



### Dental Caries Trend among Adolescents in Lagos, South-West Nigeria

*La Tendance Dentaire De Carie Parmi Les Adolescents Dans Lagos, Nigeria Sud-Ouest*

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#### ABSTRACT

**BACKGROUND:** The past few decades have witnessed a changing trend in dental caries prevalence among Nigerians; thus the need to investigate the current trend of caries among adolescents Nigerians.

**OBJECTIVE:** To determine the prevalence and severity of dental caries among adolescents in Lagos, South-west of Nigeria.

**METHODS:** The World Health Organization (WHO) methodology for basic oral health surveys was employed. The study population was 11 to 16 year-old adolescents from primary and secondary schools in Surulere, Lagos, Nigeria. Surulere local government area (LGA) of Lagos State, South-West Nigeria was selected as the location of this study as the LGA is quite cosmopolitan having Nigerians of all walks of life. Information on sex, age, socio-economic status and ethnicity was obtained. The dentition of subjects was examined for dental caries, fillings and missing teeth.

**RESULTS:** Six hundred adolescents of age 11 to 16 years were studied. A high caries-free prevalence of 457(76.2%) was found among the subjects. Mean(SD) DMFT (decayed, missing, filled teeth) of 0.72(1.67) and mean DMF% (decayed, missing, filled per cent) of 2.62(6.17) were recorded among the study population. Older adolescents had higher caries crates than the younger ones. More females than males had caries while the socio-economic status did not seem to influence caries experience. DT (decayed teeth) was the major contributor of the DMFT index. Among the ethnic groups the Igbo and Edo/Delta had the highest caries experience while the Efik/Ibibio, Yoruba and Hausa had the lowest. A restorative index of 1% was recorded, showing poor utilization of dental health care services by the population.

**CONCLUSION:** This study shows an increasing caries trend when compared to previous Nigerian studies despite the mean DMFT of 0.72 being better than the WHO target of 1.5 DMFT. Ready availability of sweets and confectionaries to all classes of people in the country compounded by poor knowledge of and utilization of preventive and restorative oral health care services may be contributory to the current trend. WAJM 2007; 26(3): 201 – 205.

**Keywords:** Dental Caries, Adolescents, Social class, Ethnicity, Restorative index

#### RESUMÉ

**Contexte:** Le passé peu de décennies ont observé une tendance changeante dans la prédominance de carie dentaire parmi Nigériens. Ainsi le besoin d'examiner la tendance actuelle de carie parmi les adolescents Nigériens. **Objectif:** Pour déterminer la prédominance et la sévérité de carie dentaire parmi les adolescents dans Lagos, le Sud-ouest de Nigéria.

**Méthodes :** L'Organisation de Santé de Monde (QUI) la méthodologie pour les études de santé orales fondamentales a été employée. La population d'étude était 11 aux adolescents de 16 ans des écoles primaires et secondaires dans Surulere, Lagos, Nigéria. Surulere le secteur de gouvernement local (LGA) d'Etat de Lagos, Nigéria Sud-ouest a été choisi comme l'emplacement de cette étude comme le LGA est avoir Nigériens tout à fait cosmopolites de toutes promenades de vie. L'information sur le sexe, l'âge, le statut et l'ethnicité socio-économiques ont été obtenues. La dentition de sujets a été examinée pour la carie dentaire, les garnitures et manquer les dents.

**Résultats:** Six cent adolescents majeurs 11 à 16 années ont été étudiés. Une haute prédominance de carie-libère de 457(76.2%) was found among a été trouvée parmi les sujets. Signifier (SD) DMFT (pourri, manquer, les dents remplis) de 0.72(1.67) and mean et DMF moyen % (pourri, manquer, le pour cent rempli) de 2.62(6.17) were recorded ont été enregistré parmi la population d'étude. Les plus vieux adolescents ont eu plus haut erates de carie que la plus jeune une. Plus de femelles que les mâles ont eu la carie pendant que le statut socio-économique n'a pas semblé influencer l'expérience de carie. DT (a pourri des dents) était le collaborateur majeur de l'index de DMFT. Parmi les groupes ethniques l'Igbo et l'Edo/Delta a eu la plus haute expérience de carie pendant que l'Efik/Ibibio, Yoruba et Hausa ont eu le plus bas. Un index remontant de 1% a été enregistré, montrant l'utilisation pauvre de services de soin de santé dentaires par la population.

**Conclusion:** Cette étude montre une tendance de carie qui augmente quand en comparaison des études nigérianes précédentes malgré le DMFT moyen de 0,72 est mieux que le qui cible de 1,5 DMFT. La disponibilité prête de doux et confectionaries à toutes classes de gens dans le pays composé par la connaissance pauvre de et l'utilisation de services de soin de santé préventifs et remontants oraux peut être cotisable à la tendance actuelle. WAJM 2007; 26(3): 201 – 205.

**Mots clés:** La Carie dentaire, les Adolescents, la classe Sociale, l'Ethnicité, l'index Remontant

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Abbreviations: DMF%, percent of DMFT atrisk; DMFT, decayed, missing, filled teeth; DT, decayed teeth; FT, filled teeth; LGA, local government area; MT, missing teeth; WHO, World Health Organisation.

## INTRODUCTION

The past few decades have witnessed changing trends in the prevalence and severity of dental caries in different parts of the world.<sup>1-5</sup> Several factors have been shown to influence dental caries and these could be host or environmental factors.<sup>6</sup> The host factors include age, sex, socio-economic status and ethnicity among others.<sup>7-13</sup> Dental caries may be recorded as simply 'present' or 'absent' in an individual and the prevalence of the disease and percentage of caries-free persons in the population thus calculated. The severity of the condition may be expressed using the DMFT (decayed, missing, filled teeth) indices and the mean DMFT of the population calculated. The proportion of decayed, missing and filled teeth per 100 teeth at risk (DMF% indices) may also be employed to express caries severity thus, correcting for any errors caused by differences in the average eruption dates of teeth between for example, people of different sexes or ethnic groups.<sup>14</sup>

Various studies have been carried out among adolescents to determine their caries experience and the factors influencing the disease in such populations.<sup>1,4,7,15-17</sup> Adeniji in 1997 reported a caries-free prevalence of 64.14% among Nigerian adolescents aged 11–16 years.<sup>18</sup> Studies by Umesi et al in 2002 among 12 year-old Nigerians showed a caries-free prevalence of 83% and a mean DMFT of 0.41.<sup>4</sup> Sofola et al in 2004 reported a caries-free prevalence of 94.6% and mean DMFT of 0.10 among 12–16 year-old Nigerians.<sup>17</sup> These studies point to an initial increase in dental caries prevalence and severity from the 1960s to the 1970s and a downward trend from the 1980s through to the 1990s into the early part of the present decade. The more recent studies show a low and declining caries prevalence and severity among Nigerian adolescents.<sup>4,18</sup>

In other parts of Africa and Asia, low and declining caries prevalence rate have been reported. Among 12 year-old Ghanaians caries-free prevalence of 78% and 0.7 DMFT have been reported.<sup>2</sup> Mean DMFT of 0.25 and 0.39 among 11 and 14 year-old Tanzanians respectively have been reported.<sup>3,19</sup>

In Beijing, 0.95 DMFT and 50%

caries-free level among 11 year-olds have been reported.<sup>3</sup> In several parts of the Western and industrialized countries dental caries has been on a steady decline over the past years.<sup>8,9,20-22</sup>

This seems to have informed the decision of the World Health Organization to review the goal for dental caries from 3 DMFT to not more than 1.5 DMFT at age 12 years.<sup>23,24</sup>

The study reported here was a cross-sectional study involving adolescents of the age 11-16 years, who are easily sampled from the school system, with the aim to determine their dental caries status and look at host factors that may influence the disease in these subjects. The level of restorative care among the children was also determined. The study was located in Surulere, an urban local government area in Lagos, Nigeria, which plays host to Nigerians of different ethnic groups and socio-economic standing.

## METHODS

Surulere local government area (LGA) of Lagos State, South-West Nigeria was the location of this study and the target population was the adolescents attending primary and secondary schools in the area. The LGA is quite cosmopolitan having Nigerians of all walks of life. Six schools, three secondary and three primary, were randomly selected from the list of schools obtained from the Education Department at the LGA headquarters. The LGA has thirty-two secondary schools, seventy-one public primary schools and twenty-three private primary schools. No formal school health care programme exists in the LGA, however dental services are available at a State General Hospital, a Federal Teaching Hospital and some private dental clinics located in the LGA.

Six hundred adolescents of the age ranging from 11 years to 16 years were included in the study. Selection of subjects at the schools was by stratified random sampling. The strata were first the schools and secondly the different arms of primary class six and secondary classes JSS 1-3 (junior secondary school classes 1-3), SSS1-3 (senior secondary school class 1-3) at the schools. A sample size of about one hundred subjects of

each age category, 11-16 years, was selected in line with the World Health Organization recommendations for pathfinder oral health surveys.<sup>25</sup> A sampling frame of children who belonged to a particular age category in each arm of the appropriate classes at the schools was made and using a sampling ratio of 1 in 3, subjects were selected and examined. This was repeated at the different schools until about one hundred subjects of each age category were selected.

Information about sex, age, dental visits, ethnic group and social class was obtained from the subjects. The occupation of the parent or guardian was used to determine the social class of the subjects using the categorization – class 1 for professional, class 2 for intermediate professionals, class 3 for skilled workers and class 4 for unskilled workers.<sup>26</sup> The subjects were examined, seated on an ordinary straight back chair by one of the authors who had been trained and calibrated. The dentition of each subject was examined for dental caries using the criteria outlined in the World Health Organization Basic Oral Surveys.<sup>25</sup>

The DMFT index, which indicated the total number decayed, filled or missing teeth was then calculated for each subject and the mean DMFT for the entire study population calculated. Similarly the DMF% was also calculated which is an indication of the proportion per 100 teeth at risk of being decayed, missing and filled. The restorative index which is the ratio of filled teeth to filled plus decayed teeth<sup>27</sup> was also calculated. SPSS version 10.0 software was used for data analysis. Chi-square and analysis of variance tests were used to test for association at an alpha level of 0.05.

## RESULTS

The study subjects comprised 307 boys and 293 girls. Dental caries was found in 143(23.8%) of the subjects, 457(6.2%) were caries-free (Table 1). A caries-free prevalence of 251(81.1%) was recorded among the males while 206(70.3%) of the females were caries-free. The difference in caries prevalence between the sexes was significant ( $p < 0.05$ ). Caries-free prevalence of 77(78%), 79(76%), 81(85.8%), 82(81.2%), 80(77.1%) and 58(59.8%) were recorded among the

11, 12, 13, 14, 15 and 16 year-olds respectively, the difference among the age categories was statistically significant ( $p < 0.05$ ) with the older adolescents having higher prevalence of caries (Table 1).

Among the social classes no significant difference ( $p > 0.05$ ) was observed in caries-free prevalence with 64(70.3%), 136(74.7%), 123(79.9%) and 121(70%) being recorded in social classes 1, 2, 3 and 4 respectively. A difference in caries-free prevalence was

noted among the ethnic groups. The Yoruba presented 279(79.3%) caries-free prevalence, Igbo 90(65.7%), Hausa 13(76.5%), Edo/Delta 35(72.9%) and Efik/Ibibio 40(87%). The difference in caries-free prevalence among the ethnic groups was, however, not statistically significant although the Efik/Ibibio and the Yoruba recorded the highest caries-free levels, while the Ibo and Edo/Delta had the highest caries prevalence.

A DMFT range of 0 – 11 was observed among the subjects. While

457(76.2%) of the subjects had 0 DMFT, 119(19.8%) had 4 or less DMFT and 24(4%) had more than 4 DMFT (Table 1). The mean DMFT for the study population was 0.72(1.67) and the mean DMFT % was 2.62(6.17%) (Table 2). Females had significantly higher mean DMFT (1.00/1.97) than the males (0.45/1.28). The older adolescents had significantly higher mean DMFT values than the younger ones. No difference in mean DMFT was noted among the social classes. A significant difference in mean DMFT was observed among the ethnic groups, the Igbo and Edo/Delta had the highest mean value of DMFT, which were 1.12(2.08) and 1.12(2.14) respectively. The Yoruba, Hausa and Efik/ibibio recorded mean DMFT of 0.58(1.48), 0.47(1.07) and 0.26(0.77) respectively. The DMF% for the Yoruba, Ibo, Hausa, Edo/Delta and Efik/Ibibio was 2.08(5.36), 4.13(7.88), 1.75(4.04), 4.14(8.0) and 0.96(2.82) respectively. The mean DMF% for the age categories and social class is shown in Table 2.

The contribution of the different components (DT – decayed teeth, MT – missing teeth and FT – filled teeth) to the DMFT index is shown in Table 3. For all subjects the mean values for the components are as follows: DT = 0.7(1.63); MT = 0.01(0.13); FT = 0.007(0.01). The D component was the major contributor to the index. A low F component was noted and a low restorative index of 1% was recorded. Majority of the subjects (93.8%) had never been to a dentist while the rest made dental visits for treatment only or rarely for routine visits.

**DISCUSSION**

The caries-free prevalence of 76.2% recorded in this study on dental caries prevalence among adolescents in Lagos, South-west of Nigeria is better than that reported in 1995 for a National Survey in Nigeria.<sup>16</sup> It is similar to 78% caries-free prevalence reported among Ghanaian adolescents.<sup>2</sup> It is, however, lower than the 83% reported in 2002 and the 85.6% reported in 2004 for studies carried out in similar settings.<sup>4,17</sup> This is indicative of increasing caries prevalence among adolescents in Lagos. Recent studies carried out in some European and

**Table 1: Distribution of Subjects by Age and Dental Caries Prevalence**

Age in yrs	Prevalence of Caries according to Severity, N(%)*						Total
	0	1	2	3	4	>4	
11	77(78.6)	5(5.1)	7(7.1)	2(2.1)	7(7.1)	0(0)	98
12	79(7.6)	10(9.6)	7(6.7)	1(1)	3(2.9)	4(3.8)	104
13	81(83.5)	2(2.1)	4(4.1)	3(3.1)	5(5.1)	2(2.1)	97
14	82(81.2)	7(6.9)	3(3)	0(0)	4(4)	5(4.9)	101
15	80(77.7)	8(7.8)	6(5.8)	3(2.9)	1(0.9)	5(4.9)	103
16	58(59.8)	13(13.4)	8(8.2)	1(1)	9(9.3)	8(8.2)	97
Total	457(76.2)	45(7.5)	35(5.8)	10(1.7)	29(4.8)	24(4.0)	600

\*Severity of dental caries using DMFT Score Ranged from 0 – 11. DMFT, Decayed, Missing, Filled Teeth.

**Table 2: DMFT and DMF% by Age and Social class**

Age (years)	Total	Mean (SD) Score	
		DMFT	DMF%
11	98	0.54(1.18)	1.99(4.32)
12	104	0.61(1.42)	2.24(5.26)
13	97	0.55(1.43)	1.97(5.14)
14	101	0.66(1.82)	2.37(6.50)
15	103	0.70(2.10)	2.64(7.37)
16	97	1.27(1.67)	4.53(7.50)
Social Class			
1	91	0.84(1.83)	3.01(6.55)
2	182	0.80(1.82)	2.98(6.97)
3	154	0.62(1.57)	2.22(5.64)
4	173	0.66(1.52)	2.38(5.51)
All Subjects	600	0.72(1.67)	2.62(6.17)

\*DMFT, Decayed, Missing, Filled Teeth. DMFT%= proportion of DMFT per 100 teeth at risk. F (ANOVA), by age = 2.674,  $p < 0.05$ ; by social class = 0.560,  $p > 0.05$

**Table 3: Mean Scores of Decayed, Missing, Filled Teeth by Age**

Age(years)	N	Mean (SD) Score of Dental Caries		
		Decayed	Missing	Filled
11	98	0.53(1.16)	0(0)	0.012(0.1)
12	104	0.56(1.34)	0.02(0.2)	0.09(0.98)
13	97	0.52(1.29)	0.01(0.1)	0.021(0.2)
14	101	0.66(1.82)	0	0
15	103	0.68(1.797)	0.019(0.2)	0
16	97	1.26(2.07)	0.01(0.1)	0
All	600	0.7(1.63)	0.01(0.13)	0.007(0.01)

F = 2.964,  $p < 0.05$ ; Restorative index =  $(0.007 / 0.7 + 0.007) \times 100 = 0.9901$  i.e.  $(FT / DT + FT) \times 100$

other countries indicate that caries prevalence may also be high or on an upward trend in those countries.<sup>5,10,22</sup>

The 0.72 DMFT recorded in this study is lower than the World Health Organization goal of not more than 1.5 DMFT in adolescents aged 12 years.<sup>24</sup> It is better than 1.3 DMFT recorded in 1995 for a National survey.<sup>16</sup> It is, on the other hand, higher than 0.41 DMFT reported in 2002 and 0.10 DMFT reported in 2004 respectively.<sup>4,17</sup> This points to an increasing trend in dental caries severity among adolescents in Lagos.

Several host factors have been found to influence the caries experience with respect to prevalence and severity. In most communities caries experience increases with age such that the older adolescents present a higher prevalence and severity than the younger ones.<sup>3,8,10-12,16,17,22</sup> Similarly in the present study while 78% of the 11 year-olds were caries-free, only 59% of the 16 year-olds did not have dental caries. This difference was statistically significant ( $p < 0.05$ ), showing that in this population age was a factor in dental caries experience with the older adolescents presenting higher prevalence of the disease. The older adolescents also had higher mean DMFT values than the younger ones, with 0.54(1.18) DMFT recorded among the 11 year-olds and 1.27(1.67) DMFT among the 16 year-olds.

Some studies indicate a significant difference in caries prevalence between males and females with the latter having more caries than the former.<sup>7,8,10,12,15</sup> Other studies show a lack of difference in caries experience between the sexes.<sup>2,4,9,17,28</sup> The higher caries levels found in females have been attributed to females consuming more sweets and sugar than males and to the fact that girls tend to erupt teeth earlier and thus have more teeth erupted than boys of the same age.<sup>12</sup> Females had significantly ( $p < 0.05$ ) more caries than males in this study, 81.1% males were caries-free while only 70.3% females were caries-free. Moreover, males had 0.45(1.28) DMFT while females had a higher mean DMFT of 1.00(1.97).

Adolescents belonging to families of high socio-economic status have been found to have higher caries experience

than those of lower social class in different studies.<sup>2,5,11</sup> This higher caries experience among the high social class has been attributed to the more affluent being able to afford and consume greater quantities of confectionaries and diets high in sugar content.<sup>29</sup> Several other studies, however, found that subjects of lower social classes presented higher caries experience than those from families of higher socio-economic status.<sup>10,30,31</sup> This was adduced to poor oral health care, knowledge, attitude and behaviour among the lower classes combined with the adoption of high sugar diets by the lower classes in an attempt to copy or emulate the lifestyle of the more affluent and socially advantaged. In some other studies, no association was found between socio-economic status and caries experience.<sup>4,9,13</sup> In one of the studies this lack of association was attributed to the fact that the particular study population was made up of subjects who were frequent dental attendees irrespective of their socio-economic status due to the dental health care system available to them.<sup>13</sup> The difference in caries prevalence and severity among the social classes in the present study was not statistically significant ( $p > 0.05$ ). This may be attributed to sweets and confectionaries being readily available and affordable to all classes of people in the communities visited, such that social class did not hinder accessibility to sugars. This may be compounded by poor knowledge of and utilization of preventive and restorative oral health care services, which seemed to cut across all the social classes. The lack of a school oral health care programme may also indicate unavailability of adequate oral health care irrespective of social class.

Ethnicity has been found to play a role in dental caries experience in several studies. Dental caries experience seems to be higher in immigrant groups who adopt high sugar diets in their new locations, usually without a corresponding access to oral health care.<sup>8-10</sup> In the present study dental caries prevalence was found to be highest among the Igbo subjects when compared to the Edo/Delta, Yoruba, Hausa and Efik/Ibibio subjects, although the difference

in prevalence was not statistically significant ( $p > 0.05$ ). However, in terms of severity, the Igbo and Edo/Delta subjects had significantly higher DMFT scores ( $p < 0.05$ ) than subjects from the other ethnic groups, while the Efik/Ibibio had the lowest DMFT scores. The reason for the ethnic difference in caries severity in this study is not clear but it is noteworthy that only the Yoruba tribe is indigenous to this part of Southwest Nigeria while the other ethnic groups seen may be considered migrant to the region. However, information on migration pattern was not obtained from the subjects such that although these tribes may not be indigenous to the region, the children may have lived there all their lives. Further research is thus needed to elucidate the role of ethnicity in caries experience in Nigeria.

The DT (decayed teeth) component has been found to be the major contributor to the DMFT indices in several studies.<sup>2,4,5,12,16</sup> This has been attributed to low utilization of or poor access to oral healthcare among the populations in those studies. Similarly, in the present study DT was the major contributor to the DMFT index, contributing 0.7 of the mean DMFT of 0.72. The FT (filled teeth) component was very low, contributing only 0.007 to the mean DMFT. The low level of restorations among the subjects is further evidenced by the Restorative index of about 1% (0.9901%) recorded among the study subjects. This is hardly surprising, as over 90% of the subjects had never visited a dentist. The Restorative index has been found to be a good measure of the level of restorative care within a community and the index is calculated as being the ratio of filled teeth to filled plus decayed teeth, that is (F/F+D) per cent.<sup>27</sup> There is a need to improve the pattern of dental visitations in the study population. This could be achieved through dental health education and promotion programmes.

In this study among adolescents of age 11 to 16 years in Lagos, South-West Nigeria, it was found that the factors that influence caries experience in the population include sex, age and ethnicity. Socio-economic status did not seem to play a role. The study recorded

76.2% of the subjects being caries-free and 23.8% had caries with a mean DMFT of 0.72(1.67). This finding suggests an upward trend in caries prevalence among Nigerian adolescents despite the mean DMFT being lower than the World Health Organization (WHO) goal of 1.5 DMFT at age 12 years. It is thus, imperative to take positive action to curb the threat of a caries explosion by carrying out coordinated oral health education and promotion programmes in Nigeria.

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