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Knowledge, Attitude and Practice of Good Oral Hygiene among Pregnant Women in Rivers State, Southern Nigeria – A Multicenter Study

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Authors' contributions

This work was carried out in collaboration between both authors. Author OCH designed the study, wrote the protocol and wrote the first draft of the manuscript. Author IEH performed the statistical analysis and literature search. Both authors read and approved the final manuscript.

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ABSTRACT

Background: Poor oral hygiene during pregnancy has been reported to be associated with an increased rate of gingivitis, dental caries, periodontal disease, and tooth decay.
Objectives: This study aimed to assess the knowledge, attitude, and practices of good oral hygiene among pregnant women in Rivers State, Nigeria. Specifically, it would evaluate their knowledge and awareness of good oral hygiene. It would also evaluate the rate of oral hygiene practices such as frequency of tooth brushing, type of toothpaste, use of dental floss, the rate of a dental check-up and professional teeth cleaning. It would also evaluate the signs of poor oral hygiene, dental education during pregnancy and self-reported oral pathology.
Methods and Materials: A descriptive cross-sectional study, conducted among 224 antenatal care women in three selected hospitals; Rivers State University Teaching Hospital, General Hospital Bonny, and Nigeria Liquefied Natural Gas Hospital, all in Rivers State, Nigeria. A two-phase sampling technique was used to select the days for sample collection, and the subjects. A structured questionnaire was distributed and filled by the participants, and relevant information on knowledge, attitude, and practice of oral hygiene was obtained and analyzed.

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Results: The level of awareness of oral hygiene among the women was very high, Odds ratio = 11.2 [7.18, 17.41]. However, this did not reflect appreciably in their oral hygiene practices. Only 24.1% consulted a dentist in the index and previous pregnancies, 59.4% have never had professional teeth cleaning, and only 8.0% clean their teeth every 6 months. The use of dental floss was low (32.1%), however 78% used toothbrush with paste, and 56% brushed twice daily. Only 10.7% of the women received oral hygiene educated during antenatal classes. The most prominent sign of poor mouth hygiene was bad breath 97(19.3%), and bleeding gum 60(22.4%) was the most common self-reported dental pathology.
Conclusions: The pregnant women in Rivers State, Nigeria have good knowledge of oral hygiene, but relatively poor attitude and practices, especially with a dental consultation, professional teeth cleaning and use of dental floss. Secondly, Nigerian women are not given proper oral hygiene education during antenatal classes. Integration of oral health into antenatal care could improve most of the poor oral hygiene indices, and the complications associated with it.

Keywords: Knowledge; oral hygiene; attitudes; practice; pregnant women.

1. INTRODUCTION

The gestational period in humans is 280 days or 42 weeks, and it is characterized by physiological changes designed to accommodate the growing foetus. This maternal adaptation to pregnancy stabilizes the maternal homeostasis, and keeps the women physically, mentally and psychologically fit, and competent to cope with the challenges of pregnancy [1]. Almost all organs and systems in the body are involved in these dynamics, including the oral cavity. Though the intent of nature is for good, these changes sometimes directly or indirectly result in adverse effects [1,2].

Concerning the oral cavity, hormonal changes such as an increase in estrogen and progesterone, in conjunction with poor oral hygiene, could significantly alter the oral architecture [3]. This could lead to pathological conditions like gingival hyperplasia, gingivitis, pyogenic granuloma, increased tooth mobility, tooth erosion, melasma, ptyalism and dental caries [3,4]. During pregnancy, progesterone increases blood flow to the gingival tissues, with fluid and water retention. This could lead to irritation, swelling and tenderness. It has been reported that this, in combination with poor oral hygiene during pregnancy highly predispose women to periodontal disease [4,5].

Periodontal disease is a serious infection characterized by swelling, redness and tenderness of the gum gums [5,6]. Pregnancy highly predisposes to periodontal disease, and in Sudan, the prevalence rate during pregnancy was reported as 24% [7]. Pregnant women are vulnerable because up to 60 – 70% have gingivitis, which is the early stage of periodontal disease [8,9]. Some authorities however believe that the increased nausea and vomiting during pregnancy causes poor oral hygiene, and it could cause gum irritation, and trigger or aggravate the periodontal disease [10,11].

The danger of periodontal disease in pregnancy relies on its potential to cause pregnancy-induced hypertension, preterm labour and delivery of low birth weight babies [12,13]. Cytokines such as interleukin 6 and 8 and PGE2 have been reported as the pathological catalyst, and significant levels have been found in the amniotic fluid of these women [12].

Gingivitis has been identified by various studies as the commonest dental pathology during pregnancy and very high prevalence rates ranging from 60 – 70% have been reported [8]. It is characterized by inflammation of the gums with swelling, tenderness, receding gum and gums that bleed easily during brushing. The commonest cause of gingivitis is poor oral hygiene, and evidence indicated that good oral habits, like regular dental checks, daily flossing and twice-daily brushing not only prevent but could reverse gingivitis [13].

Another very common dental pathology during pregnancy is dental caries, also referred to as cavity or tooth decay. It is characterized by permanent areas in the teeth that develop into a tiny hole and could lead to toothache, infection and tooth loss. Pathologically, there is progressive destruction of the tooth structure (enamel and dentin) secondary to demineralization. Causes of dental caries include bacteria producing acid from food debris and

sugary drinks and by poor oral hygiene [6]. Poor oral hygiene preserves these bacteria as dental plaques and calculi, the bacteria metabolise sugar in food particles and drinks to produce acids, which in turn breaks down the tooth enamel, with cavity formation [6,14].

It has been reported that pregnant women are more prone to dental caries because of hormone-mediated increased acidity in the oral cavity, increased appetite for snacks, sugary food, drinks and sweets. It has also been proven that good oral hygiene during pregnancy, with regular tooth brushing and flossing, removes bacteria from the mouth and prevents dental caries [9,15].

Oral pyogenic granuloma of pregnancy or granuloma gravidarum is a benign tumor-like growth in the oral cavity, which results from the reactive hyperplasia of the connective tissues in response to local irritants [5]. The commonest site is the gingiva, less common sites include the buccal mucosa, lips and palates. The prevalence rate during pregnancy is estimated at 1-1.5%, and risk factors include a history of granuloma in a previous pregnancy, poor oral hygiene, gingivitis, oral plaques [5,16].

The rate of tooth mobility also increases during pregnancy; it is the horizontal or vertical displacement of a tooth beyond its normal physiological boundaries. Pregnant women are predisposed as a result of hormonally induced mineral changes in tooth support, mainly the lamina dura and periodontal ligament [17]. Other causes of tooth mobility are supra and subgingival plaques, dental caries located close to the gums, and poor oral hygiene [17,18].

From the evidence above, it could be deduced that poor oral hygiene is a strong risk factor for oral diseases during pregnancy. This was further affirmed by findings from a previous study, which concluded that improper oral hygiene practices and attitude results in poor oral health, indicated by dirty teeth, tooth decay, improper brushing, bad breath and bleeding gums [19]. In another study, the indices of good oral hygiene attitude and practices were reported as twice-daily tooth brushing with fluoride toothpaste, daily flossing, and mouth rinsing with mouthwash or water, and six-monthly professional teeth cleaning [19,20,21].

KAP studies in Egypt and Lagos in Nigeria, reported that antenatal women had good knowledge of oral hygiene, but there was a gap between knowledge and oral hygiene practices. Oral health education for antenatal women was therefore advocated [21,22]. A similar study has done elsewhere identified a significant gap in knowledge, practice and attitude of oral hygiene among pregnant women. They identified a lack of access to dental care facilities as a major factor militating against oral health among antenatal women in many countries globally [23,24].

Oral hygiene during pregnancy has been an issue of public health interest for decades, and several articles have been published on this subject matter. However, there is a dearth of publications in this environment. This study intends to evaluate the degree of awareness, attitude and practice of oral hygiene among pregnant women in Rivers State, southern Nigeria. It would provide an insight into Nigeria's current situation on oral health among pregnant women. It would also serve as a fulcrum to formulate a comprehensive antenatal oral health policy in Nigeria.

2. OBJECTIVES

This study aimed to assess the knowledge, attitude and practices of good oral hygiene among pregnant women in Rivers State, Nigeria. Specifically, it would evaluate their knowledge and awareness on good oral hygiene. It would also evaluate the rate of oral hygiene practices among the women, such as frequency of tooth brushing, type of toothpaste, use of dental floss, the rate of a dental check-up, and professional teeth cleaning. It would also evaluate the signs of poor oral hygiene, dental education during pregnancy and self-reported oral pathology. Finally, it would evaluate the socio-demographic characteristics of women.

3. MATERIALS AND METHODS

3.1 Study Population

Pregnant women who booked and attended antenatal care (ANC) in 3 selected hospitals in Rivers State, Southern Nigeria.

3.2 Study Sites

It was a multicentre study carried out in 3 selected hospitals in Rivers State. These are Rivers State University Teaching Hospital (RSUTH), General Hospital Bonny (GHB), and Nigeria LNG Industrial Hospital (NLNG Hospital).

General Hospital Bonny (GHB) and Nigeria LNG Industrial Hospital (NLNG Hospital) are located in Bonny Island. The Island is located at the edge of the Atlantic Ocean in Rivers State in the Niger Delta region, in Nigeria. It is the headquarters and the most populated city in Bonny Kingdom. Its strategic location attracts a beehive of Oil and Gas exploring and exporting activities. As a result, it hosts almost all the major Oil and Gas companies in Nigeria, including NLNG, and Shell Petroleum Development Company of Nigeria (SPDC). It has a surface area of 249.27 sq. meters (645.60 km²) and an estimated population of 214,983.

The Rivers State University Teaching Hospital (RSUTH) is located in heart of Port Harcourt, the capital of Rivers State. Port Harcourt is a densely populated area, with an estimated population of 1,865,000 inhabitants in 2016.

RSUTH being a tertiary hospital serves as a referral centre for the entire Rivers State and some communities in the neighbouring states, such as Abia, Imo and Bayelsa States. GHB serves as a referral hospital for the entire bonny kingdom and its environs and the NLNG Hospital is a high grade and standard hospital that receive multinational patients (including expatriates) working in most of the major Oil and Gas companies in Bonny Island, and Port Harcourt. While RSUTH and GHB receive patients that truly reflect the Nigerian society, which includes women with low socioeconomic class, and low educational background, NLNG Hospital was selected with the intent to include the perspective of the highly privileged population.

3.3 Study Design

This study was a descriptive cross-sectional multicentre study carried out from 1st of March 2018 to 30th August 2018 and the participants were pregnant women who received antenatal care at the three selected hospitals during the period of study.

3.4 Sample Size Power Analysis

The sample size formula for a descriptive study was employed. The minimum sample size:

$n = Z^2pq/d^2$ where n=sample size,

d = degree of precision (0.05);

Z = standard normal deviate (1.96 at 95% Confidence Interval);

p = proportion of the population projected to have a good knowledge of oral hygiene. 0.84% was used based on a previous study in Benin City, Nigeria, [20] and q = 1- p.

Thus, the minimum sample size calculated was 207. An additional 20% was added to accommodate attritions, to give a total sample size of 248.

3.5 Distribution of Sample Size among the Selected Hospitals

Based on the calculated sample size of 248 (as stated above), the respective sample size for each hospital was distributed as follows:

(1) 83 for NLNG Hospital,
(2) 83 for RSUTH and
(3) 82 for GHB.

3.6 Sampling Procedures

During the period of study, a total of 494, 1680, and 1800 patients attended ANC at NLNG Hospital, GHB, and RSUTH respectively. The two-phase sampling technique was used for participants' selection.

3.6.1 First phase (selection of ANC days for sample collection)

RSUTH and GHB hospitals run antenatal clinics for five days in a week (every working days), while NLNG Hospital provides ANC services only on Wednesdays (once a week). A simple random sampling approach (balloting) was used to pick two days out of the five ANC days in RSUTH and GHB hospitals. While once a week sample collection was done in NLNG Hospital.

3.6.2 Second phase (selection of participants)

Systematic random sampling was used to select the respondents on each chosen clinic day. To choose the sampling interval, a dice was tossed, and an interval of 3 was obtained. Therefore on each day of patient recruitment, every third respondent that consented was recruited for this study. This was done until the minimum sample size was obtained in 8 weeks.

3.7 Pilot Study

Before the commencement of the main study, a pilot study was conducted to test the comprehensiveness, clarity and validity of the

Table 1. Socio-demographic and obstetrics characteristic

Variables	Frequency (n=224)	Percent (%)
Age group (years)		
18 – 30	102	45.5
31 – 43	110	49.1
≥ 44	12	5.4
Marital status		
Married	189	84.4
Single	26	11.6
Widowed	8	3.5
Divorced	1	0.4
Level of education		
Primary	7	3.1
Secondary	66	29.5
Tertiary	145	64.7
Non formal	6	2.7
Ethnicity		
Ijaw	50	22.3
Hausa	17	7.6
Igbo	98	43.8
Yoruba	25	11.1
Other tribes	34	15.2
Gestational age (by last menstrual period)		
≤ 12 weeks	31	13.8
13 – 28 weeks	66	29.5
29 – 36 weeks	85	38
37 – 42 weeks	23	10.3
Not sure of date of LMP	19	8.6
Parity		
Para 0	55	24.5
Para 1	94	42
Para 2	38	17
Para 3 and above	37	16.5

The mean maternal age was 32.0 ± 8.6 years, the mean parity was 2.08 ± 1.12, and the mean gestational age was 30.0 ± 5.7 weeks. Most 145(64.7%) of the women attained secondary education, and women from the Igbo speaking tribe 98(43.8%) were predominant

questionnaire used for this study. The questionnaire composed of 41 closed-ended structured questions was pre-tested with 25 antenatal patients, selected from the 3 respective hospitals used for this study. The same method of sampling was applied for patient selection.

Only 14 (56%) respondents completed their questionnaire correctly. In 11 (44%) there was error, and some were not completed. The most outstanding reason was that they did not understand the medical terms used. Following the feedback, the questionnaire was redesigned and simplified.

3.7.1 Inclusion criteria

Included in this study were pregnant women who registered for, and attended ANC at the selected hospitals and gave written consent to participate in this study.

3.7.2 Exclusion criteria

Excluded from this study were women who did not consent to participate in this study, un-booked patients, and patients who presented at the antenatal clinics with obstetrics complications and were too ill to be interviewed. For the same reason, booked patients on admission were also excluded. Finally, those who participated in the pilot study (stated below) were excluded.

3.8 Data Collection

On each day of data collection, detailed information about this study was put across to all the pregnant women in the antenatal clinics at the selected sites. This was done both verbally

and via a participant's information sheath (PIS). Relevant concerns, especially possible complications and the right to withdraw from the study were promptly addressed. Also, questions concerning technical details about the research protocol were answered as appropriate.

A well structures questionnaire (the research protocol) was then distributed among the eligible participants for completion. A total of 248 questionnaires were filled by the participants during the study period and the distribution was as follows: For RSUTH and NLNG Hospital, 83 questionnaires were filled respectively and 82 for GHB.

The questions in the questionnaire were close-ended and were divided broadly into four parts:

(1) Socio-demographic and obstetrics characteristic;
(2) Oral hygiene knowledge;
(3) Attitude towards personal and professional dental care; and
(4) Oral hygiene practices and self-reported complications of poor oral hygiene

The following data was collected.

3.8.1 Independent variables

1. Socio-demographic and obstetrics characteristics such as: age, marital status, educational level, tribe, gestational age and parity.
2. Relevant questions about awareness on oral hygiene, and attitude towards professional dental care. The details are highlighted under results (below).
3. Data on oral hygiene practices were: use and frequency of tooth brushing, cleaning agents used, flossing, dentist visits, and professional teeth cleaning.

3.8.2 Dependent (outcome) variables

1. Self reported good oral hygiene practices
2. Response when challenged with common dental problems like tooth ache
3. Self-reported dental problems experienced during pregnancy.

3.9 Respondent Rate

During the data collection process, out of a total of 248 questionnaires distributed in the 3 selected hospitals, 224 were filled correctly and used for this study, giving a response rate of 90.3%. 24 participants were excluded because of data collection errors; there were omissions, and some areas were inappropriately filled. These errors reduced the actual sample size from 248 to 224.

3.10 Research Validity and Reliability

Efforts were made throughout the data collection process to ensure internal validity, and reliability, especially on content and face validity. All tools used for this study were evaluated by research experts, and modifications were made to accommodate their suggestions.

To establish inter-examiners reliability, all queries about the questionnaire were addressed by only the researcher. Communication via phone was employed when distance poses a barrier.

Data collected from the 224 respondents were checked for errors using SPSS statistical software, and it was found to be error-free, and Cronbach's alpha reliability test was 0.708.

3.11 Data Analysis

Data was fed into SPSS version 24 spread sheath, and EPI info software version 7 and analysed. The data were presented as proportion, frequency, and mean with standard deviation and tables. Categorical variables were compared using Pearson's Chi-square ($\chi 2$), and P value was deemed significant at <0.05 at 95% confidence interval.

4. RESULTS

The most predominant source of information 64 (28.6%) about oral hygiene in this study was the media, most women 70 (31.2%) were aware that dental visits should be 6 monthly. Tooth brushing with fluoride paste 160 (41.5) was identified as the best attribute to good oral hygiene, and irregular tooth brushing was regarded as the predominant source of poor oral health. Bad breath 97 (19.3%) was reported as the commonest sign of poor oral health.

Most women 77 (34.4%) believe that their knowledge of oral hygiene was good, this has also reflected in the significantly high level of awareness on oral hygiene among the participants. P = 0.0001, Odds Ratio = 11.2 [7.18, 17. 41].

Significantly more women believe that dental treatment is safe during pregnancy, Odds Ratio = 2.30 [1.57, 3.31]. Most women 106(47.3%) were not aware that poor oral hygiene could lead to poor pregnancy outcomes. However, they acknowledge the fact that dental problems could affect the general health of an individual, Odds Ratio = 2.97 [2.01, 4.30].

Significantly fewer women received dental hygiene education in the index and previous pregnancies, Odds Ratio = 0.64 [0.44, 0.93], and the majority of the women believe that more information and teaching is required. P = 0.0001, Odds Ratio = 5.32 [3.42, 7.64].

Majority of the patients 125(55.8%) were of the opinion that regular dental check-up was necessary during pregnancy. However, significantly more women did not consult a dentist in the index pregnancy, P = 0.0001, Odds Ratio = 9.91 [6.43, 15.3], and in previous pregnancies, P = 0.0001, Odds Ratio = 0.29 [0.19, 0.42].

The most reported reason for consulting a dentist in the current pregnancy was dental cleaning 15 (17.8), and for those who did not visit a dentist, the absence of a serious dental problem 77 (45.3%) was the commonest reason.

By far, the predominant oral hygiene cleaning agent used during pregnancy 202 (90.2%) was toothbrush with paste, most of the women 97 (48.0%) brushed their teeth twice daily, especially morning and night 107 (47.7%). Most of the women 61 (27.3%) spent over 3 minutes brushing their teeth.

Evidence from this study indicates that most women 157 (67.9%) did not use dental floss, and among the users, the frequency was predominantly 3 times daily 49 (21.9%), the majority of the women 70 (31.3%) used toothpaste with fluoride.

Concerning professional teeth cleaning, a great majority of our women 133 (59.4%) have never visited a dentist for teeth cleaning, and only 8.0% reportedly cleaned their teeth every 6 months. When pregnant women experience bleeding gums or tooth-ache, most of the women 103 (50.0%) consulted a dentist for treatment, and 33.0% prefer to be treated by their family physician. The most common dental pathology experienced during pregnancy was bad breath 49 (21.9%), closely followed by bleeding gums 48 (21.4%). However, most of the women 62 (27.7%) go through the entire gestational period without having dental issues.

Table 2. Respondents' knowledge regarding good oral hygiene

Variables	Frequency (%)	Odds ratio	Confidence interval
Main source of information about oral hygiene (n=224)			
Media (print and electronic)	64(28.6)		
Family member	21(9.4)		
Friends	6(2.7)		
Antenatal Classes	24(10.7)		
Health Facility (e.g. Health centres)	35(15.6)		
Outdoor advertising	1(0.4)		
Work place	3(1.3)		
School	42(18.8)		
I don't know/don't remember	28(12.6)		
Knowledge on how frequent dentist should be visited (n=224)			
Every month	8(3.6)		
Three monthly	33(14.7)		
Every six months	70(31.2)		
Once a year	52(23.2)		
Whenever there is a problem	51(22.8)		
I don't know	10 (4.5)		
Awareness on attributes of good oral hygiene (n-386)			
Using brushing with fluoride toothpaste	160(71.4)		
Using baking soda to brush	10(4.5)		
Use of dental floss	43(19.2)		
Chewing sugar free gums	21(9.4)		

Variables	Frequency (%)	Odds ratio	Confidence interval
Use of tooth powder and brush	13(5.8)		
Using salt to brush	6(2.7)		
Regular dental check-ups	71(18.4)		
Using mouthwash	41(31.7)		
Chewing bitter kola	3(1.3)		
Not sure	18(8.0)		
Knowledge of cause of poor hygiene status (n=452)			
Not brushing the teeth	130(58.0)		
Irregular tooth brushing	79(35.3)		
Sweets drinks or Sugary things	66(29.5)		
Bitten mouth	8(3.6)		
Smoking	41(18.3)		
Chewing tobacco	28(12.5		
Chewing bitter kola	20(8.9)		
Non-use of dental floss	30(13.4)		
Excess carbohydrates	10(4.5)		
Other Foods	17(7.6)		
I don't know	23(10.3)		
Knowledge of signs of poor mouth hygiene status (n=502)			
Bleeding gums	81(8.0)		
Tooth loss	29(12.9)		
Dirty teeth	90(40.3)		
Bad breath	97(43.3)		
Gum pain	39(17.4)		
Toothache	48(21.4)		
Hole in tooth	54(24.1)		
Tooth discolouration	37(16.5)		
I don't know	27(12.1)		
Self-reporting on level of knowledge on oral hygiene (n=224)			
Poor	5(2.2)		
Fair	28(12.5)		
Good	77(34.4)		
Very Good	53(23.7)		
Excellent	40(17.9)		
Not sure	21(9.4)		
Self-reported patients' mouth hygiene status (n =224)			
Poor	3(1.3)		
Fair	22(9.8)		
Good	79(35.3)		
Very Good	64(28.6)		
Excellent	30(13.4)		
I don't know	26(11.6)		
What are the advantages of tooth brushing? (n=371)			
Prevents bad smell	157(70.0)		
Prevents tooth decay	119(53.1)		
Prevents gum problems	75(33.5)		
I don't know	20(8.9)		
Awareness of oral hygiene (n=224)			
Yes	164(73.2)	11.2	[7.18, 17.41]
No	44(19.6)		
I don't know/don't remember	16(7.1)		

Variables	Frequency (%)	Odds ratio	Confidence interval
Aware if dental treatment is safe during pregnancy (n=224)			
Yes	118(52.7)	2.30	[1.57, 3.38]
No	73(32.6)		
I don't know	33(14.7)		
Aware of relationship between poor maternal mouth hygiene and pregnancy outcomes (n=224)			
Yes	89(39.7)	0.73	[0.51, 1.07]
No	106(47.3)		
I don't know	29(12.9)		
Whether dental problems could affect general health (n=224)			
Yes	124(55.4)	2.97	[2.01, 4.30]
No	63(28.1)		
Not sure	37(16.5)		
Need for more information and teachings on good oral hygiene in ANC (n =224)			
Yes	143(63.8)	5.13	[3.42, 7.69]
No	53(7.1)		
I don't know	23(10.3)		
Did you receive dental hygiene education during pregnancy (previous and current)? (n=224)			
Yes	94(42.0)	0.64	[0.44, 0.93]
No	119(53.1)		

Table 3. Respondents attitude towards personal and professional dental care

Variables	Frequency (%)	Odds ratio	Confidence interval
Whether regular dental check-up is necessary during pregnancy (n =224)			
Yes	125(55.8)	1.59	[1.10, 2.30]
No	99(44.2)		
Did you consult a dentist during the current pregnancy? (n=224)			
Yes	54(24.1)	9.91	[6.43, 15.3]
No	170(75.9)		
Did you consult a dentist in the previous pregnancies? (n=224)			
Yes	78(34.8)	0.29	[0.19, 0.42]
No	146(65.2)		
Reason for consulting a dentist during the current pregnancy (n=54)			
Dental cleaning	23(10.3)		
Dental check-up	15(6.7)		
Toothache	7(3.1)		
Fillings	4 (1.8)		
Gum problems	2(0.9)		
Reason for not visiting a dentist in current pregnancy (n =170)			
I did not have a serious problem	77(34.4)		
I prefer my family physician	41(18.3)		
Fear of harm to mother or baby	12(5.4)		
Financial reasons	25(11.2)		
No dental clinic nearby	7(3.1)		
Fear of instrumentation	8(3.6)		
No time	4(1.8)		

Table 4. Respondents practices of good oral hygiene

Variables	Frequency	Percentage (%)
Oral hygiene cleaning agents used (n=258)		
Charcoal	8	3.6
Toothbrush with toothpaste	202	90.2
Tooth powder and brush	7	3.1
Mouthwash	15	6.7
Baking soda	1	0.4
Table salt	1	0.4
Chew stick	22	9.8
Sticks cut from the tree	1	0.4
Frequency of teeth brushing (n=202)		
Once every 2 days	7	3.5
Once per day	57	28.2
Twice daily	97	48.0
Three times a day	24	11.2
More than 3 times daily	17	7.6
Brushing period (n=202)		
Only Morning	58	25.9
Morning and Night	107	47.7
Morning, afternoon and evening	25	12.3
After each meal	8	4.0
Anytime	4	2.0
Estimated Duration of brushing (n=202)		
Less than one minute	9	4.0
One minute	13	5.8
Two minutes	45	20.0
Three minutes	42	18.8
More than 3 minutes and above	61	27.3
I don't know	32	14.3
Use of floss (n=224)		
Yes	72	32.1
No	152	67.9
Frequency of flossing (n=140)		
Once in 2 days	13	5.8
1 time daily	18	8.0
2 times daily	43	19.2
3 times daily	35	15.6
4 or more times daily	31	13.8
Which of the toothpaste do you prefer (n=202)		
Toothpaste with fluoride	70	31.3
Herbal toothpaste with fluoride	53	23.7
Herbal toothpaste alone	49	21.9
I use paste without knowing the content	30	13.4
Frequency of professional teeth cleaning during pregnancy in the dental clinic (n=224)		
I have never cleaned my teeth	133	59.4
I cleaned once every 3 months	10	4.5
Once every 6 months	18	8.0
Once every year	1	0.4
Once in few years	21	9.4
Only in emergency or pain	21	9.4
I don't remember	11	4.9

Variables	Frequency	Percentage (%)
What is your response when you have toothache or bleeding gums (n =224)		
See a dentist	103	50.0
See your family doctor	74	33.0
Self-medication with pills or capsules	22	9.8
I apply drug at pain or bleeding site	6	2.7
Chew herb to relieve symptoms	11	4.9
Brush teeth more often	8	3.6
Self-reported signs of poor oral hygiene experienced in the index and previous pregnancies (n=283)		
No problem was experienced	62	27.7
Bleeding gums	48	21.4
Bad breath	49	21.9
Dirty teeth	45	20.1
Shocking teeth	22	9.8
Toothache	14	6.3
Broken tooth	14	7.1
Hole in tooth	9	4.0
Tooth discoloration	8	3.6
Tooth loss	5	2.2
Displaced teeth	2	0.9
Other problems	6	2.6

5. DISCUSSION

According to FDI world dental federation, oral health is a multi-faceted, and includes the ability to speak, smile, smell, taste, touch, chew, swallow and convey a range of emotion through facial expression with confidence, and without pain, discomfort and disease of the craniofacial complex [25]. This could only be achieved among antenatal women if standard oral hygiene practices are maintained.

Though oral health is well integrated with the health care delivery services in Nigeria, its implementation in maternal and child health services seems to be inadequate, as there is no clear cut implemented oral health policy for antenatal services. As a result, our antenatal obstetrics health personals, and the pregnant women are at liberty to decide on oral matters as they wish.

Maintenance of good oral hygiene during pregnancy is of paramount importance, and it has been proven to be beneficial to the mother and fetus. Good oral health has been reported to improve the quality of life [19,21].

Evidence from this study indicates that the level of awareness of oral hygiene among our antenatal women was high (67%) Odds Ratio = 11.2 [7.18, 17.41]. This did not deviate widely from the 67% reported in a systematic review on the level of awareness of oral health among pregnant women [26]. In contrast, a low level of awareness was obtained in other centres, including Nigeria [27], Poland [28], and ESIC Medical College and Hospital in India [29].

It is very clear from this study that as obstetrics health care givers, we are not doing enough to enlighten our pregnant women on oral hygiene matters, especially poor oral hygiene and its consequences on maternal and fetal health. As evidenced in this study, the majority of our antenatal women relied on the mass media for information; only a handful (10.7%) received oral hygiene education from antenatal classes. A similar study in Lagos, Nigeria identified the need to provide antenatal oral health education for pregnant women to improve their oral health status [22]. In addition to what this author has recommended. We suggest that dental staff should be posted to the antenatal clinics to take charge of oral health education; it has the potential to significantly improve the poor oral health indices in our women.

Concerning attitude towards personal and professional dental care, the majority (55.8%) of the women in this study acknowledged the fact that regular dental visit was necessary during pregnancy. However, they did not put it to practice, as significantly more women did not

consult a dentist in the index pregnancy, P = 0.0001. This trend tends to replicate in many centres globally; in Ibadan, western Nigeria, as much as 96% of the antenatal women never visited a dentist or any other oral health provider [30]. A similar rate, 80.95% was reported in Brazil [31], 90.1% in Egypt [21] and 50% in Haryana, India. [29] Inappropriate advocacy and sensitization may be responsible for this disparity.

Routine six monthly teeth cleaning with a dentist (scaling and polishing) is regarded by many as a tool for good oral hygiene maintenance; it removes plaques, calculus, debris and stain from the teeth [32]. It has been proven to prevent tooth decay, gingivitis, and periodontal disease [32,33]. However, evidence from the systematic review and randomized controlled trial doubt its cost-effectiveness, and how frequently the routine procedure should be carried out. [34,35]. Results from a randomized controlled trial indicate that there was no difference in the frequency of plaques, if routine scaling and polishing are done on a healthy patient at 6 months (73.8%), 12 months (76.0%) and at 24 months (84.0%), P = 0.746 for both 12-month and at 24-month compared with at 6-month [36].

However, even though well-equipped dental facilities and services are available in almost all tertiary health institutions in Nigeria, including those used for this study, the majority of the women in this study have never visited a dentist for teeth cleaning, and only a handful, 8.0% routinely clean their teeth every 6 months. The response is below expectations, taking into cognizance the high level of education among the participants; 64.7% had tertiary education. This is a wakeup call for more enlightenment on oral health hygiene.

The practice of self-teeth cleaning among the participants was quite appreciable; as much as 90.2% use toothbrush with paste and the majority (48.0%) brush twice daily. However, the use of dental floss was quite low (32.1%), most of these women may use tooth pick, most probably because they have little knowledge of the advantages of dental floss. This is another area that requires enlightenment. However, it's appreciably higher than the 15.7% reported in Benin City, Nigeria [37].

Based on self-reporting, the commonest manifestations of poor oral health seen in this study were bleeding gums and bad breath. Though the scope of this study does not include clinical and antenatal complications of poor oral hygiene, some of the complications reported in other centres include gingivitis, periodontal disease, dental caries, and tooth decay [12,38]. Antenatal complications were pregnancy-induced hypertension, preterm labour and delivery of low birth weight babies [13]. Further studies are needed to verify whether similar results would be obtained in this environment.

It could be inferred from this study that the existing antenatal care structure in Rivers State, Nigeria has paid little attention to oral health education, and this has impacted negatively on the attitude and practice of oral hygiene among our women. The interventions needed to improve the situation are not complex and within reach; posting dental staff to antenatal clinics to take charge of oral health education could significantly reduce most of the negative consequences our women suffer from poor oral hygiene.

The second intervention is that of policy formulation and implementation. While in some developed countries, oral health has been accepted and integrated into the antenatal care program [23], it is not an essential component in many developing countries, including Nigeria. There is no well-established dental policy for antenatal care patients and guidelines and protocols for management of dental cases are not made available at the antenatal clinics. As a result, the pregnant women and their health care givers are at liberty to take decisions on dental issues at their discretion, instead of following laid down protocols and guidelines.

6. CONCLUSIONS

The pregnant women of the Rivers State, Nigeria pose a good knowledge of oral hygiene, but they have a relatively poor attitude and practices, especially in case of dental consultation, professional teeth cleaning and usage of dental floss. Nigerian women are not provided with proper oral hygiene education during their antenatal classes. Integration of oral health into antenatal care could improve most of the poor oral hygiene indices, and the complications associated with it.

ETHICAL APPROVAL AND CONSENT

All issues concerning ethical conduct of this study such as, confidentiality, rights and privacy, informed consent, institutional permissions for

data collection, participant's withdrawal, anonymity, and confidential data storage were strictly complied. Written informed consent was obtained from those who volunteered to participate. Approval to carry out this study was given by the ethical committee at RSUTH, reference number RSUTH/ADM/Vol. 260/417. The other hospital, GHB and NLNG Hospital did not have research ethical committees, and permit was granted by the hospital management.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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