-ups and treatments are irrelevant and a waste of time	15 (7.6)
Agree	174 (87.9)
Disagree	9 (4.5)
I have no idea	
Mean percentage oral health attitude = 83.1%	
TOTAL	198 (100)

Concerning the oral health practices of the respondents, it is notable that 73 out of 198 respondents (36.9%) disclosed having previously visited a dentist. A significant proportion, 75 respondents (37.9%), indicated that they resort to consulting a patent medicine store when experiencing toothaches or gum bleeding/pain. Surprisingly, only 8 respondents (4.0%) reported visiting the dentist biannually for regular

check-ups. Furthermore, a vast majority, 193 respondents (97.5%), confirmed using a toothbrush and toothpaste for their daily dental hygiene routine. An even higher number, 197 respondents (99.5%), stated that they brush their teeth every day, with 93 of them (47%) adhering to brushing twice a day. Additionally, all respondents reported including tongue brushing as part of their oral care regimen, and a substantial 127 respondents (64.1%) devoted more than three minutes to brushing. When it came to changing their toothbrush, 141 respondents (71.2%) adhered to a three-month replacement schedule, and 97 respondents (47.0%) reported using toothpicks as part of their dental care routine [Table 4].

Table 4: Oral health practices of the respondents.

ORAL HEALTH PRACTICE	FREQUENCY(%)
Have you ever visited a dentist before now?	
Yes	73 (36.9)
No	125 (63.1)
When you have a toothache or bleeding/painful gum what do you always do?	
I consult a patent medicine store	75 (37.9)
I use 'touch and go' or dental powder	26 (13.1)
I consult a dentist	36 (18.2)
I consult peers, relatives, or herbalists for advice	50 (25.3)
Others*	11 (5.5)
When do you usually visit the dentist?	
Only when I have toothache/pain or dirt/tartar on the teeth	66 (33.4)
Every six months	8 (4.0)
I have never visited	124 (62.6)
What tools do you use for cleaning your teeth?	193 (97.5)
Toothbrush and toothpaste	5 (2.5)
Others**	
How often do you brush your teeth?	197 (99.5)
Daily	1 (0.5)
Occasionally	
If you brush your teeth daily, how many times do you do it?	1 (0.5)
No, I don't brush daily	98 (49.5)
Once	93 (47.0)
Twice	6 (3.0)
Three times	198 (100.0)
Do you brush your tongue?	0 (0.0)
Yes	
No	71 (35.9)
How much time do you spend brushing?	127 (64.1)
Less than 3 minutes	
3 – 5 minutes	5 (2.5)
How often do you change your toothbrush?	141 (71.2)
Once per year	20 (10.1)
Every three months	31 (15.7)
Every six months	1 (0.5)
Only when it becomes worn down or gets lost	
I use charcoal and water	74 (37.4)
Do you use any of these in addition to toothbrushing?	97 (49.0)
None	20 (11.1)
Toothpick	7 (3.5)
Dental floss and antibacterial mouthwash	
Others***	
Mean percentage oral health practice = 55.0%	
TOTAL	198 (100)

*Others: I use warm water and salt; I apply toothpaste. **Others: Chewing stick; Charcoal; Salt and water. ***Others: a combination of dental floss and toothpick; a combination of toothpick and mouthwash; a combination of dental floss, toothpick

A majority of respondents, constituting 147 individuals (74.2%), were found to be free from dental caries, resulting in a caries prevalence rate of 25.8%. Looking at the prevalence rate across genders, 76 female participants, or 74.5% were caries-free, yielding a caries prevalence of 25.5%. In comparison, 71 male individuals (74.0%) were caries-free, resulting in a caries prevalence of 26.0%. The mean DMFT (Decayed, Missing, Filled Teeth) score among all respondents was calculated to be 0.78; the proportion of decayed, missing, and filled teeth was 55.8%, 42.9%, and 1.3% respectively. Among the individuals who had a DMFT ≥ 1 , dental caries accounted for 55.8%, and, of these, 43.3% had only one carious lesion DT = 1. Notably, the mean DMFT for males was slightly higher at 0.86, while for females, it was marginally lower at 0.72. The restorative index among this study's participants was 2.25%

Concerning the evaluation of oral hygiene status, a normality test was computed to ascertain the normality of the oral hygiene status variable among the respondents (Kolmogorov-Smirnov statistic = 0.105, $p < 0.001$; Shapiro-Wilk's statistic = 0.959 $p < 0.001$). As the oral hygiene status scores of the respondents were not normally distributed the median was employed as the measure of central tendency. Thus, the median Debris Index score (DI-S) was determined to be 1.33 (IQR: 1.00 – 1.67), and the median Calculus Index score (CI-S) was 0.83 (IQR: 1.33 – 0.33), yielding a median Oral Hygiene Index score (OHI-S) of 2.00 (IQR: 1.33 – 2.83) It is worth highlighting that the median OHI-S was significantly higher among males (2.33 [IQR: 1.50 – 3.00]) compared to females (1.67 [IQR: 1.29 – 2.50]) after computing a Mann-Whitney U test ($U = 3667$, $p < 0.004$).

DISCUSSION

In this study, respondents exhibited fair oral health knowledge and practices, while demonstrating good oral health attitudes. The methodology employed in this study involved collecting responses from the participants on each item of the knowledge, attitude, and practices proforma and calculating the proportion of selected responses. This approach was chosen over assigning numerical scores to individual responses as it gives a true good representation of the findings, though it also prevented certain statistical analyses from being computed. Although the study used convenience sampling based on the study's specific context, this does not diminish the significance of the findings or contributions to the existing body of knowledge. Also, the proforma was interviewer-administered as opposed to self-administered, which prevented incomplete responses, and inaccuracies.

The overall oral health knowledge among the respondents was assessed as fair. This finding aligns with previous studies¹⁵⁻¹⁶ but contrasts with some other enquiries¹⁷⁻¹⁸ a discrepancy that may be attributed to the heterogeneity of the study populations. Approximately half of the respondents demonstrated knowledge of the causative organism of dental caries, while nearly three-quarters were aware that gingival bleeding should not occur during toothbrushing. Furthermore, more than four-fifths of the respondents believed that the consumption of sugary foods could lead to dental caries. In addition, over half of the respondents were familiar with fluoride and recognized it as the active ingredient in toothpaste. Almost half of respondents reported brushing their teeth before breakfast and after supper as their daily routine, indicating a potential deficiency in oral health education in the study area,

highlighting the necessity for comprehensive oral health education program's. Likewise, more than half of the respondents were aware that toothache could result from dental caries, while more than seven-tenths understood the relationship between tartar and mouth odor.

The overall oral health attitude among the respondents was evaluated as good. This finding was consistent with some previous reports^{17,19} but disagreed with some other studies^{15,20} a disparity that may be attributed to differences in the study settings, specifically the distinction between rural and urban environments. A significant proportion, exceeding eight-tenths of the respondents, demonstrated an understanding of the importance of regular dental check-ups, the significance of self-care in preventing dental diseases, and held a high level of esteem for the condition of their teeth. Similarly, more than seven-tenths of the respondents believed that smoking had a detrimental impact on their teeth, considered maintaining a clean mouth as important, and acknowledged the notable influence of self-care on the condition of their teeth. These findings indicate a positive and health-conscious oral health attitude among the study participants.

The overall oral health practices among the respondents were assessed as fair. This finding was in consonance with some previous studies^{15,19} but was at variance with some other investigations^{17,21} and may be ascribed to sociocultural variations between the study populations. More than half of the respondents had never visited a dentist, and only eight respondents reported visiting a dentist twice yearly. Additionally, fewer than one-fifth of respondents consulted a dentist in cases of toothache, gingival bleeding, or pain. On the positive side, nearly all respondents reported using a toothbrush and toothpaste for their daily dental hygiene routine, with the majority brushing their teeth daily. Among those who brushed daily, almost half brushed once a day. Furthermore, all respondents mentioned including tongue brushing as part of their oral care regimen. A significant majority, more than seven-tenths, replaced their toothbrush every six months, and more than six-tenths spent more than three minutes during each tooth-brushing session. However, only approximately one-tenth of respondents reported using antibacterial mouthwash or dental floss, indicating a potential area for improvement in oral hygiene practices.

This study evaluated respondents' oral health knowledge, attitudes, and practices, revealing fair knowledge and practices but good attitudes. Gaps in knowledge and practices highlight the need for targeted oral health education; good attitudes create a foundation for effective oral health promotion. Future research should focus on comparative analyses, longitudinal studies, intervention effectiveness, cross-cultural examinations, and advanced statistical analyses to inform tailored interventions and policies for diverse populations.

CONCLUSION

This study assessed respondents' oral health knowledge, attitudes, and practices, revealing fair knowledge and practices but good attitudes. There are notable gaps, particularly in oral hygiene knowledge and practices. The positive attitudes recorded in the present study provide a scaffold for effective oral health promotion.

RECOMMENDATION

We strongly advocate for an intensified emphasis on oral health education and promotion, led by dentists and dental care professionals. This imperative focus should extend not only to dental offices but also to community-level initiatives and schools. Recognizing that adults were once children, enhancing educational efforts during routine dental visits and within educational institutions will profoundly contribute to elevating overall oral health awareness and fostering healthier practices.

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