

## Prevalence of Anterior Teeth Trauma among Under-Five Children in Lagos, Nigeria: A Cross-Sectional Survey

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### Abstract

**Background:** Traumatic dental injuries have been shown to be more common in childhood and early adolescence with a significant amount said to involve toddlers as they are left in the care of children who are a few years older leaving them with little or no supervision. Previous reports have shown that regardless the type of dentition in question, TDIs affects the anterior teeth more than the posterior teeth.

**Materials and Methods:** Interviewer-administered questionnaires were used to collect data of respondents. Data collected were analyzed using SPSS version 22.0. Summary statistics such as frequencies and mean were done. Associations between selected variables were tested using inferential statistics such as Chi square test. All analysis will be done at 95% confidence interval and level of significance will be set at 5% ( $P \leq 0.05$ ).

**Results:** This study included respondents with age ranging from 1 to 4 years with a mean age of  $2.84 \pm 1.68$ . The prevalence of anterior teeth trauma is 9.87% with fall on collision accounting for the most common cause of anterior teeth trauma in these children. Most of the injuries occurred in school (50.0%). There was a statistically significant association between the sex of the children, the type of school attended, position of the child in the family and the occurrence of anterior teeth trauma.

**Conclusion:** In conclusion, there was a low prevalence of anterior teeth trauma in children less than five years in Lagos with fall on collision accounting for the common cause of injury.

**Keywords:** Prevalence; Anterior teeth trauma; Under-five children

**Abbreviations:** TDIs: Traumatic dental injuries

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## Introduction

Generally, the oral region comprises 1% of the total body area, yet oral traumas are not frequent and make up to 5% of all injured parts of the body of all ages but in children aged 0-5 years, it comprises about 17%. [1] The aetiology of these traumatic oral injuries is multifactorial. Key causes includes falls which is the single most common cause of dental trauma and account for 31.7%-64.2%, Sporting Activities (40.2%), Traffic Injuries and bicycling (7.8%), Physical Violence (6.6%), Iatrogenic causes and dental procedures which account for 0.04%-12%. [1-4] Other factors include the child's behaviour (risk taking children), obesity, and presence of illness. [1]

About twenty-five percent (25%) of school children experience dental trauma [1] with results from many studies [2,3,4] demonstrating that the majority of TDIs occur in childhood with males experiencing TDIs approximately twice as much as females. [8-10] Home and School have been identified as common places where traumatic dental injuries occur and it has been shown that the place of injury may be related to the gender i.e. male children were observed to sustain TDIs in the school followed by home while the case is vice versa in female children. [8-10]

Although TDIs are more prevalent in permanent dentition, 36.8% occur in primary dentition with luxation injuries being the most common type of TDIs in the primary dentition. [5,6] The majority of TDIs still involve the anterior teeth, especially the maxillary central (66.7%) and lateral incisors (17.4%), regardless of the type of study. [5,6] This location preference also applies to the primary dentition. TDIs usually affect a single tooth, but certain trauma events, such as sports, violence and traffic accidents result in multiple tooth injuries. [5] In Nigeria, studies carried out to determine the prevalence and incidence of dental trauma discovered a high prevalence of TDIs in primary teeth in Nigeria to children of preschool age and regard these children as being more accident prone, especially in societies where toddlers are in the care of children who are only a few years older themselves. [5,6]

This study is however borne out of the need to determine the prevalence of anterior traumatic dental injuries using a Nigerian locality as a starting point as previous studies done only reported the prevalence of dental trauma with no emphasis on preschool age children other than they being accident prone. The knowledge of the prevalence would further help to create awareness, provide substantial evidence regarding the relevant aetiology of anterior TDIs, and prevention of these causes in children less than five years of age.

## Study Objectives

- To determine the prevalence of TDIs to anterior teeth of children less than five years.
- To determine the aetiological factors of anterior teeth trauma in children less than five years.
- To determine the environmental factors predisposing sustaining of anterior teeth trauma in children less than five years.

## Material and Methods

This is a descriptive, cross-sectional epidemiological study carried out in a community in Lagos Nigeria. Sample size was calculated using appropriate statistical methods. Subjects were selected using the multistage sampling technique according to preset inclusion and exclusion criteria. A total of 152 subjects met these criteria and were included in this study within a three month period.

Interviewer-administered pretested questionnaires were then administered to the parents of these children after which the subject (child) was examined. The questionnaire comprised of two sections.

Part A – Demographic Information

Part B – Examination findings

The questions present comprised of only close-ended questions. Assessment for the presence of dental trauma in Part B was done using the criteria of Andreasen, *et al.* [5] consisting of visual assessment of tooth discolouration and dislocation.

Code	Injury	Criteria
0	No injury	No evidence of treated or untreated dental injury
1	Treated dental injury	Composite restoration, bonding of the tooth fragment, crown, denture, or bridge pontics replacing missing teeth due to TDI, restoration located in the palatal/lingual surface of the crown suggesting endodontic treatment. No evidence of decay or any other treatment provided due to TDI
2	Enamel fracture only	Loss of small portion of the crown, including only enamel
3	Enamel/dentin fracture	Loss of a portion of the crown, including enamel and dentin without pulp exposure
4	Pulp injury	Signs and symptoms of pulp involvement due to dental injury. It includes fractures with pulp exposure, dislocation of the tooth, presence of sinus tract, and/or swelling in the labial/lingual vestibule without evidence of caries and discoloration of the crown. The examiner must check if pulp involvement was due to caries (presence of treated/untreated caries lesion)
5	Missing tooth due to trauma	Absence of the tooth due to a complete avulsion. Used only for teeth judged to be missing due to trauma. A positive history of trauma is needed to record missing teeth due to trauma, and the examiner must ask the participant if the avulsion was due to a harmful incident involving the front teeth/mouth or have been extracted due to caries
9	Excluded tooth	Signs of traumatic injury cannot be assessed i.e., presence of appliances or all permanent incisors missing due to caries

**Table 1:** Andreasen Visual Assessment of Tooth Discolouration and Dislocation.

Data collected was analyzed using SPSS version 22.0. Frequency distributions were generated for all questions represented in the questionnaire. Mean and Standard deviation were calculated where appropriate. The statistical significance of outcomes were evaluated at 95% confidence interval and the level of significance was set at  $p < 0.05$ .

## Results

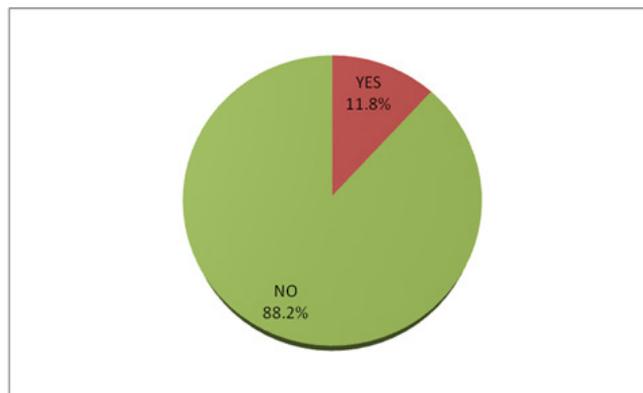
Regarding the socio-demographic information of subjects, 45.4% of them were three years old while 26.3%, 15.1% were four and two years old respectively with a mean age of  $2.84 \pm 1.68$ . Most subjects were males (58.5%) and in the Nursery school (52.6%). All the child participants in this study were enrolled in an educational centre with 68.4% enrolled in private centres while 31.6% were enrolled in public centres (Table 2). From table 3, it was observed that 23.7% parents/guardians attested to the presence of any form of traumatic dental injury in their child/wards mouth while 76.3% had children who haven't experienced any form of traumatic dental injury. Fall was the most common cause of dental trauma in those who experienced traumatic dental injuries (86.1%) while 11.1% of the parents could not remember or ascertain the cause of the traumatic dental injury. Most of the traumatic dental injury (50.0%) occurred in school centres while 36.1% occurred at home. Also 8.3% and 5.6% occurred at malls and amusement parks respectively. It was observed that 18 subjects (11.8%) of the children examined had one form of TDI or the other (Figure 1). Furthermore, 15 subjects (9.8%) had anterior TDI (figure 2)

	Frequency (n = 152)	Percentage (%)
Age (In Years)		
1	20	13.2
2	23	15.1
3	69	45.4
4	40	26.3

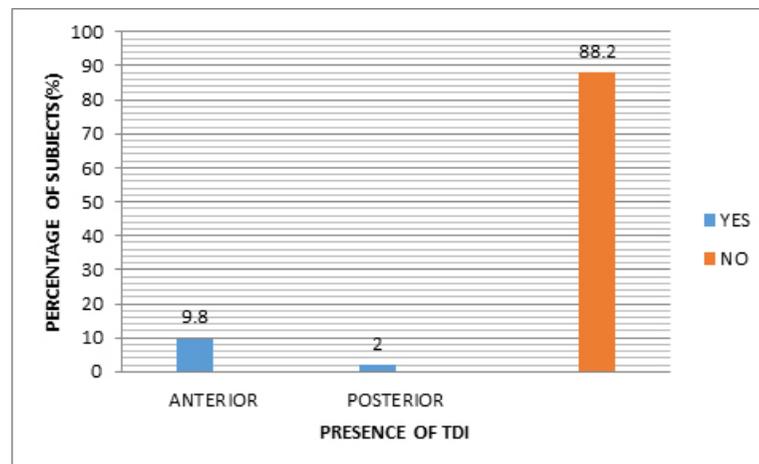
Mean Age + SD	2.84 ± 1.68	
Sex		
Male	89	58.5
Female	63	41.5
Educational Level of Child		
Kindergarten	58	38.2
Nursery	80	52.6
Primary	14	9.2
Type of School		
Private	104	68.4
Public	48	31.6
Father's Occupation		
Professional Worker	28	18.4
Artisan	67	44.1
Self-Employed	43	28.3
Unemployed	8	5.3
Others	6	3.9
Mother's Occupation		
Professional Worker	16	10.5
Artisan	54	35.5
Self-Employed	55	36.2
Unemployed	10	6.6
Others	17	11.2
Religion		
Christianity	88	57.9
Islam	64	42.1
Ethnicity		
Hausa	16	10.5
Yoruba	83	54.6
Igbo	28	18.4
Others	25	16.5
Position of Child		
First	27	17.8
Second	18	11.8
Third	64	42.1
Fourth	20	13.2
Fifth	8	5.3
Others	15	9.8

Number of Children in The Family		
1-2	49	32.2
3-4	80	52.6
>4	23	15.1

**Table 2:** Socio-Demographic Information of Subjects.



**Figure 1:** Presence of TDIs in subjects.



**Figure 2:** Prevalence of Anterior TDIs.

	Frequency (n = 152)	Percentage (%)
Presence of Traumatic Dental Injury (Subjective)		
Yes	36	23.7
No	116	76.3
Aetiology of Teeth trauma		
Fall	31	86.1
Sporting activities	1	2.8
I can't remember	4	11.1
Site of occurrence of teeth trauma		

School	18	50.0
Home	13	36.1
Amusement Parks	2	5.6
Malls	3	8.3

**Table 3:** Occurrence of Teeth Trauma in under 5's.

A total of 2176 teeth were examined. 26 teeth in all were affected with TDI. 84.6% were anterior teeth while 15.4% were posterior teeth. Most of the teeth affected were maxillary central incisors (61.5%) with 73.3% of the subjects having single teeth affected. Code 2 injuries (Enamel fracture only) was the most commonly seen type of TDI (55.6%) (Table 4).

	Frequency (%)
Total Number of Teeth Examined	2176
Teeth With TDI	26 (100.0)
Anterior	22 (84.6)
Maxillary Central Incisor	16 (61.5)
Maxillary Lateral Incisor	4 (15.3)
Mandibular Central Incisor	1 (3.9)
Mandibular Canine	1(3.9)
Posterior	4 (15.4)
Number of Teeth Involved (Anterior Teeth)	N = 15
1	11 (73.3)
>1	4 (26.7)
Andreasen Classification of Teeth Trauma	
N = 18	
Code 1	4 (22.2)
Code 2	10 (55.6)
Code 3	2 (11.1)
Code 4	0 (0.0)
Code 5	2 (11.1)
Code 9	0 (0.0)
Flush Terminal Plane	N = 18
Normal	14 (77.8)
Mesial step	3 (16.7)
Distal step	1 (5.5)
Overjet	N = 18
Normal	12 (66.7)
Increased	2 (11.1)
Edge-to-edge	4 (22.2)
Reverse	0 (0.0)
Lip Competence	
Competent	15 (83.3)
Incompetent	3 (16.7)

**Table 4:** Examination Findings.

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	Presence of anterior teeth trauma		Chi-square ( $\chi^2$ )	p Value
	YES	NO		
Sex				
Male	10 (66.7)	79 (57.7)	78.89	0.052*
Female	5 (33.3)	58 (42.3)		
Educational Level				
Kindergarten	1(6.7)	57(41.6)	85.90	0.487
Nursery	6(40.0)	74(54.0)		
Primary	8 (53.3)	6 (4.4)		
Type of School				
Private	4 (26.7)	100 (73.0)	27.23	0.002*
Public	11 (73.3)	37 (27.0)		
Position of Child				
First	2 (13.3)	25 (18.2)	76.98	0.028*
Second	9 (60.0)	9 (6.6)		
Third	1 (6.7)	63 (46.0)		
Fourth	0 (0.0)	20 (14.6)		
Fifth	1 (6.7)	7 (5.1)		
Others	2 (13.3)	13 (9.5)		

**Table 5:** Association between Sociodemographic Factors and Occurrence of Anterior Teeth Trauma.

## Discussion

Traumatic dental injuries (TDI) are the most overlooked oral conditions regardless of the prevalence rate and their associated impact on children. [2] It is well known that physical activity is a basic need for the growth of a child and as such during these physical activities, injuries to the face and anterior teeth are some of the risks associated which result in pain, loss of function, poor aesthetics and psychological trauma. [19] Traumatic dental injuries hence constitute a true dental emergency and require immediate assessment and management. This study was conducted among 152 child participants to determine the prevalence as well as aetiologic and predisposing factors for anterior teeth trauma among children less than five years with its finding important as these infants and preschool age children are known to be at risk of traumatic dental injuries.

The prevalence rate of traumatic dental injuries in primary teeth ranges from 9.4 to 74%. [7-9] The prevalence rate of traumatic dental injuries in anterior teeth among children under five in this cross-sectional study is 9.87%. This is remarkably lower than as compared with earlier studies by Berti, *et al.* Soriano, *et al.* and Dua, *et al.* with a prevalence rate of 52.3%, 23.3% and 14.5% respectively with several reasons for this variation being age of the study subject, gender, sample size and other criteria used. [19,7-8] Although lower, similar prevalence rates were observed according to reports of studies whose study criteria were similar with that of this study. Chalissery, *et al.* [19] reported in a study conducted in Jaipur City in India to determine the prevalence and associated factors of anterior dental trauma among 800 preschool children aged 3-5 years, a prevalence rate of 10.2% which was also similar to a 10.13% prevalence observed by Govindrajan, *et al.* [7] among school children aged 3–13 years. The prevalence rate of 9.87% observed in this present study is however higher than what was reported by Ain, *et al.* [7] Hegde, *et al.* [7] and Nik-Hussein, *et al.* [10] with prevalence rates of 9.3%, 7.3% and 4.1% respectively. This may also be attributed to the type of criteria and study subjects in these studies.

Gender is a well-known risk variable for anterior TDI. Of the fifteen subjects with anterior TDI, 66.7% were males while 33.3% were females with the male to female ratio being 2:1 and this was statistically significant with this agreeing with similar studies worldwide. The higher prevalence for anterior TDI in male children under five was similar to what was obtained in the report by Chalissery, *et al.* where 55.2% occurred in males and 44.8% in females with a ratio of 1.2:1. [19] Male to female ratio based on the prevalence of anterior TDI was 1.6:1 as reported by Hegde, *et al.* [25] 1.7:1 as reported by Hamdan, *et al.* and 1.8:1 [10] as reported by Gojanur, *et al.* [10]. The report of this study as regards gender predisposition is however in contrast to other studies which reports observed no sex predilection in primary dentition trauma. The reason for low prevalence of dental trauma in females in this study can be attributed to the less energetic and inclination toward indoor activities in the preschool age group.

Falls was the most common aetiologic factor for anterior TDI in children under five years as it accounted for 86.1% of the causes. Other causes were of unknown origin (11.1%) as the parents could not ascertain the cause of the TDI and sporting activities (2.8%). This report was in comparison to reports by Gojanur, *et al.* [29] (71.1%), Govindarajan, *et al.* [25] (41.98%), Rai, *et al.* [10] Dua, *et al.* [24] and Hegde, *et al.* [27] where majority of anterior TDIs were due to falls by collision. Although dental injuries may occur at any age, they are fairly common in children under the age of five years as during this developmental period, children start learning how to walk and run. Their coordination and sense of judgment is not keenly developed and as such, falls are common in this age group. The second most common cause of anterior TDI according to this study was of unknown origin as this study is retrospective in nature with parents not being present as at the time of injury and as such were not able to identify the cause of anterior TDI in their children.

Most of the injuries occurred in the school (50.0%) other places where injuries occurred are at home (36.1%), malls (8.3%) and amusement parks (5.6%). This is in contrast with the observations of a study by Gupta, *et al.* [10] reporting that TDIs occurred most commonly at home followed by school and road accidents. Also, there was a statistically significant difference in the type of school attended by the child and the prevalence of anterior dental trauma which agrees with the reports of the study by Ain, *et al.* [26]

A total of 2176 deciduous teeth were examined with no permanent dentition seen in any of the children examined. 26 teeth (1.2%) were seen to be affected with one form of TDI or the other with 84.6% of teeth affected in the anterior region while 15.4% were in the posterior region. The maxillary anterior region is the most commonly affected with 61.5% involving the maxillary central incisor and 15.3% affecting the Maxillary Lateral Incisors. This report is consistent with that of Chalissery, *et al.* [19], Koroluk, *et al.* [10] and Bauss, *et al.* [10] where the maxillary region was most affected with the maxillary central incisor the most implicated tooth. This could be attributed to the natural protection of the mandibular incisors combined with the relative prominence of the maxillary central incisors thus tending to be the first ones to procure a direct blow resulting in trauma. Other reasons could include the rigidity of the maxilla due to its attachment to the skull base whereas the mandible being a flexible part aids in reduced impact forces towards the lower anterior teeth by movement.

Enamel injury accounted for the most common type of dental trauma (55.6%) while Enamel and dentine injury as well as missing tooth due to trauma accounted for 11.1% respectively. This finding is in agreement with earlier reports by Ain, *et al.* (68.5%) [26], Govindarajan, *et al.* [25] and Chalissery, *et al.* [19] This study also depicted that anterior TDI to the deciduous teeth mostly involves a single tooth (73.3%) and infrequently involve two or more teeth (26.7%) with this being consistent with the observations of most reports.

The influences of the position of the child with anterior TDI as well as the number of the children in the family were observed in this study. Most of the children with anterior TDI were the second child of their families (60.0%) and there was a statistically significant association between the position of the child and the prevalence of anterior TDI. This was consistent with the report of Chalissery, *et al.* [19] and Govindarajan, *et al.* [25] and in contrast to the report of Hegde, *et al.* [27] Most of the children anterior TDI were from a family with three children (46.7%) followed by families with two, four, five and above five children with 20.0%, 13.3%, 13.3% and 6.7% respectively. The reason for this may be attributed to the neglect the second child faces after the birth of the third child in a family of three children as the second child is usually left in care of the first child who is usually a few years older.

## Conclusion

The prevalence rate of anterior dental trauma among children under the age of 5 years according to this study is 9.87%. This observation is however in accordance with similar studies carried out with similar age criteria. Most of these injuries occurred in the male gender and falls accounted for the cause of most of these injuries with a large number of them occurring at school rather than at home.

The maxillary central incisor is the most commonly involved deciduous teeth and most of these injuries in children under five involved only the enamel. Also this study established a statistically significant relationship between the position of the child in the family and the prevalence of anterior dental trauma as most of these injuries occurred in the second child as opposed to any other position. However, there is the need to conduct this survey across Nigeria to further corroborate the evidences observed in this survey.

**Conflict of Interest:** None

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