Original Article

Oral health status, knowledge of dental caries aetiology, and dental clinic attendance: A comparison of secondary school students in the rural and urban areas of Lagos

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Abstract

Background: Dental caries is painful, expensive to treat and can harm nutrition and overall health. Good oral hygiene, regular utilization of dental health facilities, dietary habits and knowledge of determinants of dental caries play important role in the prevalence of dental caries among school children. Tooth loss, sequelae to untreated dental caries is higher among urban school children than their rural counterparts.

Aim: To compare and determine the oral health status and investigate dental clinic attendance and knowledge of students in rural and urban secondary schools in Lagos on the aetiology of dental caries.

Methods: Using stratified and proportionate to size sampling techniques, a random sample of 598 students aged 12-26years from rural and urban local government areas were examined for dental caries and gingivitis. Questionnaires were administered to elicit information on frequency of consumption of refined sugar, parents' educational status, knowledge of dental caries aetiology and dental clinic attendance. The decayed, missing and filled tooth index (DMFT) was measured according to the WHO caries diagnostic criteria for epidemiological studies and the clinical oral hygiene status measured with the gingival index (GI) of Loe and Silness, Plague index and the Simplified Oral Hygiene Index.

Results: There was a statistically significant difference between urban and rural students in caries experience in permanent teeth (mean DMFT = 0.26 in urban areas; 0.11 in rural areas), More of the parents of students in the urban schools are educated than those in rural schools. The decayed (D) and missing (M) components were higher in the rural area, indicating a high level of restorative treatment need among the students in rural area. The urban participants had better oral hygiene and the gingival index was higher among rural students. Dental clinic attendance was higher among the urban participants than the rural participants.

Conclusion: The students in urban secondary schools had better oral health status and make use of dental facilities more than their rural counterparts. The knowledge of aetiology of dental caries is poor among both the rural and urban school students.

Keywords: Decayed missing and filled teeth index, dental caries, dental clinic attendance, gingival index, oral health status, secondary school students

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Introduction

The oral cavity has a multitude of functions in relation to our daily life.[1] It is used for food intake, speech, to make social contact, and it plays an important role in our appearances. Hence, poor oral health has the potential of hampering our quality of life, and a good oral health is the key to ensuring overall well-being.[1,2] Though, oral health is a state of being free from chronic mouth and facial pain, oral and throat cancer, oral sores, birth defects (such as cleft lip and palate), periodontal (gum) disease, tooth decay and tooth loss, and other diseases and disorders that affect the oral cavity,[1] studies[3,4] have shown that the risk factors for oral diseases include unhealthy diet, tobacco use, harmful alcohol use, and poor oral hygiene. Hence, despite great improvements in the oral health of populations across the world, problems persist, particularly among poor and disadvantaged groups in both developed and developing countries.[3-5]

Dental caries and periodontal disease are two major oral diseases that have been linked to different systemic diseases and according to the World Oral Health Report, dental caries remains a major public health problem in most industrialized countries affecting 60–90% of schoolchildren and the vast majority of adults.[6]

Although it may appear that dental caries is less common and less severe in developing countries of Africa,[5] it is anticipated that the incidence of caries will increase due to changing living conditions and dietary habits, and inadequate exposure to fluorides. Some studies[7-9] have linked oral diseases to the lifestyles of individuals, and their prevention depends on adopting lifestyles that are conducive to oral health. Good oral health practices are thus the clue to preventing not only the diseases of the oral cavity but also those of the body system as well. The important oral health behaviors that have been shown to have a positive impact on oral health include tooth brushing with fluoridated toothpaste, inter-dental cleaning by floss picks or dental floss, and dental clinic attendances every 6 months.[7-10]

Previous studies[11,12] in Nigeria recorded an increase in sugar consumption and higher dental caries among students, especially those in urban schools. This is not surprising since a change has been observed in the diet of Nigerian youths, especially from the traditional diet, which was mainly fibrous to cariogenic food and drinks in the last two decades. Moreover, the students in urban schools had more money to buy more sweets than those in the rural schools since the majority of their parents are financially better off than parents that live in the rural area.[12] Thus, adequate knowledge on the aetiology of dental caries will help to influence dietary choices.

Oral diseases have been documented to have a high impact on peoples' quality of life in terms of pain, suffering, and impairment of function. The cost of treatment is extremely high in industrialized countries and most low- and middle-income Countries so early institution of preventive measures and creating awareness regarding the danger of high consumption of refined sugars and habitual dental clinic attendance at adolescence when many habits that continue throughout life are initiated will help to reduce such financial burden.

The aim of this study was to compare and determine the oral health status and investigate dental clinic attendance and knowledge of students in the rural and urban secondary schools in Lagos on the aetiology of dental caries.

Materials and Methods

This was a comparative, cross-sectional, population-based study to compare and determine the oral health status and investigate dental clinic attendance and knowledge of students in the rural and urban secondary schools in Lagos on the aetiology of dental caries.

Study area

The study was carried out among students in four secondary school, two each in urban (Surulere) and rural (Ikorodu) local government areas (LGAs) in Lagos State, Nigeria.

Study area description

There are twenty major LGAs in Lagos. Sixteen are termed rural LGAs, while four are rural LGAs (Badagry, Epe, Ikorodu, and Lekki). There are over 9 million people in Lagos. Ikorodu is a city and LGA in Lagos State, Nigeria.[13] It is located along the Lagos Lagoon and shares a boundary with Ogun State. As of the 2006 census, Ikorodu had an enumerated population of 535,619.[14-16]

Surulere is a residential and commercial LGA located on the Lagos mainland in Lagos State, Nigeria, with an area of 23 km². It is a part of Metropolitan Lagos. At the last census in the year 2006, there were 503,975 inhabitants, with a population density of 21,864 inhabitants/km².[17-19]

Study design

This was a comparative, cross-sectional study.

Study population

This consisted of students in junior and senior secondary schools in the study areas.

Inclusion criteria

All junior and secondary school students who were 12 years and above, who consented to be part of the study, and whose parents and guardians gave written consent.

Sample size determination

The sample size was determined using the formula for a comparison of two proportions,[20] at 95% confidence level and 80% power, with p_1 = and p_2= (prevalence of caries among secondary school students in the urban and rural area from the previous study). The minimum sample size calculated for this study is 230 per group.

Ethical consideration

Approval was obtained from the Lagos State Ministry of Education. Written consent was also obtained from the school principals, guardian/parents of the students, and each of the respondents after selection before enrollment into the study.

Sampling technique

Data were obtained from 598 participants. The LGAs and schools were randomly selected from the ballots of all LGAs and secondary schools in Lagos State. Again, random sampling was used to select the participating classes in each school after which the number of participating students was based on the proportional allocation. Finally, the study participants were selected by systematic random sampling with the class register serving as the sampling frame. The first student was randomly selected from the sampling frame and subsequent students were selected through a predetermined sequence ($k = N/n$) until final sample size was attained for each school. For knowledge of aetiology of dental caries, Yes or No questions were used and score 0–1 awarded to incorrect and correct responses, respectively. Scores >60% were graded as good knowledge, scores between 40% and 59% were graded as fair, and scores <40% were graded as poor knowledge of dental caries aetiology.

Method of data collection

Validity and reliability of the questionnaire were determined through a pretest done among secondary school students in Mushin local government area. This was followed by the training of four research assistants who are dentists. The aim and objectives, criteria and indices to be used for the study were explained to them over a period of 3 days. Verbal informed consent was obtained from the school principals, guardian/parents of the students, and each of the respondents after selection. Data collection was by questionnaires which consisted of closed and open-ended questions. An interviewer-administered questionnaire containing details regarding age, sex, religion, knowledge of dental caries aetiology, and frequency of dental visit was used. Confidentiality was maintained by using participants' initials on the questionnaires. The oral clinical examination was performed on each participant by the researcher and four other dentists. The oral health status was measured using the decayed, missing, and filled tooth (DMFT) index according to the WHO[6] caries diagnostic criteria for epidemiological studies, the gingival index (GI) of Loe and Silness,[21] Plaque index (PI) of Loe and Silness,[21,22] and the simplified oral hygiene index (OHI-S).[23]

WHO caries diagnostic criteria

Oral health status was measured using the DMFT index according to the WHO[6] caries diagnostic criteria for epidemiological studies. A tooth was marked as "decayed" when any of the following was observed: Unmistakable cavitation on the occlusal, buccal or lingual walls of the tooth, a detectable softened floor or wall or remaining, carious roots, and filled tooth with signs of caries. When in doubt, the tooth was recorded as sound. A tooth extracted due to caries was marked "missing."

Gingival index of Loe and Silness

GI was scored based on a 0–3 scale that combined an assessment of tissue color and form with bleeding on stimulation, where 0 represented healthy gingiva; 1 for mild inflammation observed as a slight change in color, slight edema, and no bleeding on probing; 2 for moderate inflammation: Redness, edema and glazing, bleeding on probing; and 3 for severe inflammation: Marked redness and edema, ulceration, and tendency toward spontaneous bleeding. Buccal surfaces of all the present teeth were examined. When in doubt between scoring 0 or 1, the score 1 was given.[21]

Plaque index of Loe and Silness

Six teeth were selected and all surfaces examined for the thickness of plaque on the gingival one-third. 0 was scored for absence of plaque, 1 for a film of plaque adhering to the free gingival margin and adjacent area of the tooth, which cannot be seen with the naked eye but only by using disclosing solution or by probe, 2 for moderate accumulation of deposits within the gingival pocket, on the gingival margin and/or adjacent tooth surface, which can be seen with the naked eye, and 3 for abundance of soft matter within the gingival pocket and/or on the tooth and gingival margin. The PI is calculated as total scores divided by the number of surfaces examined.[21,22]

Simplified oral hygiene index

A composite index that scores debris and calculus deposition on selected tooth surface.[23]

The index is one of the most commonly used indices for assessing oral hygiene status. Six surfaces of the six index teeth were examined: the buccal surfaces of the upper right and left first permanent molars, the lingual surfaces of the lower right and left first permanent molars, and the labial surfaces of the upper right and lower left permanent central incisors. Oral debris was scored 0 when there was no debris or stain, 1 for soft debris covering not more than one-third of the tooth surface or presence of extrinsic stains without other debris regardless of surface area covered, 2 for soft debris covering more than one-third, but not more than two-thirds, of the exposed tooth surface, and 3 for debris covering more than two-thirds of the exposed tooth surface. The absence of calculus was scored 0, 1 was scored for supragingival calculus covering not more than third of the exposed tooth surface, 2 for supragingival calculus

covering more than one-third but not more than two-thirds of the exposed tooth surfaces or the presence of individual flecks of subgingival calculus around the cervical portion of the tooth and 3 for supragingival calculus covering more than two-thirds of the exposed tooth surface or a continuous heavy band of subgingival calculus around the cervical portion of the tooth. Scores for both debris and calculus were added to get the OHI-S whose values range from 0 to 6 and interpreted as good (0–1.2), fair (1.3–3.0), and poor (3.1–6.0).

Statistical analysis

Data analysis was performed using Epi Info version 3.5.1 (wwwn.cdc.gov/epiInfo/html/prevVersion.htm, wwwn.cdc.gov/epiinfo. Center for Disease Control and Prevention, Atlanta, USA) (August 2008) statistical software. A descriptive analysis was done. Continuous variables were expressed by simple means and frequencies. Categorical variables were expressed as proportions. For all comparisons, the level of significance was set at 5%, relationship between two parameters was determined using Chi-square. Intra- and inter-examiners reliability was calculated using Fleiss' Kappa.

Results

Four secondary schools from two (Surulere and Ikorodu) LGAs in Lagos were involved in this study. Of the 600 students that were recruited for the study, 598 (99.7%) completed the study based on the set criteria and their data were analyzed. There were 300 from secondary schools in Surulere (U) and 298 students from Ikorodu (R). The Kappa inter-rater reliability index for this study was 0.8.

Altogether, 296 males and 302 females participated in the study. More female than male in the rural schools (male [46.6%], female [53.4%]) and the reverse in the urban schools (male [52.3%], female [47.7%]). This however showed no significant difference.

The overall mean age was 13.61 ± 2.10 with rural and urban having 13.78 ± 2.16 and 13.44 ± 2.04, respectively [Table 1].

There was a statistically significant difference between urban and rural students in caries experience in permanent teeth (mean DMFT = 0.26 in urban areas; 0.11 in rural areas). The decayed (D) and missing (M) components were higher in the rural area (D: rural = 17 ± 0.59, urban = 0.08 ± 0.47; M: rural = 0.43 ± 1.20, urban = 0.07 ± 1.51), indicating a high level of restorative treatment need among the students in the rural area [Table 2].

Although the frequency of consumption of refined sugars is higher among the urban participants than their rural counterparts and consumption occurred more on a daily basis; statistical analysis showed no significance [Table 3].

Table 1: Sociodemographic characteristics of participants

Variables	Frequency (%)		χ^2	d	P
	Rural	Urban			
Gender					
Male	139 (46.6)	157 (52.3)	1.72	1	0.10
Female	159 (53.4)	143 (47.7)			
Total	298 (100.0)	300 (100.0)			
Age (years)					
11-15	179 (60.1)	193 (64.3)	143.34	3	<0.001
16-20	66 (22.1)	47 (15.7)			
21-25	52 (17.5)	60 (20.0)			
26-30	1 (0.3)	0 (0.0)			
Total	298 (100.0)	300 (100.0)			
Mean=13.61±2.10, rural=15.33±1.38, urban=12.03±0.84					
Father's educational status					
No formal education	2 (0.7)	7 (2.3)	199.40	3	<0.001
Primary education	19 (6.4)	12 (4.0)			
Secondary education	86 (28.8)	101 (33.7)			
Tertiary education	191 (64.1)	180 (60.0)			
Total	298 (100.0)	300 (100.0)			
Mother's educational status					
No formal education	6 (2.0)	10 (3.3)	238.01	3	<0.001
Primary education	36 (12.1)	29 (9.7)			
Secondary education	111 (37.2)	93 (31.0)			
Tertiary education	145 (48.7)	168 (56.0)			
Total	298 (100.0)	300 (100.0)			
Religion					
Christian	235 (48.9)	228 (76.0)	24.44	2	0.03
Muslins	63 (21.1)	70 (23.3)			
Others	0 (0.0)	2 (0.7)			
Total	298 (100.0)	300 (100.0)			
Ethnicity					
Yoruba	199 (66.8)	152 (50.7)	2.47	3	0.29
Igbo	52 (17.4)	92 (30.7)			
Hausa	0 (0.0)	7 (2.3)			
Others	47 (15.8)	49 (16.3)			
Total	298 (100.0)	300 (300.0)			

Table 2: The mean decayed, missing and filled tooth of the participants

Variables	Mean±SD	t	P
DMFT			
Rural	0.11±0.42	2.61	<0.001
Urban	0.26±0.87		
Decayed component			
Rural	0.17±0.59	2.02	0.04
Urban	0.08±0.47		
Missing component			
Rural	0.43±1.20	2.98	<0.001
Urban	0.07±1.51		
Filled component			
Rural	0.01±0.18	1.76	0.08
Urban	0.06±0.38		

SD: Standard deviation, DMFT: Decayed, missing, and filled tooth

The participants showed a limited knowledge of the aetiology of dental caries [Table 4].

Table 5 shows the oral hygiene practice and dental clinic attendance of the participants. Many participants in the rural schools (81.5%) than their urban counterparts (72.3%) claimed to brush their teeth twice daily. Most participants in the rural schools (66.8%) than the urban schools (48.7%) have never visited the dentists and of those who did the visit was over a year ago.

Table 3: The participant's consumption and frequency of refined sugar

Consumption and frequency of refined sugar	Frequency (%)		χ^2	*d*	*P*
	Rural	Urban			
Intake of sweets, biscuits, sugared tea and coffee, and chocolate					
Yes	292 (98.0)	299 (99.7)	2.34		0.06
No	6 (2.0)	1 (0.3)			
Total	298 (100.0)	300 (100.0)			
Frequency of taking refined sugar					
Daily	129 (44.2)	115 (38.5)	4.39	3	0.22
Weekly	50 (17.1)	71 (23.7)			
2-3 × weekly	26 (8.9)	27 (9.0)			
Occasionally	87 (29.8)	86 (28.8)			
Total	292 (100.0)	299 (100.0)			

Table 4: The total knowledge score of the participants on aetiology of dental caries

Total knowledge	Rural (%)	Urban (%)
Good	71 (23.8)	78 (26.0)
Fair	36 (12.1)	40 (13.3)
Poor	191 (64.1)	182 (60.7)
Total	298 (100.0)	300 (100.0)

Table 5: The participants practice of tooth brushing and dental visit

Variables	Frequency (%)		χ^2	*d*	*P*
	Rural	Urban			
Frequency of brushing					
Once	13 (4.4)	25 (8.3)	20.14	3	0.02
Twice	243 (81.5)	217 (72.3)			
Thrice	39 (13.1)	50 (16.7)			
Others	3 (1.0)	8 (2.7)			
Total	298 (49.8)	300 (50.2)			
Dental visit					
Yes	99 (33.2)	154 (51.3)	20.81	1	<0.001
No	199 (66.8)	146 (48.7)			
Total	298 (100.0)	300 (100.0)			
Last dental visit					
6 months ago	19 (19.2)	48 (31.2)	12.89	4	0.18
6-12 months	23 (23.2)	31 (20.1)			
13-24	12 (12.1)	11 (7.1)			
>2 years	31 (31.3)	46 (29.9)			
Others	14 (14.1)	18 (11.7)			
Total	99 (100.0)	154 (100.0)			
Reason for last dental visit					
Dental pain	31 (31.3)	24 (15.6)	39.35	4	<0.001
Friendly advice	8 (8.1)	8 (5.2)			
Dental checkup	35 (35.4)	72 (46.8)			
Tooth fillings	17 (17.2)	31 (20.1)			
Others	8 (8.1)	19 (12.3)			
Total	99 (100.0)	154 (100.0)			
Reason for not visiting the dentist					
Fear	15 (7.6)	15 (10.3)	13.65	5	0.02
Clinic is far	3 (1.5)	4 (2.7)			
Cost	24 (12.1)	5 (3.4)			
No pain	62 (31.3)	45 (30.8)			
No time	9 (4.5)	16 (11.0)			
No reason	85 (42.9)	61 (41.8)			
Total	198 (100.0)	146 (100.0)			

Table 6: The oral hygiene status of the participants

Oral hygiene status	Frequency (%)		χ^2	*d*	*P*
	Rural	Urban			
Gingivitis					
Yes	266 (89.3)	240 (80.0)	14.75	1	0.02
No	32 (10.7)	60 (20.0)			
Total	298 (100.0)	300 (100.0)			
OHI-score					
Good	113 (37.9)	135 (45.0)	41.56	3	<0.001
Fair	143 (48.0)	147 (49.0)			
Poor	42 (14.1)	18 (6.0)			
Total	298 (100.0)	300 (100.0)			
Gingival index					
0	26 (8.7)	54 (18.0)	69.03	3	<0.001
1	204 (68.5)	208 (69.3)			
2	46 (15.4)	33 (11.0)			
3	22 (7.4)	5 (1.7)			
Total	298 (100.0)	300 (100.0)			
Plaque index					
0	17 (5.7)	41 (13.7)	75.44	3	<0.001
1	216 (72.5)	232 (77.3)			
2	38 (12.8)	22 (7.3)			
3	27 (9.0)	5 (1.7)			
Total	298 (100.0)	300 (100.0)			

OHI: Oral hygiene index

Table 7: The mean oral hygiene indices of the participants

Variables	Mean±SD	*t*	*P*
Oral hygiene indices			
Rural	1.82±1.41	3.42	<0.001
Urban	1.47±1.08		
Plaque index			
Rural	1.28±0.71	5.30	<0.001
Urban	1.01±0.35		
Gingival index			
Rural	1.21±0.69	4.70	<0.001
Urban	0.96±0.59		

SD: Standard deviation

The oral hygiene, GI and PI scores of the participants showed statistical significance. More participants in the rural schools had gingivitis than their urban counterparts [Table 6].

The mean oral hygiene score for the participants was 1.82 ± 1.41 and 1.47 ± 1.08 for the rural and urban secondary school students, respectively. The mean GI was higher among rural students than urban students (rural = 1.21 ± 0.69, urban = 0.96 ± 0.59) [Table 7].

Discussion

In Nigeria, information about the oral health status among urban and rural areas is scarce. The present study provides information on the oral health status for urban and rural secondary school students in Lagos. This targeted group is expected to reflect the pattern of oral health disease due to the adoption of the modern lifestyle such as increased consumption of refined sugars. Two most common chronic oral diseases, dental caries and periodontal disease, as well as dental clinic

attendance, were considered in this group since living conditions and lifestyles are much different in the urban and rural areas of Lagos. This survey, however, is not a representation for the whole country.

The overall mean age of the participants in this study was 13.61 ± 2.10 and is comparable to other studies done in Enugu[24] and Port Harcourt,[25] Nigeria, that reported a mean age of 13.99 ± 3.01 and 13.21 ± 1.09, respectively.

Dental caries is a major oral health problem in most countries, affecting 60–90% of schoolchildren and the vast majority of adults.[6] The prevalence of dental caries in this study was 7.4%. This is lower than that of other Nigerian studies that reported a prevalence of 13.9%, 33%, 35.5%, and 15.4%,[11,12,24,25] but still within the prevalent rate range of 4–30% in Nigeria.[26] This discrepancy can be explained by the different sampling methods and caries diagnostic criteria.

The mean number of DMFT recorded in most epidemiological studies in Nigeria has been below four in both children and young adult.[27] Many studies in Nigeria reported a DMFT/dmft range of 0.5–3.5.[11,12,26,28-32] It is reported to be higher in urban than in rural population and private than in public schools, said to increase with age and differs in different communities and geopolitical zones.[26,28,33,34] In this study, the mean DMFT for the participants was higher among urban than rural students (R = 0.11 ± 0.42, U = 0.26 ± 0.87). This study compares with studies done in Burkina Faso (U = 0.45, R = 0.00) and Zimbabwe (U: 0.57 (±1.13) R: 0.49 (±1.42), $P \geq 0.29$) in which the DMFT was significantly higher among the urban than rural students.[20,35] The mean DMFT recorded in the present study was in the low category and contrast to the mean DMFT of 4.2–5.3 recorded in caries annual report of dental oral and craniofacial data resource center.[6] However, it compares with that of other studies done in Nigeria[11,12,28-32] and other parts of the world.[11,35,36] Reports from other African countries such as Sudan,[34] Tanzania,[36] and Burkina Faso[20] reported a mean DMFT of 0.42, 1.26, and 0.7, respectively, and a cross-sectional study in Belgaum has shown a mean DMFT of 2.41 in 13–15-year-old schoolchildren.[37]

The decayed (D) component formed the greater component in this study and indicated a high preventive and restorative treatment need. The decayed component is higher among the rural school participants (0.17 ± 0.59) than their urban counterparts (0.08 ± 0.47). This is similar to other studies done in Mexico and South Indian in which the participants in the rural had higher decayed component.[38,39] Studies done in Africa and other industrialized countries also reported a high D component among their participants.[11,29,40-44] The filled component (F) is higher among the participants from the urban area than the rural area in this study. This finding is similar to that reported by a study done in Thailand.[45]

The higher decayed component is not surprising since the result from this study showed that almost all the participants take refined sugars, more on a daily basis, and only a few visited the dentist in the last 1-year. Consumption of refined sugars is an important factor in the development of dental caries, and the adverse effect is both related to the frequency and the amount of intake of free sugars.[12] Access to money has been reported to have a direct influence on sweet snacking.[46] Regular consumption of sweets among participants in the urban schools was found to be higher (99.6%) than those in the rural schools (98.4%).[47]

The high frequency of sugar consumption by the participants in this study compared to that reported by other studies in Nigeria.[12,48,49] It may be that the children in urban schools had more money to buy more sweets since the majority of those attending the rural schools are from low-income families and may not have access to extra money to do so.

The participants' knowledge of the aetiology of dental caries was inadequate. This contrasted with the study done among pre-university students in Indian, which reported knowledge of basic aetiology of dental caries.[50] The difference in result might be accounted for by the difference in the educational status of the participants used in the different studies. It is a known fact globally that contributory factors to good oral health are low consumption of refined sugar, brushing twice daily with fluoridated toothpaste, and regular attendance at the dental clinic.[1] Knowledge influences peoples' health. If knowledge about health is allowed to influence attitude and practice, it has the capability of reducing disease occurrence. Through basic education and public knowledge, individuals become aware of the meaning of self-protection and personal hygiene.[51] Thus, schools should incorporate health instructions relating to maintenance of oral health into their curriculum, make arrangement for periodic visits by the dentists in their provinces, and organize in-service training programs for their teachers to enable them to acquire the necessary practical skills needed for dental health. In this study, there was a significant difference ($P \leq 0.001$) in dental attendance between the rural participants (33.2%) and urban participants (51.3%). Students in urban schools visited the dentists more than their rural counterparts. This is not strange as more dental clinics are available in urban than rural areas in Nigeria and dental care is costly. Only those of high to medium socioeconomic status can access them, and majority of them are found in urban areas. It could also be that the children did not recognize the need for regular dental visits and were satisfied with their own dental health. Thus, only children who have problems

with their teeth seek dental care as reported by a study done in Kuwait.[52]

Other studies done in Nigeria[11,12] and China[53] reported 20%, 18.6%, and 58% dental attendance, respectively. The reasons given for nondental attendance in this present study were cost and fear of dental treatments and the far distance from dental clinics to their homes. This study reported a high prevalence of gingivitis among the rural participants (89.3%) than their urban counterparts (80%).

In this study, the rural participants had poorer oral hygiene than their urban counterparts despite the fact that majority of them claimed to brush their teeth twice daily. This is similar to a study done in Nigeria where urban dwellers had better oral hygiene than their rural counterparts.[54] The study revealed that oral hygiene, plaque, and gingival indices were lower in the urban participants than the rural participants. This compares with studies done in Iraq and Yemen[55,56] that also reported better indices among their participants but contrasted with that done in Georgia.[57] The mean oral hygiene indices for rural and urban secondary schools were 1.82 ± 1.41 and 1.47 ± 1.08, respectively.

The use of WHO diagnostic criteria could have underestimated the caries prevalence and DMFT since incipient caries were not recorded as decayed in this study as they are likely in most cases to remineralize and overt interproximal caries with cavities were recorded as decayed. Ikorodu was used as a rural area in this study because Lagos State government classified it as such, but actually it could be termed a semi-rural area since there have been new developments in this area since their last classification. These constituted limitations of this study.

Conclusion

The students in the urban secondary schools had better oral health status and make use of dental facilities more than their rural counterparts. The knowledge of aetiology of dental caries is poor among both the rural and urban school students.

Recommendations

The health authorities should be encouraged to develop targeted community-oriented oral health-care promotion strategies aimed at further improvement of oral self-practice, and regular dental visits to secondary schools in both rural and urban areas. Healthy foods must be made available in the school canteens, and the canteens should be prohibited from selling foods and drinks that contain high sugar levels. Although parents play a role in influencing the eating behaviors of their children, a more effective outcome can be achieved if the children can be empowered to make healthy food choices.

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Conflicts of interest

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