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An assessment of dental caries and periodontal disease burden in selected primary and secondary school children in Edo State, Southern – Nigeria

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ABSTRACT

Objective: To assess the prevalence of dental caries and periodontal disease among school children attending primary and secondary schools to establish the need for surveillance, planning, implementation and evaluation of interventional oral health programs.

Methods: A cross-sectional survey design was used. Sociodemographic data and oral examination was carried out on school children. Diagnosis of caries and periodontal disease was according to the World Health Organization criteria. Children in need of treatment were referred for treatment. Statistical Package for Social Sciences (SPSS) version 21.0 was used for statistical analysis. Prevalence was determined in percentages and Chi-square test was used to test for associations at 95% confidence interval with p set at < 0.05 significance.

Results: A total number of two thousand and sixty-six children (n=2066) were examined. Age range from 4-21 years and mean age of 11.07+/-3.07 years. The study participants consisted of 54.9% males and 45.1% females, 62.1% in primary schools and 37.9% in secondary schools, 32.3% and 67.7% were schooling in rural and urban areas respectively. Children in public schools represented 66.5% and 62.8% of the examined population were referred. The prevalence of untreated caries and periodontal disease was 18.1% and 19.3% respectively. The Decayed, Missing and Filled Teeth (DMFT)/ decayed, missing and filled teeth (dmft) index value was 0.33/0.29. Children in urban, private schools were more at risk of caries and females at a higher risk of having periodontal disease.

Conclusion: There is a need for school oral health policy to reduce the burden of untreated preventable common oral diseases and observed inequalities in oral health experience.

Keywords: Surveillance, school children, caries, periodontal disease

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INTRODUCTION

Oral diseases and conditions are of public health importance because of its high prevalence and adverse impact on individuals, families and communities in general extends beyond physical discomfort and pain.¹ In Nigeria, dental caries which is a bacteria-initiated disease causing demineralization and destruction of hard dental tissues of erupted teeth, and periodontal disease, with its early manifestation as infective inflammation of the gingival, are ubiquitous.^{2,3} They constitute a significant portion of oral diseases burden. Although, many studies have been conducted in different parts of the country, reports show about a quarter of the Nigerian population experience caries and established chronic periodontitis.⁴⁻⁷ Regrettably, nearly all

caries and periodontal disease are left untreated even with the availability of treatment and prevention-oriented services.⁸

Children are particularly a vulnerable group with respect to these oral diseases and suffer greatly from the consequences of the untreated oral diseases.^{9,10} The consequences may manifest in form of excruciating pain, disruption of sleep, poor concentration in room, selection of diet, oral malodour and impaired oral self-cleansing practices.^{10,11} These will inevitably lead to poor quality of life at a very young age. It is therefore critical that this group be protected.

One of the core strategic direction of Nigerian oral health policy is the creation and maintenance of information database on oral health through constant surveillance.¹² Despite Nigerian very low severity status in oral disease, particularly in caries prevalence, reports have shown downturn of oral health indices in some parts of the country. This has been attributed to increasing consumption of westernized diet and poor oral health awareness.^{7,13} In addition, scanty oral health data have impeded development of action plans required to address the challenges.¹⁴ The objective of this study was to assess for surveillance of caries

and periodontal disease in school children to ensure effective planning, implementation and evaluation of interventional oral health programs.

MATERIALS AND METHODS

The study was conducted over a thirty-month period from November, 2013 to May, 2016. Eighteen public and private schools were selected from the list of schools obtained from the Edo State Ministry of Education using the systematic random sampling technique. Permission was obtained from the selected schools, other relevant authorities and parents for oral health promotional school visits and screening. Ethical approval was obtained from the Ethical committee of the University of Benin Teaching Hospital, Edo State.

An interviewer-administered oral health evaluation form was used to extract data on sociodemographic variables such as age, gender, school location (urban or rural), school type (public or private), class (primary or secondary) and oral examination. Oral health education was given to the children before data collection. Each child was assigned a number and selection was by simple random sampling technique using the balloting system. Oral examination was carried out under natural daylight, using a dental mirror, cotton wool and probe to determine the presence of caries and periodontal disease from selected children who gave assent. Diagnosis of the diseases was according to the World Health Organization's criteria.¹⁵ This criteria involves visual diagnosis of carious cavity with the Decayed, Missing and Filled Teeth index used to measure caries experience. Diagnosis of periodontal disease was achieved by the application of Community Periodontal Index (CPI) modified with the removal of periodontal pockets and loss of attachment category. Children who needed dental treatment were referred. The examiners were trained and calibrated at the Community Dentistry Unit, Department of Preventive Dentistry, University of Benin Teaching Hospital, Edo State for a period of 10 weeks by an experienced oral epidemiologist. Inter-examiners reliability using the Cohen Kappa statistics was 0.79 which is rated as excellent.¹⁶

Data was coded in microsoft word version 2007. The coded data was reviewed for correctness and exported to IBM SPSS version 21.0 for statistical analysis. Prevalence was determined in percentages and Chi-square test was used to test for associations at 95% confidence interval with p set at < 0.05 significance

RESULTS

A total number of two thousand and sixty-six children (n=2066) participated in the study. The ages ranged from 4-21 years with a mean age of 11.07 (+/-3.07) years. The study participants consisted of 54.9% males and 45.1% females (Table 1), 62.1% in primary schools and 37.9% in secondary schools, 32.3% and 67.7% were schooling in rural and urban areas respectively.

Table 1: Distribution according to age and gender

Gender	Age group in years (%)			Total
	4-11	12-15	16-21	
Male	926(44.8)	200(9.7)	8(0.4)	1134(54.9)
Female	745(36.1)	187(9.1)	0(0.0)	932(45.1)
Total	1671(80.9)	387(18.7)	8(0.4)	2066(100.0)

$$\chi^2=8.372, df=2, p=0.015$$

Children in public schools represented 66.5% and 33.5% were in private schools. 62.8% of the examined population was referred

Table 2: DMFT/dmft value of different sociodemographic variables

Sociodemographic variable		DMFT/ dmft value
Gender	Male	0.29/ 0.27
	Female	0.39/ 0.30
Location	Urban	0.40/ 0.28
	Rural	0.26/ 0.28
School type	Public	0.25/ 0.30
	Private	0.54/ 0.30

The Decayed, Missing and Filled Teeth (DMFT)/decayed, missing and filled teeth (dmft) index value was 0.33/0.29. The overall total missing and filled teeth count was five (F=1, m=2, f=2) and these were contributed by children in urban, private schools. Table 2 shows the DMFT/dmft value of different sociodemographic variables. The prevalence of untreated caries was 18.1% with 84.5% of the prevalence contributed by children within the 4-11 years age group (Table 3). The number of caries affected teeth in each child ranged from one tooth [1] to nine teeth [9] (Figure 1).

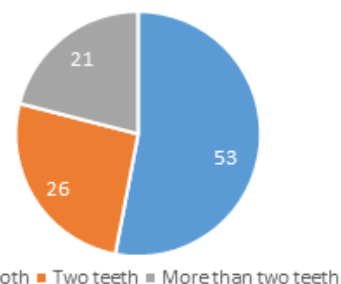


Figure 1: Percentage distribution of number of decayed teeth in each child

Periodontal diseases prevalence was 19.3%. The combined contribution to the periodontal disease prevalence by the two age groups (12-15 years and 16-21 years) is approximately one-third of the total prevalence (Table 4). Analysis of the relationship between age and gender with both diseases showed that a greater proportion of the females had caries and periodontal disease in the two younger age groups than males (Table 3 and 4). Table 4 shows a significant relationship exists between the two demographic variables with periodontal disease ($p = 0.000 < 0.05$). There is no significant association between age and gender with caries [$p = 0.109 > 0.05$] (Table 3).

Ninety-eight (98) children experienced caries and

periodontal disease (Table 5) giving a 4.7% joint prevalence and this was statistically significant with test for associations ($p = 0.000 < 0.05$). The relatively higher prevalence of periodontal disease was noted in secondary (25.1%), rural (24.0%) and public (23.7%) schools in relation to the class, location and school type of the children (Table 6)

There are significant associations with the fore-mentioned variables with periodontal disease ($p = 0.000$). Concerning caries, relatively lower prevalence was observed in secondary (16.1%), rural (15.3%) and public (15.3%) schools (Table 7). A similar result was obtained in the caries as was in periodontal disease in test for associations except with the class of the children ($p = 0.061$).

Table 3: Caries distribution among age groups and gender

Untreated caries	Age groups						Total (%)
	4-11 years		12-15 years		16-21 years		
	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)	
Present	150 (13.2)	166 (17.8)	30 (2.6)	26 (2.8)	2 (0.2)	0 (0.0)	374 (18.1)
Absent	776 (68.4)	579 (62.1)	170 (15.0)	161(17.3)	6 (0.5)	0 (0.0)	1692 (81.9)
Total	926 (81.7)	745 (79.9)	200 (17.6)	187 (20.1)	8 (0.7)	0 (0.0)	2066 (100.0)

$$\chi^2 = 4.437, df = 2, p = 0.109$$

Table 4: Periodontal disease distribution among age groups and gender

Periodontal diseases	Age group (years)						Total (%)
	4-11		12-15		16-21		
	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)	
Present	143 (12.6)	118 (12.7)	65 (5.7)	72 (7.7)	1 (0.1)	0 (0.0)	399 (19.3)
Absent	783 (69.0)	627 (67.3)	135 (11.9)	115 (12.3)	7 (0.6)	0 (0.0)	1667 (80.7)
Total	926 (81.7)	745 (79.9)	200 (17.6)	187 (20.1)	8 (0.7)	0 (0.0)	2066 (100.0)

$$\chi^2 = 79.143, df = 2, p = 0.000$$

Table 5: Joint distribution of caries and periodontal disease

	Caries		Total (%)
	Present (%)	Absent (%)	
Present	98 (4.7)	301 (14.6)	399 (19.3)
Absent	276 (13.4)	1391 (67.3)	1667 (80.7)
Total	374 (18.1)	1692 (81.9)	2066 (100.0)

$$\chi^2 = 13.100, df = 1, p = 0.000$$

DISCUSSION

The aims of this study were to highlight the oral health status of school children with respect to caries and periodontal disease. In addition, it seeks to provide baseline data to enable comparison between groups, periodic surveillance, planning, executing and monitoring of health activities designed at improving

oral health. This study revealed that about one-fifth of the children had unmet treatment need in dental caries and periodontal diseases. This is relatively lower when compared with prior studies¹⁷⁻²⁰ but enjoys support with a recent local study.²¹ Periodontal diseases have a slightly higher prevalence than caries. The majority of both diseases burden was contributed by the pre-adolescent

school children. This may suggest harmful oral behaviour by these group of children, poor parental care or neglect of oral health education and programs in schools.²²⁻²⁵

Location and school type of the children were significant predictors of untreated caries experience in this study with children in urban areas and in private schools more

predisposed to having caries. Similar observations were reported in the literature.^{7, 26} The reason for this may be that children from affluent families are most likely to be found attending private schools in urban areas. Many affluent families display westernised lifestyle including diets rich with refined sugars as a social defining status. However, this regrettably

Table 6: Prevalence of periodontal disease according to class, location and school type

		Periodontal disease (%)	X^2	df	P
Class	Primary	202 (15.8)	27.415	1	0.000
	Secondary	197 (25.1)			
Location	Urban	239 (17.1)	13.448	1	0.000
	Rural	160 (24.0)			
School type	Public	326 (23.7)	51.282	1	0.000
	Private	73 (10.5)			

Table 7: Prevalence of untreated caries according to class, location and school type

		Untreated caries (%)	X^2	df	P
Class	Primary	248 (19.3)	3.516	1	0.061
	Secondary	126 (16.1)			
Location	Urban	272 (19.4)	5.247	1	0.022
	Rural	102 (15.3)			
School type	Public	210 (15.3)	21.299	1	0.000
	Private	164 (23.7)			

The study findings were however, reversed with periodontal disease. The variables of location, school type and class having significant associations. Children in urban private schools had better periodontal health to their counterparts in rural, public schools. This is in agreement with a previous report.²⁸ Plausibly, this finding may be attributed to access to better plaque control methods, dental services and better awareness due to more dental awareness programs in the urban areas.^{13, 28-30} The relatively poor periodontal health for children in secondary schools and higher prevalence of periodontal disease in females was noted in this study. This finding is at variance with past study.²⁸ Many females in the study group were at their adolescent stage which is characterised by pubertal changes. Thus, exaggerated response to dental plaque attributed to hormonal factors in the female may be a contributory reason for the higher prevalence observed.³¹

In this study, positive association exists with the presence of dental caries and periodontal disease but this is not surprising. Although the two diseases share the podium as most common oral diseases, they are also linked to dental plaque as an initiating etiologic factor. Hence, both diseases can be controlled simultaneously if the target of oral intervention is dental plaque control.^{32,33} This strategy underlines the concept of common risk

factor approach to disease control and prevention.³⁴

CONCLUSION

A large proportion of children still undergo dire suffering as a result of untreated common preventable oral diseases. This calls for concern and should serve as impetus for oral health policy makers and other stakeholders to increase their drive in designing and implementing effective interventional programs to herald a reduction in this proportion as well as promote research to further understand the role of environmental and social determinants in inducing inequalities in oral health experience in this venerable group.

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