UNDERSTANDING HOW ORAL HEALTH INDICATORS PREDICTS DEPRESSION AND GENDER AMONG UNIVERSITY STUDENTS IN EASTERN NIGERIA

Dr. Agwu Michael Ezenna*[1] and Dr. Iwuoha Egiroghene Carol[2]

[1]Department of Public Health Mother Teresa Public Health Research Center, Aba, Abia State, Nigeria.
[2]Department of Community Medicine, Abia State University Teaching Hospital, Aba, Nigeria.

*Corresponding author: Dr. Agwu Michael Ezenna

Department of Public Health Mother Teresa Public Health Research Center, Aba, Abia State, Nigeria.

ABSTRACT

Background: Oral health is increasingly being recognized by health officials as a mirror image of the overall health. Consequently, monitoring oral health is an essential strategy in monitoring overall health and planning intervention. The mouth is an important factor in social communication and therefore may be the origin of concern not only for a possible health condition but also for frequent psychological alterations leading to social and personal isolation. Monitoring oral health indicators such as teeth cleaning, state of gum and teeth, oral hygiene, source oforal health information etc. may be an important step in predicting oral health status This is the first study that examined the association between oral health indicators with depression and gender.in Nigeria especially among university students. **Aims:** The aim of this study is to determine the association between oral health indicators with depression and gender. **Method**: This is a cross sectional descriptive study. Full time university students were recruited from the department of public health in the University of Calabar, Cross River state Nigeria. Data collection was based on an anonymous questionnaire and the sample size was (n= 291). Descriptive tests and chi-square tests were conducted. **Results:** The study indicated that oral health indicators such as state of the gum and the frequency of teeth cleaning were related to students' depression. On the other hand sources of oral health information and the state of the teeth are significantly related to gender. **Conclusion**: This study is the first to gauge oral health indicators in in Nigeria and will provide a baseline data for further research within Nigeria, using a larger sample in a quantitative approach. However, the result indicated that oral health should be included in the primary health care and should be considered when planning interventions for depression.

KEYWORDS: Halitosis, mouth odour, assessment, psychosocial, gender, depression, oral health indicators, teeth.

1.0. INTRODUCTION

Oral health is an important contributor to overall health for individuals and the population. The frequency of teeth cleaning, the use of appropriate tooth paste with fluoride incorporated, source of information on oral health, regular visit to the dentist, self-rating of oral health, and a history of tobacco use are key indicators of oral health status (Brace A. Dye, X ian fen Li and Euqenio D. Beltran- Equistar, 2012). The above oral health indicators are vital in predicting oral diseases outcome, such as dental caries (tooth decay) periodontal disease, tooth loss, oral cancer, mouth odour, noma and HIV infection (WHO, 2018, Peterson P.E., Ogawa, H. 2016, Glendor U. 2009).

Consequently, oral health is a key indicator of overall health, wellbeing and quality of life. Similarly, world health organization (WHO, 2003) defined oral health as a state of: "*Being free from chronic mouth and facial pam and sores, periodontal (gum) diseases, tooth decay, tooth loss and other diseases and disorders that limit an individual's capacity in biting, chewing, smiling, speaking and psychological wellbeing*".

The Global Burden of Disease study (GBD, 2017) estimated that oral diseases affected at least 3.58 billion people worldwide, with caries sf the permanent teeth being the most prevalent of all conditions assessed. More so, globally, it is estimated that 2.4billion people suffer from caries of permanent teeth and 486 children suffer from caries of primary teeth. On the other hand, periodontal disease affects the tissues that both surround

and support the tooth. This often presents as bleeding or swollen gums (gingivitis) pain and sometime as bad breath (halitosis). In its more severe form, loss of gum attachment to the tooth and supporting bone, causes "pockets" and loosening of teeth (periodontitis). Severe periodontal disease, which may result in tooth loss, was the 11th most prevalent disease globally in 2016, (GBD, 2017).

However, according to (WHO, 2003) the main causes of periodontal disease are poor oral hygiene and tobacco use. More so, oral diseases are the most common non-communicable diseases (NCDS) and affect people throughout their lifetime, causing pain, discomfort, disfigurement and even death (GBD, 2017). Studies exist with regard to oral health indicators among adults and school children. However no study was found with regard to university students. Understanding how the oral health indicators relate to depression and income among university students in Nigeria is important to ascertaining health intervention effectiveness towards oral health status, and monitoring progress, and as a critical step in measuring the health of the general population. Furthermore, students are future leaders and potential policy makers, their health and wellbeing need to be guided at this most important phase of their development, and equipped with the right knowledge to be able to distinguish between healthy and unhealthy lifestyles (Garrusi *et al.*, 2008; Brunt & Rhee, 2008; Schmidt, 2012, Agwu *et al.,* 2017).

The aim of this study is to gauge how the frequency of oral health indicators such as the frequency of teeth cleaning, the use of appropriated tooth paste with fluoride incorporated, source of information on oral health, regular visit to the dentist, self-rating of oral health, and a history of tobacco use predicts depression and income status among university students in Nigeria. This study is the first to examine this relationship in Nigeria and will definitely fill a gap in knowledge and as well make a contribution to literature on oral health and general health status of university students.

1.2. Depression
Studies has shown that the rates of psychological ill-health among university students are increasing and identifying modifiable risk factors for students psychological health becomes increasingly important, given the persistence of students psychological health into adulthood (Kaya *et al.,* 2007; Zawawi & Hamaideh, 2007, Agwu *et al.,* 2017). Consequently, the mental health condition of university students is a public health issue in both developed and developing countries and many young adults may experience their first psychiatric episode during their time at the university (Bayram and Bilgel, 2008; Adewuya, *et al.,* 2006). In a large study conducted by the American College Health Association – National College Health Association [ACHA] (2006), with a population of (n = 47000) students from 74 American colleges. The result showed a significant

increase of students' mental health; from 8% to 23% with 10% of students' contemplated suicide, 14%, reported depression of various degrees while 63% reported feeling of hopeless.

Although, several studies examined the factors associated with students' mental health, however, no study was found that examined the possible relationship between oral health indicators with depression and income status among university students by gender. Although, different studies reported gender differences in student's perception of depression but the findings were controversial. While some studies found that female students reported depression more than male students (e.g. Dahlin *et al.,* 2005; Mikolajcyzk *et al*., 2008), others (e.g. Bayran & Bilgel, 2008) found no significant differences between male and female students. Dusselier *et al*. (2005) postulated that gender differences in stress and depression among university students might be due to women's stronger determination to succeed academically, which might give rise to a greater level of stress. Secondly, that women report more illness than men do, because of men's reluctance to admit illness rather than to the actual incidence of illness among women. Consequently, Rosenthal and Schreiner (2000), emphasized that the evidence for gender and ethnic differences in depression is limited and that more studies with students sample from different ethnic backgrounds are inconclusive, and recommended for more studies.

On the other hands,. Nolen-Hoeksman (1990) found that higher income countries had a significant gender differences in depression, whereas low-income countries had no significant gender differences in depression. Student's mental health was reported to be associated with income status (Adewuya *et al.*, 2006; Mikolajcyzk et al., 2008). A study by Martins *et al.* (2004) examined the correlation of mental health and income among students in one university in Brazil, the result showed a positive correlation between student's income status and mental health.

1.3. Background of the study
Nigeria is the most populous country in sub-Sahara Africa with an estimated area of 923,773 km[2] (National Bureau of Statistics (NBS) 2010; Aregbeshola, 2011), comprising of 36 states and a population of 152 million people (Ucha, 2010; Akuede *et al.,* 2012).
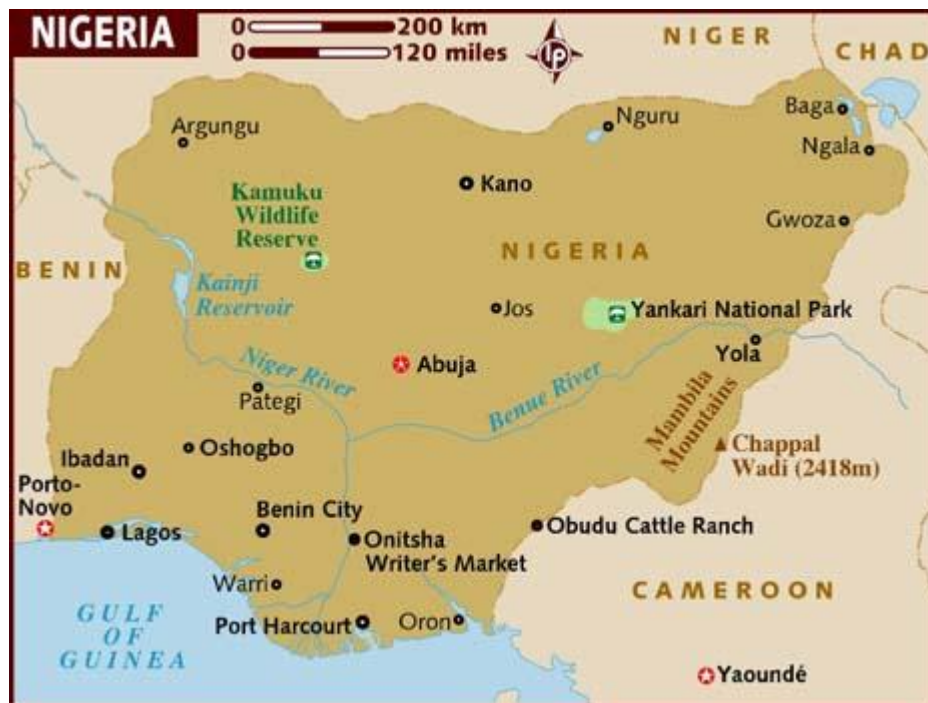
Figure 1: Map of Nigeria showing the three regions by the intersection of the Niger River and Benue River. Available at: http//: mans.com [Date of accessed 20ᵗʰ July, 2014].

Based on natural landscape, Nigeria is divided into three regions namely: Northern region, Western region and Eastern region, by the intersection of the River Niger and the River Benue (Figure 1) before terminating into the Gulf of Guinea (Philips, 2004). The geographical location of the Federal Republic of Nigeria is on the Gulf of Guinea in the West Africa. It is between Benin in the west and Cameroon in the east, in the north east is Chad and Niger in the north-west.

The diversity of climates observed in Nigeria are aridity in the North, tropical in the center, and equatorial in the South, with a maximum temperature above 32 degrees Celsius in the North (Walker, 2008). The annual rainfall is more in the South 2000 millimeters than in the North 500-700 millimeters (Aregbesola, 2011). Therefore, the Northern region is exposed to a prolonged heat, prolonged drought, and dry seasons, this hash environmental conditions is expected to affect growing of crops, vegetation, and grazing of animals, sources of domestic water and sanitation and farming among others. Consequently, it is assumed that the environmental conditions will affect both the physical health and psychological health of Nigerians living in the Northern region, differently from those living in the other two regions (Terrass & Benjelloun, 2010). However, no comparative cultural study exists in Nigeria that examined the demographic factors and its relations to depression among the three regions in Nigeria. This study intends to provide the first baseline information with regards to the association of oral health indicators with depression and income among university students in eastern region.

2.0. Research Method
2. 1. Consent and Confidentiality
However, the present study involved only healthy and non-vulnerable adults from the age of 18 years, and no stage of the data collection involved any invasive procedure, emotional or psychological impact, However, the researcher sought permission to conduct the research from the Dean of the Faculty. A letter for approval was presented by hand directly to the Dean of the Faculty of Public health. The letter contained the required information concerning the research: title, objectives and the data collection techniques. The letter also explained that the participants consent would be sought before administering the questionnaire, and that their confidentiality will be assured by employing a self-anonymous questionnaire, which does not ask participants name, address or any other form of identification. The letter also explained that the participants have a right to withdraw from the study at any time without any legal implication therefore participation is voluntary. Prior to data collection, similar information was given to the participants.

2. 2. Sampling of Participants
The samples for the current study were university students, drawn from the department of public health at the University of Calabar. The health survey was administered to 400 students of which 335 were returned and 291 respondents completed their questionnaire with the required data and were consequently entered for the analysis. To ensure that these samples have equal representation by the academic year of study, the intended sample (n =400±40) was shared among four academic years, allowing (n = 100±10) students to be

recruited from each academic year (e.g. 1, 2, 3, & 4). However, since students were recruited from lecture rooms, the recruitment exercise for each year goes on, until the estimated number of participants was met.

2. 3. Data collection procedures
Data were collected from students in the department of public health in the University of Calabar. The data collection took place between August and September 2019. Data collection was carried out by the use of anonymous questionnaire. The questionnaire was given to the participants during lecture with the entire student's on-sit. Giving students on hand in this form was a good strategy as it recorded a very high participation and completion rate. Data collection process lasted for about 40 minutes. Consequently, students' response to the questions in the present study was transferred to the SPSS statistical package, 20.0 versions, for analysis.

2. 4. Statistical data analysis for the present study
 Descriptive statistics: preliminary data analysis of this study was conducted with descriptive tests. By conducting the descriptive tests, it was possible to check the entire data set entered into the SPSS for error. Descriptive tests enabled any error to be identified and corrected in the data set. In addition, descriptive statistics made it possible for the description of the characteristics of the sample in frequency and percentages. The Chi square test was employed to explore the relationship between categorical variables in the analysis. Chi square analysis provides information on the simple 'main effect' for the current study on sex and ethnicity, which enables the level of associations to be determined.

2.0. RESULTS

A total of (n=291) of the sample completed the questionnaire correctly and was computed into the SPSS

version 20.0 for statistical analysis. The descriptive analysis of the socio-demographic factors indicated there are more female students participants (65.6%) than their male counterparts (34.4%) With regard to the state of the gum and teeth, higher percentage of students reported their teeth status to be excellent (38 %), compared to (14%) that reported excellent gum status (Table 1).

With regard to the source of oral health information, majority of the students reported getting information from dental hospital staff (33%) compared with (7.2%) of the students that reported getting information from friends. However, about (27.8%) od students reported getting information from radio and TV (Table 1). On the other hand majority of students reported not depressed (64%) compared to (35%) that reported depressed (Table 1). The result of the study indicated that (84.5%) of the students also reported visiting dentists more regularly compared to (15.5%) of those who never visit dentists. Similarly the use of fluoride toothpaste was high among the students (88.0%) and those who did not use fluoride toothpaste was only (12%).

With regard to the relationship between oral health indicators and depression, the result indicated that three items; teeth cleaning, (p- value 0.47, phi .183), state of the gum, (p-value .004, phi 252) and gender, (p-value .019, phi, -.137), have a significant relationship with depression (Table 2). The study indicated that there is a significant relationship between the different frequencies of teeth cleaning and depression. For example students that reported brushing their teeth once and more than once per day reported more depression (57%) than those that clean their teeth monthly or weekly only (2%) reported depression (p-value .047), however, the effect size is small, (phi, 183).

Table 1: Frequency (%) of Socio-demographic Variables: N=291.

Variable	Frequency	Percentages
Gender		
Male	100	34.4
Female	191	65.6
State of Gum		
Very poor	5	1.7
Poor	5	1.7
Average	13	4.5
Good	45	15.5
Very good	81	28.0.
Excellent	42	48.6
State of Teeth		
Very poor	4	1.4
Poor	0	0.0
Average	20	6.7
Good	48	16.8
Very good	104	36.6
Excellent	109	38.5
Sources of Information		
Friends	21	7.2

Relatives	24	8.2
Community health workers	68	23.4
Radio/T.V	81	27.8
Dental hospital staff	96	33.0
Visit to Dentist		
Agree	246	84.5
Disagree	40	15.5
Fluoride Tooth Paste		
Yes	242	88
No	48	12
Depressive Index		
Depressed	102	35.1
Not Depressed	189	64.9

Surprisingly, those students that reported cleaning their teeth between 2-3 times weekly or monthly reported no depression at all (0.0%) compared to those students that cleaned one or two times daily (Table 2). Also the different teeth status indicated different degrees of depression but no significant relationship was noted. However, those students who reported excellent teeth status, reported depression more (36.3%) than those who reported very poor teeth status (2.9%).

In addition those students who reported their teeth status as 'good' were associated with more depression (17.5%) than those who reported their teeth status to be average (10.8%). However, the relationship between the different categories of teeth status with depression shows no significant relationship (p-v = .122, and the effect size was also low, phi =.159 (Table 2).

Table 2: Frequency (%) of Oral Health Indicators and Depression, Chi Square.

Variable	Depressed	Not Depressed	P-Value	PHI Value
Teeth Cleaning				
Once monthly	2 (2.0.)	1 (0.5)		
2-3 times monthly	0 (0.0)	2 (1.1)		
2-3 times per week	0 (0.0)	4 (2.1)	.047	.183
Once daily	41 (41)	52 (27.5)		
Twice / more / day	57 (57)	130 (68.5)		
Use of Fluoride Toothpaste				
Yes	78 (87.6)	134 (86.5)	.791	0.17
No	11 (12.4)	21(13.5)		
State of Teeth				
Very poor	3 (2.9)	1 (0.5)		
Average	11 (10.8)	9 (4.8)		
Good	18 (17.5)	30 (16.1)	.122	.159
Very good	33 (32.4)	74 (39.8)		
Excellent	37 (36.3)	72 (78.7)		
State of Gum				
Very poor	3 (3.2)	2 (1.1)		
Poor	1 (1.1)	4 (2.2)		
Average	11 (11.6)	2 (1.1)		
Good	13 (13.7)	32 (18.0)		
Very good	25 (26.3)	56 (31.5)	.004	.252
Excellent	42 (44.2)	82 (46.1)		
Information Source				
Friends	7 (33.3)	14 (66.7)		
Relatives	8 (33.3)	15 (66.7)		
Community Health Workers	24 (35.3)	44 (64.7)	.994	.027
Radio / TV	30 (37.0)	51 (63.0)		
Dental Hospital Staff	33 (34.4)	63 (65.6)		
Gender				
Male	26 (25.5)	74 (39.2)	.019	-.137
Female	76 (74.5)	115 (60.8)		

On the other hand the study indicated that the frequency of teeth cleaning is related with depression when examined by gender. When the frequency of teeth cleaning was examined by gender in the presence of depression the result suggested that female students with high frequency of teeth cleaning reported more depression than their male counterparts with lower frequency of teeth cleaning (Figure 2). The study also indicated that the female students who reported both depressed and not depressed are more compared to their male counter parts who reported both depressed and not depressed (Table 2 and Figure 2).
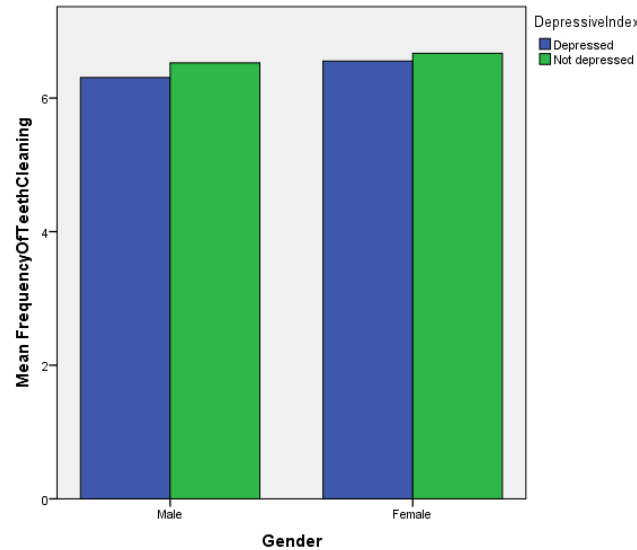
Figure 2: A bar graph of the relationship between depression and the frequency of teeth cleaning by gender.

With regard to the state of the gum, more students reported very good (26.3%) and excellent (44.2%), compared to those that reported very poor (2.9%) and average (10.8%), and this differences is significant, (p-value, .004) and effect size also strong (phi, .252) as shown in (Table 2). It is important to note that very poor gum status reported more depression among the students compared to those that reported poor gum status. Similarly, those that reported excellent gum status also reported more depression than those that reported very good gum health. It is important to understand this trend, that the more extreme condition the more depressed (Table 2).

However, when the gum status was examined by gender, the result indicated that more male students reported their gum health status to be either very good or excellent compared with their female counterparts (Figure 3). However, with regard to 'very poor' and 'poor' gum health, the difference seemed to be significant. Almost as much as those who reported very poor gum health among male students, reported the same among the female students. The result also indicated that poor gum status is related to depression in both male and female students (Figure 3).
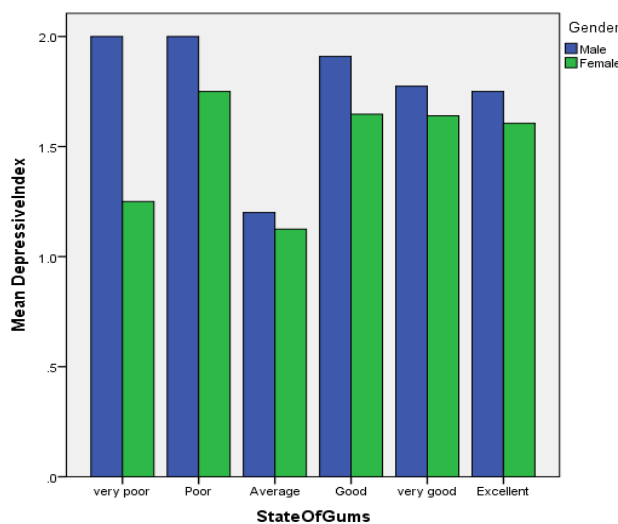
Figure 3: **A bar graph showing the relationship of depression and gum status by gender.**

With regard to the relationship between oral health indicators and gender, six items were tested (Table 3), but only 'state of the teeth' p-v .020, phi, .201, and 'source of oral health information' (p-v .028, phi .193) reported some significant relationship. With regard to the state of the teeth and gender, the study indicated that more female students reported bad teeth than male students. For example, while (2.1%) of female students reported 'very poor state' of their teeth, no male student reported very poor state of teeth (Table 3). On the other hand, while more than half of the male students reported the 'state of their teeth to be excellent (50.5%) only (31.2%) of female students reported excellent gum status.

On the other hand, the study indicated that the relationship between oral health indicators and gender, indicated that of all the items tested (Table 3) only 'gender' (p-v = .019, phi, = -.137) Table 2 'state of the teeth' (p-v =.020, phi = 183), and information source for oral health, (p-v= .028, phi = .183), Table 3, are significant though the effect size is minimal. With regard to the direct relationship between depression and gender the result indicated a significant relationship (p-v .019) however, the effect size is very weak, (phi, -.137). The study also indicated that while (74.5%) of female students are depressed, only (25.5%) of male students are depressed (Table 2 and Figure 4).
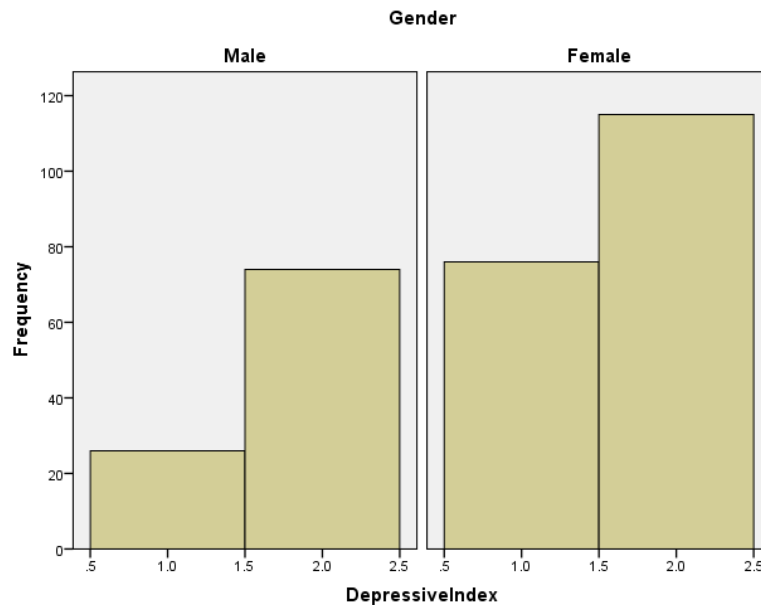

Figure 4: A bar graph showing the relationship between depression and gender.

On the other hand, more female students reported 'not depressed' (60.8%), compared to male students (39.2%) that reported 'not depressed.' However, the result indicated significant differences between depressed male students and those of female students. Similarly, there is a significant difference also between 'not depressed male students and those of their female counterparts.

Table 3: Frequency of Oral Health Indicators by Gender.

Variables	Male	Female	P-Value	PHI Value
State of the Gums				
Very poor	1 (1.0)	4 (2.3)		
Poor	1 (1.0)	4 (2.3)		
Average	5 (5.2)	8 (4.5)		
Good	11 (11.3)	34 (19.3)		
Very good	31 (32.0)	50 (28.4)	.503	.126
Excellent	48 (49.5)	76 (43.2)		
State of the Teeth				
Very poor	0 (0.0)	4 (2.1)		
Average	6 (6.1)	14 (7.4)		
Good	13 (13.1)	35 (18.5)		
Very good	30 (30.3)	77 (40.7)	.020	.201
Excellent	50 (50.5)	59 (31.2)		
Information Source				
Friends	11 (11.0)	10 (5.3)		

Relatives	5 (5.0)	19 (10.0)	.028	.193
Community Health Workers	30 (30.0)	38 (20.0)		
Radio / TV	29 (29.0)	52 (27.4)		
Dental Hospital Staff	25 (25.0)	71 (37.4)		
Visit to Dentist				
Agree	81 (82.7)	165 (87.8)	.237	-.070
Disagree	17 (17.3)	23 (12.2)		
Teeth Cleaning				
Once monthly	2 (20)	1 (0.5)		
2-3 times monthly	1 (10)	1 (0.5)		
2-3 times per week	2 (20)	2 (11)		
Once daily	35 (35.0)	58 (30.7)	.576	.100
Twice / more per day	60 (60)	127 (67.2)		
Fluoride Toothpaste				
Yes	73 (86.9)	139 (86.9)		
No	11 (13.1)	21 (13.1)	.995	.000

With regard to the importance of visiting a dentist, though there were no significant differences among male and female students who 'agree' and those who 'do not agree.' However, the result was very interesting. Among the male students who agreed on the importance of visiting a dentist the number are less (82.7%) compared to female students who agreed (87.8%). Consequently, more male students believed that regular visits to the dentist will reduce the prevalence of tooth decay.

Similarly, the use of fluoride tooth paste was found to be the same in both male and female among those who answered yes in both male and female (86.6%) and also the same among those who answered 'no' in both male and female students (13.1%).. However, the differences between those who said 'yes' and 'no' to fluoride tooth paste are highly insignificant (Table 3).

With regard to the source of oral health information and gender, the result indicated that majority of male students get oral health information from community health workers (30%), compared to female students (20%). On the other hand more female students reported using dental hospital staff for their source of oral health information (37.4 %) compared with male students (25%) Table 3 and figure 5).
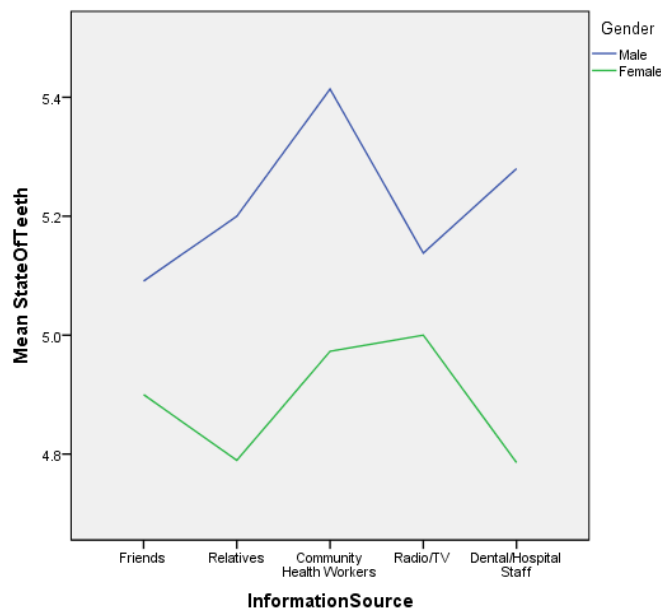

Figure 5: A line graph showing interaction effect of the relationship between state of the teeth, oral health information source and gender.

4.0 DISCUSSION

This study examines how depression and gender can influence the frequency and distribution of oral health indicators. The oral health indicators examined in this study includes, frequency of teeth cleaning, the use of fluoride toothpaste, state of the teeth, state of the gum, information sources for oral health, frequency of tobacco use, and regular visit to the dentist. No study was found in literature that examined the oral health indicators among university students in Nigeria.

4.1 Socio-demographic variables

A total of (n=291) students were sampled for the study, however, the analyses indicated that there were more female students (66%) compared to (34%) of male students. However, other studies among university students in Nigeria indicated that there may be more female students attending universities in Nigeria than males (Agwu et al., 2017, Adewuya et al., 2006). It is possible that there are certain incentives on women education from the government and NGOs that are encouraging more women to get involved on female education, in addition to gender equality campaign in Nigeria.

4.2. Frequency of oral health indicators by depression

Among the oral health indicators examined with depression, only gender (p-v .019), teeth cleaning (p-v= .047) and state of gum (.004) that reported a significant association (Table 2). However, with regard to depression the current study reported females to be more depressed than males (Figure 4). Depression is common among Nigerian university students and significantly associated with socio-demographic factors. An effective model for the prediction of the development of depression in university needs to be developed and evaluation and interventions aimed at reducing the incidence of depression among this population need further research.

Other studies have also found that more female students reported depression than male students. For example, in Nigeria, Adewuya (2006) and Aniebue and Onyema (2008), found that female students are more likely than males to experience depression. Similarly, the present study supported the result of a study in a Taiwan university by (Chang, 2007) which also found that female students were more likely to seek professional psychological help than male students, an indication of depressive symptoms. However, Abdel-Khalek and Ansari (2004) argued that female vulnerability to mental health problems is associated with a type of genetic predisposition, rather than purely environmentally sex differences. Other studies postulated that women in general are more prone to over report medical symptoms than men (Abdel-Khalek & El- Ansari, 2004). There is no conclusion on the sources of female student's depression and this study recommends more studies that will employ questionnaire and interview in data collection.

With regard to the frequency of teeth cleaning and depression, the study indicated that high frequency of teeth cleaning is related to depression. This is understandable especially with people that have psychological halitosis also called (halitophobia), (Agwu and Lye, 2020). Similarly, Iwakura et al. (1994) noted that depression associated with halitosis is due to the inability to be sure whether or not halitosis is present makes them unhappy. In addition, Eli et al. (2001) noted that halitophobics often display other psychological phenomena, such as compulsive teeth brushing and withdrawal from social interactions. With regard to the state of the gum, the study also found that those students who have excellent healthy gum also reported high depression (table 2), similar argument to that of increased depression in the presence of frequent teeth cleaning. It may be argued that constant struggle to maintain excellent oral health may generate tension that may translate as depression.

4.3. Frequency of oral health indicators by gender

Of the oral health indicators considered in this study (Table 3) only two items state of the teeth (p-v=.020, phi = .201) and source of information on oral health (p-v = .028, phi = .193) are significant in their association with gender. With regard to the state of the teeth, more male students reported their teeth to be excellent (50.5%) compared to female students (31.1%). Previous studies (Agwu et al., 2017, Abdel Khalek and Ansari, 2004). However, Abdel and Ansari (2004) argued that women in general are more prone to over report medical symptoms than men. Women generally are found to be highly sensitive to teeth aesthetics and body image compared to men (Mikolajczyk et al. 2008, Agwu, 2020). Another important observation is the significant relationship between sources of oral health information and gender (p-v= .028) and (phi = .193). The study indicated that the majority of male students received their oral health information more from community health workers, whereas more of the female students received more information on oral health more from dental hospital staffs. This is understandable since most women use inter net and television more than men.(Table 3). However, this is the first time this type of study is found in Nigerian literature so no reference is available for comparison. There is need for more studies on how oral health indicators are influenced by the source of information available to the individual.

5.0 CONCLUSION

This study focused mainly on the distribution of oral health indicators and their possible association with depression and gender among university students in Nigeria. Literature evidence indicates that the findings from this study have not been presented in Nigeria, which makes comparison with previous studies difficult. The result of the study indicated that the prevalence of oral health indicators differs between male and female students (main effect) and it also associates with depression. These findings are unique as it suggests that oral health intervention should be based on items of interest and gender. It should be targeted on students with depressive symptoms. This study was able to identify that the state of teeth, and the source of oral health information are the major oral health items that are gender sensitive, and suggests that linear intervention for oral health for university students are appropriate. On the other hand the study identifies state of the gum and the frequency of teeth cleaning as the major oral health indicators that associate with depression. These findings

are important for those responsible for students' health in Nigeria.

5.1. Limitations of the study

Participants for the present study were limited to one university in Nigeria. It should be expected that the experiences and needs of other students might not be accurately reflected by the investigation. Another caution inherent in the current investigation concerns the homogeneity or lack of diversity, of participants. Consequently, since the participants involved only students in higher institutions, the findings may not reflect the true condition of adolescent youths in Nigeria. Additionally, since not all the universities in Nigeria were used, there may be variations between universities that may have been over looked. Consequently, there is a need for more studies among university students in Nigeria. Another limitation of this study may be due to the self-report nature of the instruments. Due to the instruments relying on the participants perceptions, the accuracy of the study could be influenced by imprecise self-reports or mistaken perceptions of a situation. Due to participants, trying to anticipate the socially "correct" answer rather than honestly, the reliability of instruments is always a concern in self-report situation. Similarly, the findings of the current study may be limited because of the methodology utilized. Similar to all cross sectional studies, the present study can only be interpreted based on observed associations of variables, and not on cause and effect relationship with a causal interpretability of results.

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