Normative Oral Health Status And Behaviour Of Preschool Children Aged 3-5 Years Olds In Public And Private Schools In Ibadan

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ABSTRACT
Objective: To describe the oral health status and behavior of children aged 3-5years in Ibadan.

Methods: This was a cross sectional study involving 430 children aged 3-5 years attending 15 public and 11 private schools. Socio-demographic and oral health behavior data were collected from caregivers/parents with a self-administered semi structured questionnaire. Each child was examined for dental caries, oral hygiene status, gingivitis, trauma, and malocclusion using a modified WHO oral assessment form. Descriptive statistics and logistic regression were used for data analysis on SPSS 20.0 at $p<0.05$.

Results: The mean age of the children was 4.3 ± 0.8 years. Malocclusion was the commonest (59.3%) oral condition. Majority (64.2%) of them brush once a day, 92.1% use toothbrush and toothpaste with more than half being supervised. Children attending public schools had a poorer oral hygiene ($p< 0.001$). The mean decayed missing and filled teeth and oral hygiene status were 0.25 ± 0.9 (Median= 2.0, IQR= 3.0) and 1.08 ± 0.8 respectively. Children attending private schools are 0.19 times ($p<0.001$, CI-0.09-0.42) more likely to be supervised by an adult while brushing.

Conclusion: The commonest oral condition in the preschool children was malocclusion, those attending public schools had poorer oral hygiene as well as oral hygiene practices.

Keywords: Trauma, Malocclusion, Oral health, Oral hygiene, Preschool children

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INTRODUCTION
Children aged 3-5 years are also called preschoolers and they have a complete set of primary dentition which is usually established by age 2½ - 3 years.1 These teeth help in speech development, mastication, guide the eruption of the permanent teeth and prevent deleterious habits. Despite these functions, because they are temporary, most people consider these teeth unimportant and

thus do not require as much attention as the permanent dentititon.[2,3] Such negligence can result in untoward health outcomes[4] that will not only affect the permanent dentition but has been associated with significant negative physical, functional and behavioral consequences.[5,6] In addition, it poses a threat to the general health of the child as oral health is integral to total wellbeing.[7,8]

Majority of the common oral diseases are preventable and their presence is associated with poor oral health practices such as inadequate tooth brushing frequency and methods leading to plaque accumulation, which are risk factors for dental caries, gingivitis and periodontal diseases.[9–11] The most prevalent childhood disease is dental caries and has been reported to be 5 times as common as asthma.[12] Children with caries have been found to weigh significantly less than their peers and failure to thrive has been documented in some with severe caries.[12,13] This has been attributed to the effects of the sequelae of dental caries such as pain which may cause refusal to eat and inefficient mastication.[13,14] Thus, affecting the child's comfort while eating, sleeping and engaging in social interactions.[15,16] The prevalence of dental caries in preschoolers varies across communities with values as high as 66% reported in Brazil[15] and 6.6-23.5% in Nigeria.[14,17,18]

Other prevalent oral conditions seen in children include gingivitis, traumatic dental injuries (TDI) and malocclusion. Gingivitis has been observed to be common in children and the commonest type is the plaque induced gingivitis.[11,19,20] Previous reports of the prevalence of gingivitis in preschool children varies from 39% in Mexico to about 77.9% in Iran.[19,21–23] Although there is paucity of data as regards gingivitis in Nigerian preschool children, Akinyamoju et al[24] reported a prevalence of about 97% in children aged 7-17 years in a rural community.

Furthermore, preschool children are prone to dental trauma due to their curiosity and urge to explore their environment coupled with their underdeveloped psychomotor abilities.[1,25] The occurrence of TDI in the primary dentition can be associated with pain, discomfort, and detrimental consequences on the succedaneous teeth.[26–31] The prevalence of dental trauma to anterior teeth in preschoolers is between 6% and 76.13% [25,32,33] with 23.8% reported in a previous study in Nigeria.[34] The difference in prevalence for various populations may be due to variations in methodology and environmental factors.[25]

With respect to malocclusion, the status of the primary dentition affects the development of the permanent occlusion to the extent that certain traits and anomalies of the former are often transferred to the latter.[35] Malocclusion traits that may be seen in the primary dentition include increased overjet and overbite, anterior and posterior crossbites, and anterior open bite.[1,33,35,36] The absence of generalized spacing in the primary dentition has also been said to be a likely risk factor for crowding in the permanent dentition.[35] The prevalence of malocclusion was 83.1% and 51% in Chinese and Kenyan preschoolers respectively while a prevalence of 40.5% has been seen in Nigerian preschoolers.[35–37]

Due to the varying occurrences of these oral conditions, Thorpe emphasized the need for data on the oral profile of different communities and age groups across Africa in order to develop effective intervention programmes targeted at their oral health needs.[38] Hence, the need for a documentation of the oral health status of this group of children bearing in mind that early commencement of proper oral health practices will lead to better oral health in adulthood. This study aims to describe the oral health status and behavior of children aged 3-5 years in Ibadan.

METHODS

This cross sectional study was part of a survey designed to assess the caregivers' perceived and normative oral health needs of preschool children in Ibadan, Oyo state.

Ethical approval and permission for the study protocol was obtained from the University of Ibadan/University College Hospital Ibadan Joint review committee (UI/EC/15/0290) and the Ministry of Education, Oyo State respectively. Informed consent was obtained from parents/caregivers through forms which were taken home by the children; assent was also obtained from each child. Data were collected when schools were in academic session over a 2 year period from 3-5 year old preschoolers.

Sample size calculation was based on a 50% prevalence of oral health needs of preschool children; this gave a total of 430 children which was distributed equally between the private and public schools. Ibadan North Local Government Area (LGA) was selected from the 11 LGAs in Ibadan by convenience sampling because of the presence of a referral tertiary hospital within it. Fifteen (15) public and 11 private schools were selected from 74 public and 214 private registered schools in the Local Government adopting the systematic random sampling technique. Questionnaires which had been translated to Yoruba language and back translated into English language were sent to all the caregivers of the children in order to obtain data on the socio-demography, oral hygiene habits and use of dental services in each child. Oral examination was done for all the children that were willing to participate and were present in school on the day their schools were visited. Children that were apparently unhealthy, those not willing to participate and those without consent forms were excluded from the study.

Oral examination was carried out by 4 trained dentists. Training of examiners was done using a modified WHO guideline[39], they were taught the content of the guideline, during the study, in cases of discordant diagnoses reference was made to it. Oral examination was done using CPI probes and disposable wooden spatulas in a well illuminated classroom with each child seated facing the examiner. Materials used were packed and sterilized in adequate numbers for each day.

The oral health status of each child was determined as follows: dental caries experience using the dmft index. A tooth was considered decayed when it had a cavity in its pit or fissure, or on a smooth tooth surface, as well as undermined enamel, or a detectably softened floor or wall. It was considered missing or filled if extracted due to caries or has a restoration due to caries respectively.39 Oral hygiene was determined using the debris and calculus component of the Oral hygiene index- simplified (OHI-S) modified for deciduous teeth with teeth 51, 55, 65, 71, 75, 85 as index teeth. [40] OHI-S score of 0-1.2 was assessed as good, 1.3-3.0 as fair and 3.1-6.0 as poor. Gingivitis was assessed as presence (score =1) or absence (score =0) of gingival bleeding on probing the gingival crevices with the Community Periodontal Index (CPI) probe using a light probing force of less than 20g of the same index teeth as above.[39]

For dental trauma, the codes assigned to any traumatised tooth were as follows: No sign of injury -0, Treated injury -1, Enamel fracture -2, Enamel and dentine fracture -3, Pulp involvement -4, Missing tooth due to trauma -5, Other damage including luxations -6, Tooth discoloration following trauma -7.

Occlusion was assessed with patient in centric position, malocclusion was characterized by the presence of one or more of the following: overjet greater than 2mm, overbite greater

than half of the coronal height of the lower incisors, anterior open bite, anterior and or posterior crossbite, absence of generalized spacing in the upper and or lower arch as evidenced by tight contact points between the incisors.
The socioeconomic status of each child was derived from an index which has been used in previous studies in Nigeria.[41,42]

Data analysis was performed using the Statistical Package for Social Sciences IBM (SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp). Mean and standard deviation were used to summarize age, dmft and oral hygiene indices while percentages were used for sex, socioeconomic status, oral health practices, prevalences of dental caries, trauma, gingivitis and malocclusion. Test of association between type of school and presence of dental caries, gingival bleeding, traumatic dental injury and malocclusion was done using chi square test. Binary logistics was done to detect predictors of oral health behaviour and status in relation to type of school. The level of significance was set at $p < 0.05$.

RESULTS

The mean age of the children was 4.29±0.8 years; other socio demographic data are presented in Table 1. A tenth 44(10.2%) of the preschool children had dental caries experience. One hundred and seven (97.2%) teeth were decayed (d), 1 (0.9%) tooth was missing due to caries (m) while only 2(1.9%) teeth were filled due to caries (f) The mean dmft was 0.25±0.9 (Median= 2.0, IQR= 3.0). The mandibular right second molar was the tooth most 17(15.5%) affected by caries. Visible plaque was present on the upper and lower anterior teeth of 167(38.8%) and 143(33.3%) children respectively. Although few 13(3%) children had poor oral hygiene, gingivitis was seen in 41(9.5%) children. The mean plaque, calculus and oral hygiene indices were 0.98±0.6, 0.11±0.3 and 1.08±0.8 respectively. Table 2.

Although, less than one percent of the teeth examined were affected by trauma, twenty-five (5.8%) children had trauma to their anterior teeth. The commonest presentations were enamel fracture 11(33.3%) and tooth discoloration 11(33.3%). Majority 19(76%) of the children with trauma had single tooth affectation, mainly 28(84.8%) involving maxillary central incisors (Table 2).

Amongst the children under study, 255(59.3%) had malocclusion including increased overjet 4(0.9%), overbite 6(1.4%), anterior crossbite 39(9.1%) and open bite 19(4.4%). Table 2; Figure 2.

Furthermore, a greater proportion 276(64.2%) of the children brush at least once daily, with a large number 396(92.1%) using toothpaste and toothbrush. Most (88.9%) children were either brushed for by an adult or supervised by one. Nonetheless, 409(95.1%) have never visited a Dentist.

When comparing the oral health status of preschoolers attending public and private schools, a slightly higher (0.27±1.0) (Median =0.0, IQR =6) dmft was seen in private school children while more children attending public schools had trauma to their anterior teeth 16(7.5%) and malocclusion 130(60.5%) though not significant (Table 3). Also, the type of school attended was a predictor associated with some oral health parameters ($p<0.05$) as children attending private schools were 0.9 times less likely to have calculus than those in public schools ($p<0.001$)(Table 4 & 5).

Concerning oral health behavior, a greater number 166(77.2%) of children in private schools brush their teeth once daily (Table 4). The association between the type of school attended and the frequency of brushing; who cleans the child's teeth; type of tooth cleaning aid used was found to be statistically significant. Those in private schools had a higher odds of being supervised by an adult.

Majority of the children in both school types had never visited the Dentist. However, more 13(6.0%) children in the public school had been to the Dentist but had no treatment done.

Table 1. Social-demographic characteristic of the preschool children

Characteristics	Public school n=215	Private school n=215	Total N=430
Age distribution (year)			
3	45(20.9)	32(14.9)	77(17.9)
4	70(32.6)	81(37.7)	151(35.1)
5	100(46.5)	102(47.4)	202(47.0)
Mean age ±SD Gender	**4.26±0.8**	**4.33±0.7**	**4.29±0.8**
Male	108(50.2)	103(47.9)	211(49.1)
Female	107(49.8)	112(52.1)	219(50.9)
SES			
Upper	-	99(46.1)	99(23.0)
Middle	43(20)	103(47.9)	146(34.0)
Lower	172(80)	13(6.0)	185(43.0)

SES- Socioeconomic Status SD- Standard Deviation

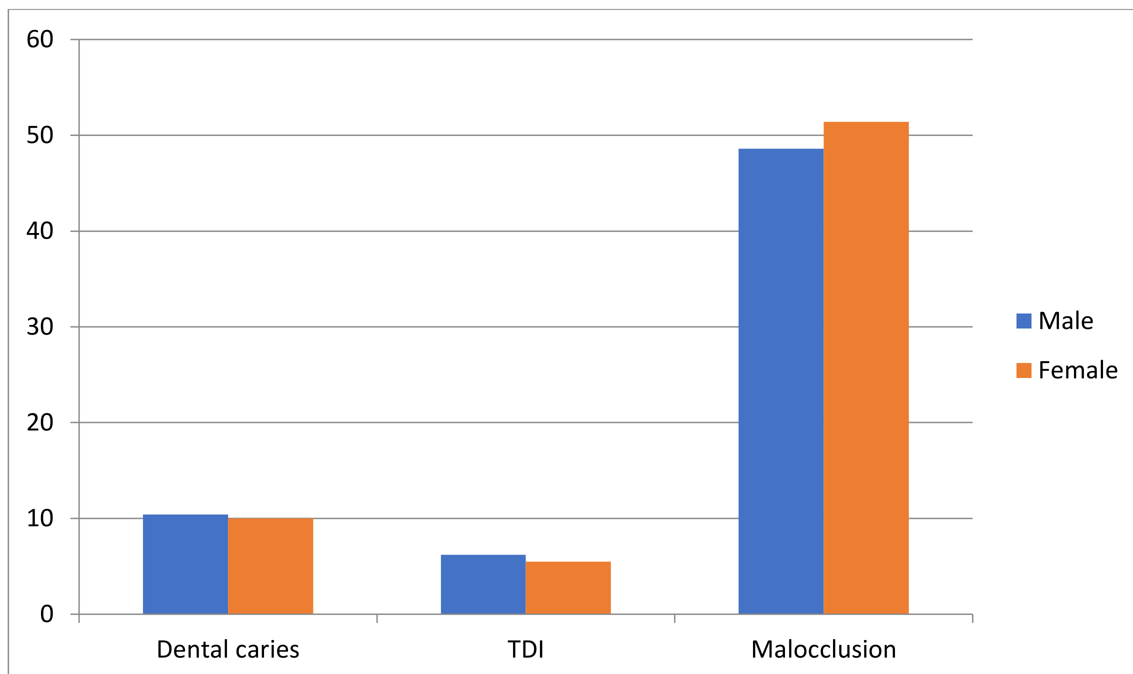

FIGURE 1: Prevalence of dental caries, traumatic dental injuries and malocclusion in children aged 3-5 years in Ibadan.

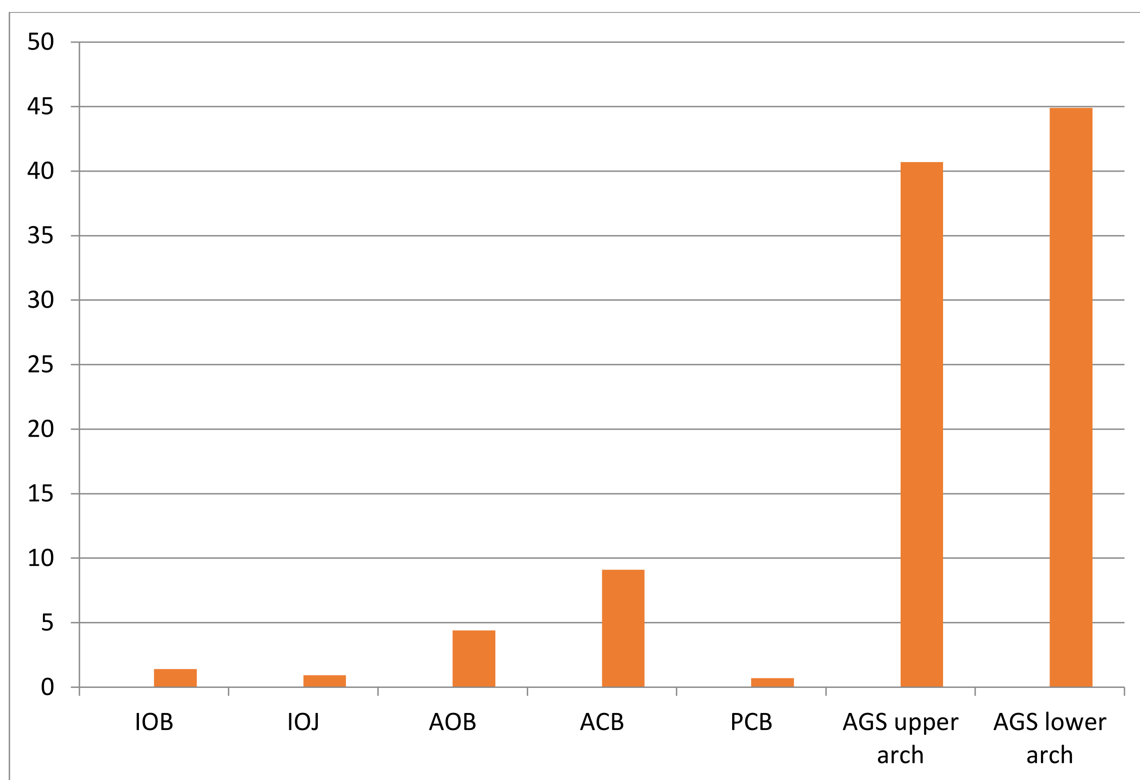

FIGURE 2: Distribution of malocclusion traits in children aged 3-5 years in Ibadan.
IOB- increased overbite; IOJ- increased overjet; AOB- anterior open bite; ACB- anterior crossbite; PCB- posterior crossbite, AGS- absence of generalized spacing

Table 2. Oral health status of preschool children

Oral health parameters	N	%
*Oral hygiene status		
Plaque present on at least one surface of index teeth	404	94.0*
Calculus present on at least one surface of index teeth	68	15.8
Visible plaque on upper anterior teeth	167	38.8
Visible plaque on lower anterior teeth	143	33.3
Oral hygiene		
Good	276	64.2
Fair	141	32.8
Poor	13	3.0
Oral hygiene indices		
Mean plaque index	0.98±0.6	
Mean calculus index	0.11±0.3	
Mean Oral hygiene index-Simplified	1.08±0.8	
Gingival bleeding	**41**	**9.5**

Traumatic Dental Injury		
Treated injury	-	-
Enamel fracture only	11	33.3
Enamel and dentine fracture	5	15.2
Enamel and dentine fracture with pulpal involvement	-	-
Avulsed(missing due to trauma)	4	12.1
Luxation injury	2	6.1
Tooth discoloration due to trauma	11	33.3
Teeth affected		
Maxillary centrals	28	84.9
Maxillary laterals	4	12.1
Mandibular centrals	1	3.0
Number of teeth affected		
Single tooth	19	76.0
Two teeth	5	20.0
> two teeth	1	4.0

*some participants had more than one oral hygiene features

Table 3. Comparison of the oral health status of public and private preschool children

Oral health status	Public	Private	P value
Caries experience			
Prevalence	23(10.7)	21(9.8)	0.75
Mean dmft	0.25±0.8	0.27±1.0	0.83*
Oral Hygiene status			
Good	93(43.3)	183(85.1)	<0.001
Fair	109(50.7)	32(14.9)	
Poor	13.0(6.0)	-	
Oral Hygiene			
Mean Plaque index	1.32±0.6	0.64±0.5	<0.001*
Mean calculus index	0.19±0.4	0.02±0.1	<0.001*
Mean OHI	1.5±0.9	0.66±0.5	<0.001*
Gingival bleeding			
Present	31(14.4)	10(4.7)	0.001
Absent	184(85.6)	205(95.3)	
Trauma to anterior teeth			
Present	16(7.5)	9(4.2)	0.23
Absent	199(92.5)	206(95.8)	
Malocclusion			
Present	130(60.5)	125(58.1)	0.62
Absent	85(39.5)	90(41.9)	

***- t test**

Table 4. Comparison of oral health behavior of preschool children attending public and private schools

Oral health habit	Public n=215 n(%)	Private n= 215 n(%)	P value
Frequency of tooth brushing			
Never	2(0.9)	-	
Once a week	2(0.9)	1(0.5)	
Every other day	12(5.6)	7(3.3)	<0.001
Once a day	110(51.2)	166(77.2)	
Twice a day	89(41.4)	41(19.1)	
Who cleans for the child			
Child alone	39(18.1)	9(4.2)	
Adult alone	58(27.0)	91(42.3)	<0.001
Child and adult	118(54.9	115(53.5)	
Cleaning Instrument			
Foam	3(1.4)	-	
Toothbrush alone	17(7.9)	5(2.3)	
Toothbrush and paste	189(87.9)	207(96.3)	0.008
Cotton wool and paste	5(2.3)	2(0.9)	
Others (cotton wool and water)	1(0.5)	1(0.5)	
Previous dental visit			
Yes	13(6.0)	8(3.7)	0.263
No	202(94.0)	207(96.3)	
***Reason for dental visit**			
Consultation	8(61.5)	3(37.5)	
Pain	3(23.1)	4(50.0)	0.205
Treatment/follow up	-	1(12.5)	
Can't remember	2(15.4)	-	

*** percentage for each parameter is based on number of preschoolers with history of previous dental visit Fishers exact test**

Table 5. Predictors of the oral health behavior and status of preschoolers attending public and private schools

	Public school n (%)	Private school n(%)	OR(95% confidence interval)	P value
Frequency of brushing				
< once daily	16(7.4)	8(3.8)		
≥once daily	199(92.6)	209(96.3)	0.5(0.2-1.26)	0.15
Cleaning instrument				
Toothbrush±toothpaste	189(87.9)	207(96.3)		
*Others	26(12.1)	8(3.7)	3.4(0.91-3.06)	0.07
Who cleans for child				
Child alone	39(18.1)	9(4.2)		
Adult alone ±Child	176(82.1)	206(95.8)	0.2(0.09-0.42)	<0.001
Oral Hygiene indices				
Plaque	1.32±0.6	0.64±0.5	0.2(0.13-2.28)	0.27
Calculus	0.19±0.4	0.02±0.1	0.2(0.13-2.28)	0.93
Oral Hygiene index	1.5±0.9	0.66±0.5	0.4(0.24-5.99)	0.49

***Others-foam, tooth brush alone, cotton wool and paste, cotton wool and water**

DISCUSSION

Preschool children aged 3-5 years were selected for this study because they are more likely to have better cooperative behavior that will allow for detailed oral examination than those younger in addition to possessing a full complement of primary teeth. Studies have shown that the prevalence of dental caries in this age group varies between countries, ranging from 64.5% to 31.3%[43,44,45] The finding in this study is lower than the latter but in consonance with those of previous Nigerian studies.[14,17,18] This may be attributed to more consumption of less sugar based diets in this environment. A similar low profile of dental caries was reported in Burkina Faso but was said to be due to the presence of high concentration of fluoride in their well water.[43]

Furthermore, when the dmft index was analysed in this study, the decayed (d) component, filled teeth and those extracted due to caries were akin to previous reports from Nigeria and other developing countries.[12,14,18,44,45] Thus, reflecting a high level of unmet needs; this may be due to several reasons such as low parental awareness about the importance of maintaining the health of primary teeth, poor utilization of dental health services as observed in this study and poor access to dental care.[17] However, no gender difference was seen in the distribution of dental caries among the children in this study unlike earlier studies in which females were said to have a higher prevalence.[12,18,44] This was attributed to more frequent snacking in girls. On the contrary, Gupta et al.[46] reported a higher caries prevalence in boys than in girls.

The high prevalence of plaque in the mouth of preschool children in this study was corroborated by other authors.[44,47] The presence of visible plaque on the anterior teeth has been indicated as a risk factor for developing dental caries in preschool children.[48] The proportion of children with visible plaque on the anterior teeth suggests inadequate supervision of oral hygiene practices in them. Calculus is mineralized dental plaque and is said to be a contributory factor to periodontal disease due to the retention of plaque on its surface. Nonetheless, it is usually not found in 3-5year olds, but calculus was present on at least one surface of the index teeth of some of the children studied. Batwala et al.[44] also reported the presence of calculus in 25.9% of children in this same age group. This buttresses the need for improved oral hygiene practices. Meanwhile, Folayan et al.18 saw that 69.6% of preschool children in Ile Ife had good oral hygiene in contrast to 40% of preschoolers in Saudi Arabia.10 This disparity may be due to the difference in methodology. Previous studies have recorded a high presence of gingivitis amongst preschool children ranging from 43% to 61.7%[10,19,22,47]. Conversely, a lower prevalence (9.5%) was found in this study, which could be due to the use of a different index to assess gingivitis.

The prevalence of TDI to anterior primary teeth varies with locality. Low values as seen in this study were documented by Shekhar et al.[32] while other authors observed higher values.[15,25] In Nigeria, the finding in this study is lower than that reported previously. Adekoya-Sofowora et al.[34] documented a prevalence of 23.8% in comparison with 30.8% seen 10years earlier in the same environment.[49] The advent of more affordable multimedia devices may account for this observation, as children tend to be less physically active. Though, the observation that males had a higher prevalence of trauma to their anterior teeth was comparable which may be due to their higher physical activity.34 On the contrary, some studies have reported no difference in the prevalence of trauma to anterior teeth between the sexes.[49,50] The maxillary incisors just as seen in this study have been reported to be more susceptible to trauma on account of their prominence in the arch.[34,49,50]

Moreover, it has been postulated that luxation injuries are more frequent in this age group due to the resilience and porous nature of their bone complemented by the presence of permanent teeth germs which dissipates traumatic impacts.[33] However, several studies including this one reported tooth fracture especially those with enamel involvement as the most prevalent presentation.[25,34,49,50] It should however be noted that the above studies are cross sectional studies and there could have been an underreporting of luxation injuries.

Onyeaso and Sote[35] reported a lower (40.5%) prevalence of malocclusion in Nigeria compared with findings in other countries[36] unlike findings from this study which are similar to that of Gomes et al.[15] (50.3%) and Kabue et al.[37](51%). This variation may be because more malocclusion traits were considered in the latter studies. The presence of generalized spacing in primary dentition makes room for the permanent incisors to be accommodated in normal alignment; its absence can be a predictor of future crowding of the anterior teeth. The number of children with generalized spacing in a Kenyan report [37] is similar to observations in this study unlike those by Onyeaso and Sote.[35] Anatomic variations may account for the varied reports. The prevalence of anterior open bite in this study is comparable with that of a previous study in the same environment[35] though higher and lower values have also been reported.[36,37] The proportion of other malocclusion traits such as increased overjet and increased overbite was found to be lower in this study than in others done in the

same age group.[35,37,44] On the other hand, Zhou et al.[36] reported a higher (63.7%) prevalence for increased overbite and 33.9% for increased overjet.

Comparison of the oral health status of preschool children relative to type of school, revealed that there is a slightly lower number of children with dental caries in the private schools contrary to Batwala et al.[44] This could be because parents of children attending private schools in this environment may have a better knowledge of prevention of dental caries in their preschoolers.[51] Likewise, preschoolers in private schools had better oral hygiene status which is in consonance with previous studies.[44,52] Though, more of the caregivers of the children attending public schools claimed their children brush their teeth twice daily, but done unassisted and with inappropriate teeth cleaning materials. This difference in oral hygiene status relative to school attended may be attributed to the difference in educational attainment and socioeconomic status of the caregivers as these have been positively associated with oral literacy.[51] Furthermore, the disparity in their oral hygiene status may account for a higher prevalence of gingival bleeding seen in the preschoolers attending the public schools.

CONCLUSION

The most prevalent oral condition in this age group was malocclusion followed by dental caries, gingivitis and dental trauma with poorer oral health behavior and hygiene status seen in children attending public schools. Therefore, there is a need to screen for malocclusion traits in preschool children for early commencement of appropriate preventive and interceptive treatment. Furthermore, oral health education of caregivers of preschoolers especially those attending public schools on appropriate oral hygiene measures is necessary to prevent progression of oral diseases.

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