

Dental caries in 12-year-old suburban Nigerian school children

Adekoya – Sofowora CA, WO Nasir, AO Oginni, MTaiwo

Faculty of Dentistry, College of Health Sciences, Obafemi Awolowo University,
Ile-Ife, Nigeria.

Abstract

Background : Dental caries is one of the commonest oral diseases in children. Despite this fact, not much attention has been given to studies on this issue among suburban Nigerian children.

Objective: To investigate the prevalence of dental caries, dental attendance and oral health behaviours among the 12-year-old suburban Nigerian children.

Subjects and Methods: Four hundred and two schoolchildren (349 boys, 153 girls) from both private and public schools age 12-year-old participated in the study in 2003. One examiner was calibrated and performed the screening procedures using standard method of WHO diagnostic criteria.

Results: The prevalence of caries was 13.9 % and mean DMFT was 0.14. The decayed component accounted for 77.2 % of the DMFT while filling and missing teeth accounted for 15.8% and 7% respectively. Over 85 % of the children examined were caries free. Seventy seven per cent of the teeth affected by caries were untreated. The probability of having caries experience DMFT > 0 was significantly associated with the type of school and regular sweet consumption $p < 0.05$. The children who had not visited the dentist had higher caries prevalence than other children. This was statistically significant $p < 0.05$. Dental attendance was generally poor in both public (90.6%) and private (83.1%) school children.

Conclusion: The findings in this study for the caries prevalence in 12 year - old suburban Nigerian schoolchildren was as low as in developed countries of central Europe and lower than the global standard according to WHO references for the year 2000.

Key words: :Caries, Prevalence, Dental, Attendance, Behaviour, Suburban, Children, Survey, Nigeria.

African Health Sciences 2006; 6(3): 145-150

Introduction

The burden of suffering of dental caries is a common phenomenon and it cuts across all socio-economic strata. Dental caries is a common oral disease in children. Pain and dentoalveolar abscess are the severe complications that may arise from untreated dental caries. Experiencing such complications is a lot of burden on children.

Caries has been defined in many ways in the literature. Modern evidence reveals that there is a continuum of disease states ranging from sub-clinical

subsurface changes to more advanced, clinical detectable subsurface caries (with so called “intact” surface layers) to various stages of more advance lesions with microscopic and later macroscopic cavitation of enamel and significant involvement of dentine^{1,2}.

During the past 20 years, understanding of biopathology of dental caries has undergone major refinement. It has been appreciated that dental caries is a phenomenon directly linked to continually present, highly complex molecular process active at the interface of susceptible tooth surfaces area and the microbial biofilms that cover them. In the multiple sites of teeth where such micro-systems exist at various stages a key feature is the constant oscillation between hard tissue demineralization and remineralization³.

Although great international and regional differences exist, the incidence and the prevalence of coronal dental caries have declined in the industrialized countries over the past 20 – 25 years⁴⁻⁷. The decline in

Correspondence:
Adekoya-Sofowora CA
Department of Child Dental Health
Faculty of Dentistry
Obafemi Awolowo University,
Ile-Ife, Nigeria.
E – mail: casofowora@yahoo.com
Telephone: + 234 8037269096

dental caries in children in established market economies (EMEs) is well documented⁸. The EMEs include most countries of North America, Western Europe, Canada, Australia, New Zealand and Japan. By the end of the 20th century caries prevalence and incidence among 12-year-old in these regions had declined dramatically^{9,17}. Similar changes have been reported in other parts of the world¹⁸⁻²². Increase in caries level has been reported in 12-year-old children in Croatia²³. The authors suggested that the war was the likely factor in this change since earlier studies had shown a distinct decline in caries level up to 1991.

Studies of caries in two UNICEF defined regions: Sub-Saharan African region and Middle Eastern crescent (including North Africa) were systematically reviewed by Cleaton – Jones²⁴. He reported no overall change in caries levels in 10 countries from each of the two regions between 1988 and 1998. The mean DMFT score trend was relatively constant in the 11 to 13 year old group.

In a recent study²⁵, investigating the association between educational indicators and dental caries experience of 12-year-old children in developing countries revealed that dental caries experience of 12-year-old children appears to be highest in countries with low-level of primary education. The authors suggested that the percent of children completing primary education might be considered a good predictor of DMFT– 12 indexes in developing countries

A review of the literature has shown that studies on caries in 12-year-olds have been reported in African children²⁶⁻²⁸. In Nigeria, the information on studies of caries in 12-year-old children is sparse especially in suburban and rural children²⁹⁻³⁴. The purpose of this study was to investigate the caries prevalence, dental attendance and oral health behaviours in 12-year-old suburban schoolchildren in Ile–Ife, a suburban population in the south western part of Nigeria.

Material and Methods:

The study was carried out in Ile –Ife, the headquarter of Ife Central local government located in the southwestern part of Nigeria in 2003. Twelve year – old Nigerian schoolchildren attending secondary school in six selected schools were included in the study. Private and public schools were chosen by the principle of representative sample regarding social, economical and cultural communities in order to attain a realistic view of the condition of the oral health of the target group in the whole of Ile –Ife.

Secondary schools in Ile – Ife are divided into three geographical areas. Three out of the 9 private schools and 3 out of 16 public schools were randomly selected

with probability proportional to the total number of schools. All schools involved provided complete list of children in classrooms. All the 402 (349 boys, 153 girls) 12 year – old children who were present in the schools on the day of examination constituted the sample size for the present study.

Prior to the start of the study, the children, their parents and the class teachers were informed. Informed consent was obtained from the parents. of the selected 12-year- old children in the schools. Only children whose parent gave their consent were included in the study. None of the children refused to participate. Also, the calibration of the examiners was undertaken by means of a pilot study of 50 children during a one-week period. The method of examination and scoring was standardized in the paedodontic clinic, Faculty of Dentistry, Obafemi Awolowo University, Ile–Ife, until inter and intra- examiner reliability of 85 per cent was archived.

Before the dental examination, a questionnaire comprising information on the frequency of tooth brushing, sweet consumption per day and dental visit behaviour was issued to the children and completed by them under the supervision of dental surgery assistant in order to prevent bias.

Data were collected in the classrooms by means of clinical examination and questionnaires. One calibrated researcher, assisted by a recorder examined all the 402 children under artificial light using plane mouth mirrors. Neither radiographic examination nor drying of teeth was carried out. Dental health status was carried out using DMFT index, following WHO criteria for epidemiological studies³⁶. A tooth was classified carious when there was either a cavity, undermined enamel or a softened floor or wall on either the pit or fissure or on one of the smooth surface. The names of children who needed dental treatment were given to the class teacher who informed the parents. All children who needed dental treatment were referred to the Dental Hospital, Obafemi Awolowo University, Ile-Ife for treatment. Oral health education and correct tooth brushing technique was given to all the children examined.

Processing and analysis of data were carried out by means of the statistical package for the social sciences (SPSS – PC version 10.0, computer software) Chi – Square tests were used for the comparison of proportions. The level of significance was set at 5%.

RESULTS

All the 12-year-old schoolchildren (402) consisting of 349 boys and 153 girls from the six schools were

examined. The dental status of the children according to the type of school they attend is shown in Table 1. The prevalence of caries was 13.9% and the mean DMFT was 0.14. The mean DMFT was low in both public (0.08) and private (0.18) schools. The decayed component (D) of the DMFT accounted for 77.2%

while filling (F), missing teeth (M) accounted for 15.8% and 7% respectively. The probability of having caries experience DMFT > 0 was significantly associated with the type of school $P < 0.05$.

Table 1: Percentage of 12 year – old schoolchildren without (decayed (D) missing (M) and filled teeth (F) DMFT = 0), and DMFT > 0 according to type of school (public and private)

	Public children	Private children	Total number children
D - T	11 (19.3%)	33 (57.8%)	44 (77.2%)
M - T	1 (1.8%)	3 (5.3%)	4 (7%)
F - T	2 (3.5%)	7 (12.3%)	9 (15.8%)
DMFT = 0	158 (92.3%)	188 (81.3%)	346 (86.1%)
DMFT = 1	11 (6.4%)	38 (16.5%)	49 (20.5%)
DMFT = 2 or 3	2 (1.2%)	5 (2.2%)	7 (3.2%)
DMFT > 0	13 (7.6%)	43 (18.7%)	56 (13.9%)
Mean DMFT	0.08	0.18	0.14

The frequency of tooth brushing and sweet consumption is shown in Table 2. Children from both public school 76.6% and private school 97.8% brush their teeth regularly. The frequency of tooth brushing was not significantly associated with the type of school the children attended $P > 0.05$. However, regular sweet consumption in private schoolchildren (96.5%) was higher than in public schoolchildren (70.2%). This was found to be significant $P < 0.05$.

Table 2: Frequency of tooth brushing and sweet consumption in schoolchildren attending public and private schools.

Frequency.	Tooth brushing		Sweet Consumption	
	Public n (%)	Private n (%)	Public n (%)	Private n (%)
Irregular (<1)	40 (23.4)	5 (21.2)	51 (29.8)	8 (3.5)
Regular(1>2 ,3)	131 (76.6)	226 (97.8)	120 (70.2)	223 (96.5)
Total	171 (100.0)	231 (100.0)	171 (100.0)	231 (100.0)

Chi – Square, $p < 0.05$

Dental visit behaviour of the schoolchildren in both public school and private schools were poor. Over 80% of the the children had never visited the dentist Table 3. The children who had not visited the dentist had significantly higher caries prevalence than other children $p < 0.05$.

Table 3: Percentage distribution of the 12-year-old suburban Nigerian schoolchildren according to their dental visit behaviour

Last dental visit	Public n (%)	Private n (%)
None	155 (90.6)	192 (83.1)
>3 year ago	9 (5.3)	24 (10.4)
1-3 year ago	5 (2.9)	10 (4.3)
Within 1 year	2 (1.2)	5 (2.2)
Total	171 (100.0)	231 (100.0)

Chi – Square, $p < 0.05$

Discussion

The present study provides information on prevalence of dental caries, dental attendance and oral health behaviours in a representative sample (n = 402) of 12 – year – old from Ile – Ife a suburban population in the southwestern part of Nigeria.

A previous study on 12 – year – old in Nigeria (30) reported caries experience of DMFT 0.7 . In the present study, the prevalence of dental caries (13.9%) and mean DMFT 0.14 was in the low category according to WHO classification.³⁷ This is considerably low when compared with recent study in Nigeria²⁹ and reports from other African countries²⁴⁻²⁸. Variation in the methods used and sampling procedures may account for the differences. However, the low DMFT in the present study sample compares favourably with studies in other parts of the world^{19,20,38}.

The present study sample consisted of schoolchildren. In Nigeria, schools are classified as either private or public depending on the source of their funding. Public schools are funded by the government and tuition fees are subsidized while private schools are funded by individual and high tuition fees are charged. In Nigeria the type of school a child attends depends on the environment where the child lives and the parent's social economic status. Most children from high and middle social economic family status attend private schools while children from low income family status attend public schools. The major reason for this difference in the choice of school is finance. The present study sample consisted of schoolchildren from both public and private schools in order to have representative of children from all the social, economic and cultural communities. This will provide a true picture of the condition of the dental health of the target group in the studied population.

The present study showed that the probability of having caries experience was significantly associated with the type of school. A previous study in Nigeria showed that dental caries was higher in children attending fee paying schools than non fee paying schools³⁹. The present study is in agreement with this study. The major reason for the difference in caries experience of private schoolchildren and public schoolchildren was due to the fact that children from private schools were financially empowered than public schoolchildren. Thus they had more money to buy cariogenic food and drinks.

The high D component of the DMFT of children examined from both private and public schools indicate the need for dental care and that the prevalence of dental caries need to be controlled. The high proportion of unrestored teeth was consistent with findings from other African countries^{26,28,29,40} and some

developing countries^{41,42}. The reason for the high proportion of unrestored teeth in Nigerian children was that dental services were not free. Children seek dental treatment from private dentist which are expensive. Furthermore, lack of dental awareness and low priority placed on oral health care compared with other needs could be responsible for not restoring teeth. A child's economic background has also been shown to influence the probability of seeking dental care⁴³.

Sweet consumption in the present study was lower than in other studies from Nigeria^{32,39}. It has been reported that access to money had direct influence on sweet snacking⁴⁴. Regular consumption of sweets amongst school children attending private schools was found to be higher (96.5%) than those in public schools (70.2%) This finding is in support of previous Nigerian studies on increase in sugar consumption among this age group³² and higher dental caries in children attending fee-paying schools.³⁹ It may be that the children in private schools had more money to buy more sweets. The majority of children attending the public school are from low income families and may not have access to extra money to buy sweets. There were corner shops located around all the schools visited for this study where sweets are being sold to the children. This situation has provided easy access to sweets by school children. It has been observed by the authors that there has been a change in diet of Nigerian youths especially from the traditional diet which was mainly fibrous to cariogenic food and drinks in the last two decades. Therefore, preventive dental health care should incorporate oral health education stressing the role of sweets and other confectioneries in the initiation and spread of tooth decay.

The present study showed that over 75% of the children claimed to brush their teeth regularly with a tooth brush. Other possible methods of cleaning the teeth could be the use of chewing stick or finger. However the poor oral hygiene condition of most of the schoolchildren reflected irregular tooth brushing habits despite the claim that they had regular tooth brushing. This could be due to inadequate brushing time, ineffective brushing technique or both factors. It was also possible that some of the children did not brush as they claim. Data collected by questionnaires have limitation⁴⁵. Over reporting is possible regarding desirable outcomes like the frequency of tooth brushing and dental visits while consumption of sweets can be under reported.

Over 80% of the children in the present study had never visited the dentist compared with 11% in Jordan⁴⁶ and 42% in China⁴⁷. The explanation for this could be that a high proportion of children were satisfied with the status of their teeth and may be it was not a tradition

to visit dentist in the studied population. This is in agreement with the literature which reported that children did not recognize the need for regular dental visits when they were satisfied with their own dental health⁴⁸ and only children who have problems with their teeth seek dental care.⁴⁹

Conclusion

The prevalence of dental caries in suburban Nigeria school children is as low as that of children in developed countries of central Europe and lower than the global standard according to WHO classification³⁷. Although the DMFT was low in this study, the poor dental visits, poor oral hygiene and high proportion of unrestored carious teeth observed could increase dental caries among suburban Nigerian children in the future. Dental health education and caries prevention programme will minimize caries in these children.

Acknowledgement

We thank school children who participated in this study and teachers in Ife Central Local Government Ile – Ife, Nigeria for their cooperation.

References

1. Featherstone JD. The continuum of dental caries – evidence for a dynamic disease process. *J Dent Res* 2004; 83: (spec Iss C) C39 – 42.
2. Kidd EA. What constitute dental caries: histopathology of caries enamel and dentine related to the actions of cariogenic biofilms. *J Dent Res* 2004; 83: (spec Iss : C) C35 – C38.
3. Proceedings from the International Concensus Workshop on Caries Clinical trials. Glasgow, Scotland 2002. *J Dent Res* 2004; 83: (spec Iss C) C4 – C5.
4. Ripa LW. Has the decline in caries prevalence reduced the need for fissure sealant in UK. A review. *J Paediatric Dent* 1990; 6: 79–83.
5. Graves RC, Stamm JW. Decline of dental caries. What occurred and will it continue? *J Can Dent Assoc* 1985; 51: 693-699.
6. Burt B. Trends in caries prevalence in North America children. *Int Dent J* 1994; 44: 403-413.
7. Spencer AJ, Davies M, Slade G *et al.* Caries prevalence in Australasia. *Int Dent J* 1994; 44: 415-423.
8. Whelton H. Overview of the impact of changing global patterns of dental caries experience on caries clinical trials. *J Dent Res* 2004; 83: (spec Iss c) C29 – C34.
9. Pitts NB, Evans DJ, Nugent ZJ *et al.* The dental caries of 12-year-old children in England and Wales. Surveys coordinated by the British Association for the study of community dentistry in 2000/2001. *BASCD Survey reports 2000/2001*.
10. Bourgeois DM, Roland E, Desfontaine J. Caries prevalence 1987-1998 in 12-year-olds in France. *Int Dent J* 2004; 54: 193– 200.
11. Lee M, Dennison PJ. Water fluoridation and dental caries in 5- and 12-year-old children from Canterbury and Wellington. *N Z Dent J* 2004; 100: 10 – 15.
12. Klemme B, Tramini P, Niekusch U *et al.* Relationship between caries prevalence and fissure sealant among 12-year-old German children at three educational strata. *Soz Preventivemed* 2004; 49: 344-51.
13. Marthaler TM, O’Mullane DM, Vrbic V. Prevalence of dental caries in Europe 1990-1995. *Caries Res* 1996; 32: 10-16.
14. Truin GJ, Konig KG, Bronkhorst EM *et al.* Time trends in caries experience of 6– and 12–year-old children of different socioeconomic status. The Hague. *Caries Res* 1998; 32: 1-4.
15. Beltran–Aguilar EG, Estupinan Day S, Baez R. Analysis of prevalence and trends of dental caries in the Americas between 1970s and 1990s. *Int Dent J* 1999; 49: 322–329.
16. Speechley M, Johnston DW. Some evidence from Ontario, Canada of a reversal in the dental caries decline. *Caries Res* 1996; 30: 423 – 427.
17. Davies MJ, Spencer AJ, Slade GD. Trends in dental caries experience in school children in Australia – 1977 to 1993. *Aust Dent J* 1997; 42: 389-394.
18. Szoke J, Peterser PE. Oral health of the child. I: Situation in Hungary based on the epidemiologic study conducted for the WHO oral data bank. *Fogory Sz* 1996; 91: 305-314.
19. Wong Mc, Lo EC, Schwarz E *et al.* Oral health status and oral health behaviours in Chinese children. *J Dent Res* 2001; 80: 459–465.
20. Leung WK, Chu CH. Dental Caries and periodontal status of 12- year–old school children in rural Qinghai, China. *Int Dent J* 2003; 53: 73–78.
21. Chawla HS, Gauba K, Goyall A. Trends of dental caries in children of Chandigarh over the last sixteen years. *J Indian Soc Pedod Prev Dentg* 2000; 18: 41-45.
22. Irigoyen ME, Sanchez–Hinojosa G. Change in dental caries in 12–year-old students in the state of Mexico after 9 years of salt fluoridation. *Caries Res* 2000; 34: 303-307.
23. Rajic Z, Radionov D, Rajic-Mestrovic S. Trends in dental caries in 12–year-old children in Croatia. *Coll Antropol* 2000; 24 (suppl 1): 21–24.
24. Cleaton–Jones P. Dental caries, trends in 5-6 year old and 11- to 13-year–old children in two UNICEF designated regions: Subaharan African and Middle East and North Africa 1970 – 2000. *J Isr Dent Assoc* 2001; 18: 11–21.
25. Egri M, Gunay O. Association between some educational indicators and dental Caries experience of 12-year–old children in developing countries an ecological Approach. *Community Dent Health* 2004; 21: 227-9.
26. Van Wyk PJ, Louw AJ, Du plessis JB. Caries status and treatment needs in South Africa: report of the 1999-2002 National children oral health survey. *South Af Dent J* 2004; 59: 238-42.

27. Wondwosen F, Astrom AN, Bjorvatn K *et al.* The relationship between dental caries and dental fluorosis in area with moderate- and high- fluoride drinking water in Ethiopia. *Community Dent Oral Epidemiol* 2004; 32: 337-344.
28. Bajomo AS, Rudolph MJ, Ogunbodede EO. Dental caries in six, 12 and 15 year old Venda children in South Africa. *East Afr Med J* 2004; 81: 236-43.
29. Okeigbemen SA. The prevalence of dental caries among 12 to 15 year-old schoolchildren in Nigeria: report of a local survey and campaign. *Oral Health Prev Dent* 2004; 2: 27-31.
30. Adegbenbo AO, el Nadeef MA, Adeyinka A. A National Survey of dental caries status and treatment needs in Nigeria. *Int Dent J* 1995; 45: 35-44.
31. Olojugba OO, Lenon MA. Dental caries experience in 5 and 12 year-old children in Ondo State Nigeria in 1977 and 1983. *Community Dent Health* 1987; 4: 129-35.
32. Olojugba OO, Lenon MA. Sugar consumption in 5-year-old and 12-year-old school children in Ondo State Nigeria in 1985. *Community Dent Health* 1990; 7(3): 259-65.
33. Kubota K, Okada S, Ono Y *et al.* Dental survey in Nigeria Part 1. Prevalence of dental caries in Nigeria. *Bull Tokyo Med Dent Univ* 1984; 31(2): 61-72.
34. Kubota K, Yonemitsu M, Hollist N *et al.* Five-year follow-up caries study among Nigerian children. *Community Dent Oral Epidemiol* 1990; 18(4): 197-9.
35. Local Inspectorate of Education Office, Ife Central Local government, Ile-Ife, Nigeria.
36. World Health Organization. *Oral Health Surveys – Basic method* 4th edn. Geneva: WHO, 1997.
37. Peterson PE. Dental caries experience (DMFT) OF 12 year-old children according to WHO region. WHO Global Oral Health Data Bank and WHO Oral Health Country / Area Profile Programme, 2000.
38. Lo ECM, Holmgren CJ, Hu DY *et al.* Dental status and treatment needs of 12-13 year-old children in Sichuan Province, South western China. *Community Dent Health* 1999; 16: 114-116.
39. Ojofeitimi EO, Hollist NO, Banjo T *et al.* Effect of cariogenic food exposure on prevalence of dental caries among fee and non fee paying Nigerian school children. *Community Dent Oral Epidemiol* 1984; 12: 274-7.
40. Okullo I, Astrom AN, Hangejorden O, Rwenyonyi CM. Variation in caries experience and sugar intake among secondary school students in urban and rural Uganda. *Acta – Odontologica Scandinavica* 2003; 61: 197-202.
41. AlDosari AM, Wyne AH, Akpata ES *et al.* Caries prevalence and its relation to Water fluoride levels among schoolchildren in Central Province of Saudi Arabia. *Int Dent J* 2004; 54: 424-428.
42. Koirala S, David J, Khadka R, Yee R. Dental caries prevalence, experience and treatment needs of 5 -6 year old, 12 – 13 year old and 15 year old schoolchildren of Sunsari district, Nepal. *Journal of the Nepal Dental Association* 2003; 5: 12-24.
43. Shah CP, Kahan M, Krauser J. The health of children of low income families. *Canadian Medical Association Journal* 1987; 137: 485-490.
44. Robertson BP, Blinhorh AS, Duxbury JT. The power of children over adults when obtaining sweet snacks. *International Journal of Paediatric Dentistry* 2003; 13: 76-84.
45. Cozby PC. *Methods in Behaviour Research*, 6th edn. Mountain View, CA. Mayfield Publishing Co. 1997.
46. Rajab LD, Petersen PE, Bakaeen G, Hamdan MA. Oral health behaviour of schoolchildren and parents in Jordan. *International Journal of Paediatric Dentistry* 2002; 12: 168-176.
47. Zhu L, Petersen PE, Wang HY, Bian JY, Zhang BX. Oral health knowledge, attitudes and behaviours of children and adolescents in China. *International Dental Journal* 2003; 53: 289-298.
48. Al – Hussaini R, Al – Kandari M, Hamadi T, Al – Mutawa A, Honkala S, Memon A. Dental health knowledge, attitudes and behaviour among students at the Kuwait University Health Sciences Centre. *Medical Principles and Practice* 2003; 12: 260-265.
49. Vigild M, Petersen PE, Hadi R. Oral health behaviour of 12 year – old children in Kuwait. *International Journal of Paediatric Dentistry* 1999; 9: 23-29.