

# Traumatic dental injuries and its effect on quality of life in 12 to 15-year-old children in Ibadan, Nigeria.

Y I Adeyemo\*, OO Bankole\*\*, TO Aladelusi\*\*\*,  
BO Popoola\*\* and OO Denloye\*\*

\*Department of Child Dental Health, Bayero University Kano/Aminu Kano Teaching Hospital Kano, Nigeria.

\*\*Department of Child Oral Health, University of Ibadan/University College Hospital Ibadan, Oyo State, Nigeria.

\*\*\*Department of Oral and Maxillofacial Surgery, University of Ibadan/ University College Hospital Ibadan, Oyo State, Nigeria.

ABSTRACT

**Purpose:** To determine the prevalence and aetiology of dental trauma and evaluate the effect of untreated traumatized anterior teeth on the quality of life of children age 12 to 15 in a developing country.

**Methods:** A cross-sectional study involving 1,575 children. Examinations were carried out on all participants and the Child Perception Questionnaire (CPQ) was used to assess the QoL of children who were aware of their trauma.

**Results:** Prevalence was 20.2% (318 participants) with a male preponderance (1.3:1.0). Peak age group of incidences was 8 to 12 years with a frequent occurrence at 11 and 8 years for males and females respectively.

Two hundred and five (64.5%) of the 318 participants with trauma to anterior teeth had enamel fractures and maxillary centrals (76.5%) were the most frequently injured teeth. Falls (61.7%) and home (60.7%) were the commonest cause of trauma and location of occurrence respectively.

One hundred and ninety-six participants were aware of their dental injury. About 62% of the participants who sustained trauma reported a negative impact on their daily life. 'Pain' and 'difficulty with chewing' were the most affected QoL domains. Overall, 84.7% of the participants had their oral health related quality of life negatively impacted by dental trauma.

**Conclusion:** Dental trauma had a negative impact on the QoL of the adolescents.

**Correspondence:** Dr. Yewande Isabella ADEYEMO.  
Department of Child Dental Health,  
Faculty of Dentistry,  
Bayero University, Kano  
E-mail: wendiepee@gmail.com.

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## Introduction

Traumatic dental injuries greatly impact on the quality of life of children due to the fact that they compromise dental health leading to aesthetic, psychological, social and therapeutic problems (Andreasen and Andreasen, 1990). With the incisors and canines playing a critical role in aesthetics,

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phonetics and functional activities, they have a significant effect on the facial profile and as such, trauma resulting in fractured, displaced or lost teeth can have negative functional, aesthetic and psychological effects on children and may also have an impact on a child's personality and quality of life (Caldas *et al.*, 2001; Navabazam and Farahani, 2010).

Trauma to anterior teeth often occur at a young age and are characterized by irreversibility, pain, high costs and treatment burden (Glendor, 2008). Its prevalence has been found to vary in different

populations and at various ages (Cortes, Marcenes and Sheiham, 2001; Locker, 2005). On the average, about 22% of all school children suffer traumatic dental injuries in the permanent dentition (Rao et al, 2008). Welbury (2003), during an epidemiological survey, revealed that by 12 years of age, 12-33% of boys and 4-19% of girls would have suffered some form of dental trauma while globally, approximately one in five children have at least one injury to the permanent teeth by the age of 15 years.

The World Health Organization report on the burden of oral diseases stated that epidemiological studies from developed countries revealed that the prevalence of traumatic dental injuries is on the increase, ranging from 4-33% among 12-14-year-old children (Petersen et al, 2005). A study conducted in 12-year-old school children in Brazil by Traebert *et al.*, (2003,2006) revealed a prevalence of 18.9% and 17.3% respectively while Soriano et al (2007) found a prevalence of 10.5%. A more recent study in Curitiba, Brazil, revealed a prevalence of 37.1% in 12 to 15-year-old school children (Carvalho *et al.*, 2010). Also, Livny *et al.*, (2010) reported a prevalence of 17.7% among 11/12 years Palestinian school children. In Africa, Hargreaves *et al.*, (1995) recorded a prevalence of 15.4% in 11-year-old children in South Africa. Alexander and Kida (2006) also recorded that, of 6 to 12-year olds with traumatized anterior teeth seen in a dental clinic in Tanzania, 48% were 10 to 12 years old.

In Nigeria, the prevalence of traumatic dental injuries in children aged between 6 and 16 years ranged from 6.5% to 19.5% from previous studies conducted in some cities and a few in suburban areas (Otuyemi and Sofowora, 1991; Otuyemi, 1994; Adekoya-Sofowora et al, 2000; Adekoya-Sofowora et al, 2005). Akpata (1969), Falomo (1986) and Naqvi and Ogidan (1990) in their studies on traumatized anterior teeth in school children in Lagos, Ibadan and Benin-City, reported a prevalence of 14.5%, 16.0% and 19.1% respectively. Otuyemi (1994) found a prevalence of 10.9% in 12-year-old Nigerian children while Adekoya-Sofowora et al (2005) reported a

prevalence of 12.87 in 12-year-old suburban Nigerian school children in Ile-Ife. Agbelusi and Jeboda, in 2005, also carried out a study on 1,600 urban Nigerian 12-year-old school children in six local government areas of Lagos state and they reported a prevalence of 9.8%. Similarly, a prevalence of 9.1% was recorded in 13 to 15-year-old secondary school children in Ile-Ife (Adekoya-Sofowora *et al.*, 2005).

For several years, not considering the patient's perspective and the impact of oral problems on their day to day life, clinical indices were used to measure oral health in terms of determining the outcome of oral disease e.g. the number of decayed, missing and filled teeth and the presence of calculus. A more complete assessment of the patient can only be determined by incorporating the patient's self-perception of their oral health into the clinical presentation (Corson *et al.*, 1999).

Measures of health-related quality of life can be used to assess both the needs for and outcomes of clinical and psychosocial interventions from the perspective of the individual concerned. As such, they have the potential to improve the quality of clinical and psychosocial care (Marcusson, Akerlind and Paulin, 2001). A health-related quality of life perspective has the advantage of being multi-dimensional and considers symptoms, physical functioning, and emotional and social well-being (Locker, Jokovic and Tompson, 2005). Also, because these measures rely on the individual's own assessment of their well-being and quality of life as it is affected by a particular health condition and they are usually referred to as patient-centered (Locker, 1988).

Not much is known about how children feel with regards to having their anterior teeth fractured and as well as its relation to possible socio-psychological and emotional impact on how they behave (Hamdan and Rock, 1995). A few articles have documented the impact of trauma to anterior teeth on Quality of Life with paucity of documentation here in Nigeria.

This study provided some baseline data, including prevalence and aetiology of dental trauma in

children in Ibadan, Nigeria, a developing country. It also evaluated the effect of untreated traumatized anterior teeth on their Quality of Life. These data will aid in implementation of oral health policies by the government which will help in planning preventive and treatment programs.

## **Materials and methods**

### **Study setting and sample size**

This was a population based cross sectional study, involving 1,575 participants which lasted a period of 1 year from January to December 2013. The study population consisted of 12 to 15-year-old children from selected public and private secondary schools in all the 5 local government areas in Ibadan, Oyo State. Participants who fulfilled the inclusion criteria and agreed to participate in the study with permission from their parents/guardians were included.

The minimum sample size required to determine the prevalence of trauma to anterior teeth was powered to 80% and calculated based on a previous Nigerian study in adolescents by Ajayi, Denloye and Abiodun Solanke (2010) using the formula by Lwanga and Lemeshow (1991). The sample size was 1,575 and participants were all equally distributed into each of the 5 Local Government Areas. The selection entailed a multi-stage sampling technique. A list of 294 (174 public and 120 private) registered schools, already numbered per Local Government Area was obtained from the Oyo State Ministry of Education. The number of participants from each public and private secondary school selected adding up to 315 participants per Local Government Area was proportionately determined. At the schools, 12 to 15-year-old participants who gave assent and whose parents had consented were randomly selected from the classes by balloting for the required number of participants per school.

The study protocol was given full approval by the joint University of Ibadan/University College Hospital Ethical Review Committee (UI/EC/12/0408) before commencement of the study. Permission to conduct the study in selected schools was obtained

from the Oyo State Schools Management Board in each Local Government Area after approval was given by the State Ministry of Education. Permission was also sought and granted by the Principals of the selected schools.

### **Study Instrument**

The study instruments for data collection of the participants were a dental trauma screening proforma and an abbreviated version of a previously validated shortened form of the Child Perception Questionnaire (CPQ<sub>11-14</sub>). The dental trauma screening proforma included socio-demographics, history and the cause of dental injury. Trauma to anterior teeth was classified using the Garcia Godoy classification of trauma to anterior teeth which has been found to be simple, quick, reliable, reproducible and specific (Adekoya-Sofowora, Adesina and Nasir, 2006). The participants who knew they had trauma to anterior teeth were further assessed using an abbreviated version of the Child Perception Questionnaire (CPQ<sub>11-14</sub>) by Jokovic, Locker and Guyatt (2006). It included data on impact of traumatic dental injuries on the participant's quality of life. Socio-economic status for each child was determined using the socio-economic index score by Oyedeji (1985).

Oral examinations and assessment of each participant was carried out by the main researcher under natural light with the participant seated on a chair during the examination. The researcher adopted strict cross infection preventive measures with the use of standard examining tools which were pre-packaged sterile mouth mirrors and CPITN probes in a pouch each for each participant and sterile gloves and gauze were used where necessary.

Traumatic injuries to the maxillary and mandibular permanent incisor and canine teeth of each child was recorded and classified according to the method described by Garcia-Godoy (1981).

The Child Perception Questionnaire (CPQ<sub>11-14</sub>), which consisted of 11 questions (item specific impacts) which were used to assess and measure the impact

of dental trauma on daily life in four domains- oral symptoms, functional limitations, their emotional and social well-being in the previous three months was administered by the interviewer for each participant. The impact was scored on a 5-point Likert scale. Measurement of impact of untreated traumatic dental injuries on the quality of life of the participants were dichotomized in accordance with previous oral health related quality of life (OHRQoL) studies (Cortes, Marcenés and Sheiham, 2002; Fakhruddin et al, 2008; Bendo et al, 2010; Ramos-Jorge *et al.*, 2014). Only participants who were aware of the dental trauma they had sustained and could tell of its impact on their Quality of Life were considered for further analysis. A score of 0/absent was recorded where there was no oral health related impact while 1/present represented those who had experienced oral health related impact on quality of life.

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 16.0. Frequency distributions were presented using tables, pie and bar charts and summary statistics such as mean and standard deviation. Cross tabulations of qualitative data e.g. gender, presence or absence of injured teeth etc. were expressed as percentages/proportions and compared using Pearson's Chi square statistics where necessary. The level of significance was set at  $p < 0.05$ .

## Results

### Demography of the participants

The response rate of the study participants was 100% as all the 1575 participants agreed to participate in the study. Of these, four hundred and four (25.7%), 538 (34.2%), 388 (24.6%) and 245 (15.6%) children were 12, 13, 14 and 15 years old respectively. Approximately 58.4% were females and 57.9% belonged to the middle socio-economic class. They were all screened for traumatic dental injuries to the anterior teeth.

### Prevalence of trauma to anterior teeth

Three hundred and eighteen (20.2%) had evidence of trauma to anterior teeth which involved the maxillary and mandibular central incisors, lateral incisors and canines. The 318 children consisted 155 of 655 male participants and 163 of 920 females giving a male to female ratio of 1.3:1.0. The proportion of males with trauma to their anterior teeth (155, 23.7%) compared to their female counterparts (163, 17.7%) was observed to be significantly higher ( $p = 0.01$ ,  $\chi^2 = 8.397$ ).

### Relationship between trauma to anterior teeth and socio-demographic variables of participants

A higher proportion of the participants with traumatized anterior teeth were 15-year old (22.9%). The mean age of the children with traumatized anterior teeth was  $13.3 \pm 1.0$  years. Of all the participants who had traumatized anterior teeth, a significantly higher proportion was seen in the low socioeconomic class (56, 26.7%). **Figure 1** depicts the relationship between age and gender of participants with trauma to their anterior teeth while the relationship between participants with and without injury and their socio-demographic variables is shown in **Table 1**.

### Distribution of traumatized anterior teeth

A total of four hundred and twenty-five (425) traumatized teeth (415 incisors (97.6%), 10 canines) were seen in the 318 participants who sustained trauma to their anterior teeth. The maxillary incisor teeth were the most frequently traumatized anterior teeth, accounting for 365 (85.9%) fractured teeth with the maxillary centrals being 325 (76.5%) and maxillary laterals being 40 (9.4%) of 425 traumatized teeth. Eight of the 10 canines had enamel fractures only and 3 (0.7%) of the 10 teeth were maxillary canines.

### Frequency of the type of trauma to the teeth in relation to socio-demographic variables

The most commonly observed type of dental injury was enamel fracture accounting for 282 (66.3%) of all traumatized teeth. This was followed by enamel-

dentine fractures without pulpal exposure (19.5%) with the least common type being enamel-dentine fracture involving the pulp (1.9%). The frequency distribution of the other types of trauma to anterior teeth are as shown in the Table 2. The number of teeth with enamel fractures, enamel cracks, enamel-dentine fractures involving the pulp and avulsion injuries were more in the females than the male participants accounting for 55.7%, 53.6%, 62.5% and 54.5% respectively. Overall, the females and participants in public schools had a higher number of traumatized teeth (50.8% and 61.2%) than the males and the participants in private schools respectively (Table 2).

### Type of trauma

Of the 318 participants who had trauma, 205 (64.5%) had enamel fractures, 68 (21.4%) sustained enamel-dentine fractures and 21 (6.6%) were with enamel cracks (Figure 2). Thirteen children in all had overlaps of dental trauma and the worst class of trauma was selected.

### Frequency of the number of traumatized teeth in relation to socio-demographics

The number of traumatized teeth per participant ranged from 1 to 6 with the majority of participants (236, 74.2%) having only one injured tooth (Table 3). The mean number of traumatized teeth was  $1.3 \pm 0.7$  per child. A higher proportion of females had 1 traumatized tooth (74.9%) and 3 traumatized teeth (6.1%) than the male participants. This observation was not statistically significant ( $p > 0.05$ ).

### Aetiology and location of occurrence of dental trauma in relation to socio-demographics

Only 196 (61.6%) participants, (101 (51.8%) males and 95 (48.5%) females) were aware of the fact that they had trauma to their anterior teeth, could recollect the cause of the trauma they sustained and where it occurred (Tables 4 and 5). However, the remaining 122 (38.4%) of 318 participants lacked an awareness, could not remember how the trauma occurred as well as where it occurred.

Further analysis (Quality of Life) on the 196 participants who were aware of the trauma they had sustained to their teeth was therefore carried out based on these reasons.

Falls accounted for 57.1% of participants with traumatized teeth making it the principal cause of traumatic dental injuries (Table 4). Road traffic crash (4.1%) was the least common cause of dental trauma. Females sustained more injuries to their teeth as a result of collision (56.1%), biting of hard food (72.7%) and road traffic crashes (75.0%) than the males while males had more injuries resulting from falls (50.9%), sports (92.3%), and violence (63.6%).

The highest number of participants with traumatized teeth as a result of violence (54.6%) was seen in the 12-year olds while the highest number as a result of falls (30.3%), collision (53.7%), sports (46.2%), biting of hard food (36.4%) and RT crash (50.0%) were seen in the 13-year olds. The number of participants whose teeth injuries were as a result of falls and sports were highest in the public schools and the middle social class. Majority of those who sustained trauma to their anterior teeth as a result of biting hard food, violence and road traffic crashes were from the private schools.

One hundred and nineteen children (60.7%) traumatized their teeth at home while 22.9% sustained trauma to their anterior teeth in school. Other locations of occurrence and the number of participants who sustained trauma in these locations are as shown in Table 5.

A higher percentage of females sustained trauma to their anterior teeth at home (54.6%) and on the road side (80.0%) in comparison to the males in these locations while a higher proportion of the males sustained trauma at school (57.8%), in the field (83.3%) and at worship centres (85.7%). The relationship between the location of occurrence of trauma and gender was found to be statistically significant ( $p = 0.027$ ). Participants aged 13 years sustained trauma at home (34.5%), school (42.2%)

and in the shops and markets (62.5%) more than those of other ages, while in the field and at the worship centres, participants ages 14 years (33.3%) and 15 years (42.9%) respectively sustained trauma more than other age groups.

#### **Impact of traumatic dental injuries on quality of life**

Though 318 participants presented with evidence of trauma to anterior teeth, only 196 (61.6%) of them knew they had traumatized teeth.

#### **CPO<sub>11-14</sub> Item specific impacts in participants**

The most prevalent CPO<sub>11-14</sub> item specific impact in 196 participants was pain where 105 (53.6%) participants reported a negative impact on their

quality of life. The next most prevalent item specific impact was chewing difficulty as 104 (53.1%) participants had their quality of life affected by the impact of trauma to their anterior teeth (**Table 6**).

#### **Domain and overall CPO<sub>11-14</sub> in participants**

In the oral symptoms' domain, 124 (63.3%) participants had their quality of life negatively affected by trauma to anterior teeth while the emotional well-being domain had 110 (56.1%) participants whose quality of life was adversely affected by the impact of trauma (**Table 7**). The overall CPO<sub>11-14</sub> revealed 166 (84.7%) participants whose quality of life was negatively affected by the impact of trauma

**Table 1: Socio-demographics of the participants with and without trauma to anterior teeth**

Socio-demographic variables	Without injury n= 1257	With injury n= 318	Total number of participants N= 1575
<b>Age (years)</b>			
12	329 (81.4)	75 (18.6)	404 (100)
13	427 (79.4)	111 (20.6)	538 (100)
14	312 (80.4)	76 (19.6)	388 (100)
15	189 (77.1)	56 (22.9)	245 (100)
	<b>p=0.594, <math>\chi^2=1.897</math></b>		
<b>Gender</b>			
Male	500 (76.3)	155 (23.7)	655 (100)
Female	757 (82.3)	163 (17.7)	920 (100)
	<b>*p=0.004, <math>\chi^2=8.397</math></b>		
<b>School type</b>			
Public	730 (79.4)	189 (20.6)	919 (100)
Private	527 (80.3)	129 (19.7)	656 (100)
	<b>p= 0.660, <math>\chi^2= 0.193</math></b>		
<b>Social status</b>			
High	353 (77.9)	100 (22.1)	453 (100)
Middle	750 (82.2)	162 (17.8)	912 (100)
Low	154 (73.3)	7356 (26.7)	210 (100)
	<b>*p=0.007, <math>\chi^2=9.799</math></b>		

\*= Significant p value

N= Total number of participants seen.

**Table 2: Frequency of the type of traumatized anterior teeth in relation to socio-demographic variables of the 318 participants with trauma.**

Socio-demographic variables	Type of trauma to anterior teeth, n (%)						Total number of injured teeth N= 425 (100)
	Enamel fractures n=282 (66.3)	ED- fracture n= 83 (19.5)	Enamel cracks n= 28 (6.6)	ED+ pulp n=8 (1.9)	Luxation n=13 (3.1)	Avulsion n=11 (2.6)	
<b>Age (years)</b>							
12	71 (25.2)	18 (21.7)	4 (14.3)	1 (12.5)	2 (15.4)	3 (27.3)	99 (23.3)
13	94 (33.3)	31 (37.3)	14 (50.0)	4 (50.0)	11 (84.6)	6 (54.5)	160 (37.7)
14	68 (24.1)	19 (22.9)	5 (17.9)	1 (12.5)	0 (0.0)	1 (9.1)	94 (22.1)
15	49 (17.4)	15 (18.1)	5 (17.9)	2 (25.0)	0 (0.0)	1(	72 (16.9)
<b>Gender</b>							
Male	125 (44.3)	52 (62.7)	13 (46.4)	3 (37.5)	11 (84.6)	5 (45.5)	209 (49.2)
Female	157 (55.7)	31 (37.3)	15 (53.6)	5 (62.5)	2 (15.4)	6 (54.5)	216 (50.8)
<b>SES</b>							
High	90 (31.9)	24 (28.9)	9 (32.1)	1 (12.5)	6 (46.1)	4 (36.4)	134 (31.5)
Middle	148 (52.5)	42 (50.6)	14 (50.0)	4 (50.0)	5 (38.5)	5 (45.4)	218 (51.3)
Low	44 (15.6)	17 (20.5)	5 (17.9)	3 (37.5)	2 (15.4)	2 (18.2)	73 (17.2)
<b>School type</b>							
Public	169 (59.9)	55 (66.3)	16 (57.1)	7 (87.5)	7 (53.8)	6 (54.5)	260 (61.2)
Private	113 (40.1)	28 (33.7)	12 (42.9)	1 (12.5)	6 (46.2)	5 (45.5)	165 (38.8)

**ED- Enamel-Dentine**

**SES- Socio-Economic Status**

**N= Total number of injured teeth**

**Table 3: Frequency of the number of traumatized teeth by socio-demographic variables**

Socio-demographic variables	Number of traumatized teeth, n (%)				Total Number of participants N = 318 (100)
	1 tooth n=236 (74.2)	2 teeth n= 65 (20.4)	3 teeth n= 12 (3.8)	4 or more n= 5 (1.6)	
<b>Age (years)</b>					
12	57 (76.0)	15 (20.0)	2 (2.7)	1 (1.3)	75 (100)
13	75 (67.6)	27 (24.3)	6 (5.4)	3 (2.7)	111 (100)
14	64 (84.2)	8 (10.5)	3 (4.0)	1 (1.3)	76 (100)
15	40 (71.4)	15 (26.8)	1 (1.8)	0 (0.0)	56 (100)
<b>p= 0.178, <math>\chi^2= 23.341</math></b>					
<b>Gender</b>					
Male	114 (73.5)	35 (22.6)	2 (1.3)	4 (2.6)	155 (100)
Female	122 (74.9)	30 (18.4)	10 (6.1)	1 (0.6)	163 (100)
<b>p= 0.055, <math>\chi^2= 7.593</math></b>					
<b>Social status</b>					
High	74 (31.4)	22 (33.8)	3 (25.0)	1 (20.0)	100 (100)
Middle	119 (50.4)	33 (50.8)	7 (58.3)	3 (60.0)	162 (100)
Low	43 (76.8)	10 (17.8)	2 (3.6)	1 (1.8)	56 (100)
<b>p= 0.336 <math>\chi^2= 13.472</math></b>					
<b>School type</b>					
Public	137 (72.5)	40 (21.2)	8 (4.2)	4 (2.1)	189 (100)
Private	99 (76.7)	25 (19.4)	4 (3.1)	1 (0.8)	129 (100)
<b>p= 0.695, <math>\chi^2= 1.444</math></b>					

**N= Total number of participants with trauma.**

**Table 4: Socio-demographic variables of the participants in relation to aetiology of trauma to anterior teeth**

Socio-demographic variables	Cause of trauma, n (%)						Total N= 196 (100)
	Fall n= 112 (57.1)	Collision n= 41 (21.0)	Sports n= 13 (6.6)	Biting hard food n=11 (5.6)	Violence n= 11 (5.6)	RT Crash n=8 (4.1)	
<b>Age (years)</b>							
12	28 (25.0)	8 (19.5)	2 (15.4)	4 (36.4)	6 (54.5)	2 (25.0)	49(25.0)
13	34 (30.3)	22 (53.7)	6 (46.1)	4 (36.4)	1 (9.1)	4 (50.0)	<b>71 (36.2)</b>
14	33 (29.5)	6 (14.6)	3 (23.1)	1 (9.1)	1 (9.1)	1 (12.5)	46 (23.5)
15	17 (15.2)	5 (12.2)	2 (15.4)	2 (18.2)	3 (27.3)	1 (12.5)	30 (15.3)
<b>p= 0.126, <math>\chi^2= 21.352</math></b>							
<b>Gender</b>							
Male	57 (50.9)	18 (43.9)	12 (92.3)	3 (27.3)	7 (63.6)	2 (25.0)	<b>101 (51.5)</b>
Female	55 (49.1)	23 (56.1)	1 (7.7)	8 (72.7)	4 (36.4)	6 (75.0)	95 (48.5)
<b>*p=0.011, <math>\chi^2=14.936</math></b>							
<b>Social status</b>							
High	39 (34.8)	14 (34.2)	2 (15.4)	7 (63.6)	3 (27.3)	4 (50.0)	69 (35.2)
Middle	55 (49.1)	16 (39.0)	8 (61.5)	4 (36.4)	6 (54.5)	3 (37.5)	<b>93 (47.5)</b>
Low	18 (16.1)	11 (26.8)	3 (23.1)	0 (0.0)	2 (18.2)	1 (12.5)	34 (17.3)
<b>p= 0.640, <math>\chi^2= 17.198</math></b>							
<b>School type</b>							
Public	66 (58.9)	25 (61.0)	9 (69.2)	2 (18.2)	5 (45.5)	3 (37.5)	<b>108 (55.1)</b>
Private	46 (41.1)	16 (39.0)	4 (30.8)	9 (81.8)	6 (54.5)	5 (62.5)	88 (44.9)
<b>p= 0.090, <math>\chi^2= 9.500</math></b>							

\* = significant p value **RT Crash- Road Traffic Crash**

**Table 5: Socio-demographic variables of the participants in relation to the location of occurrence of trauma to anterior teeth**

Socio-demographic variables	Location of occurrence of trauma						Total N= 196 (100)
	Home n= 119 (60.7)	School n=45 (22.9)	Field n= 12 (6.1)	Shop/ Market n= 8 (4.1)	Church/ Mosque n= 7 (3.6)	Road- side n= 5 (2.6)	
<b>Total, n (%)</b>	119 (60.7)	45 (22.9)	12 (6.1)	8 (4.1)	7 (3.6)	5 (2.6)	196 (100)
<b>Age (years)</b>							
12	33 (27.7)	9 (20.0)	3 (25.0)	0 (0.0)	2 (28.6)	2 (40.0)	49 (25.0)
13	41 (34.5)	19 (42.2)	3 (25.0)	5 (62.5)	1 (14.3)	2 (40.0)	71 (36.2)
14	27 (22.7)	11 (24.4)	4 (33.3)	3 (37.5)	1 (14.3)	0 (0.0)	46 (23.5)
15	18 (15.1)	6 (13.3)	2 (16.7)	0 (0.0)	3 (42.9)	1 (20.0)	30 (15.3)
	<b>p= 0.505, <math>\chi^2= 14.274</math></b>						
<b>Gender</b>							
Male	54 (45.4)	26 (57.8)	10(83.3)	4 (50.0)	6 (85.7)	1 (20.0)	101 (51.5)
Female	65 (54.6)	19 (42.2)	2 (16.7)	4 (50.0)	1 (14.3)	4 (80.0)	95 (48.5)
	<b>*p= 0.027, <math>\chi^2= 12.639</math></b>						
<b>Social Status</b>							
High	41 (34.5)	22 (48.9)	3 (25.0)	2 (25.0)	1 (14.3)	1 (20.0)	70 (35.7)
Middle	60 (50.4)	15 (33.3)	7 (58.3)	5 (62.5)	2 (28.6)	4 (80.0)	93 (47.4)
Low	18 (15.1)	8 (17.8)	2 (16.7)	1 (12.5)	4 (57.1)	0 (0.0)	33 (16.8)
	<b>p= 0.233, <math>\chi^2= 24.219</math></b>						
<b>School type</b>							
Public	66 (55.5)	21 (46.7)	7 (58.3)	5 (62.5)	5 (71.4)	4 (80.0)	108 (55.1)
Private	53 (44.5)	24 (53.3)	5 (41.7)	3 (37.5)	2 (28.6)	1 (20.0)	88 (44.9)
	<b>p= 0.618, <math>\chi^2=3.535</math></b>						

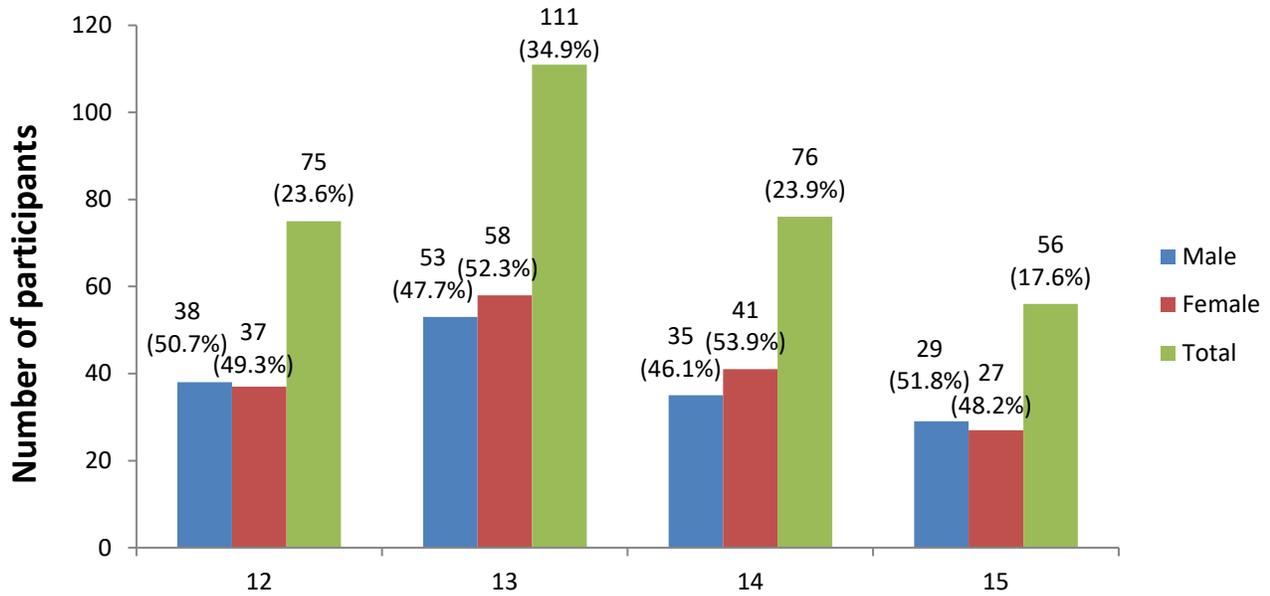
\*= significant p value

**Table 6: CPQ<sub>11-14</sub> item specific impacts for Quality of Life of participants who were aware of their traumatized anterior teeth.**

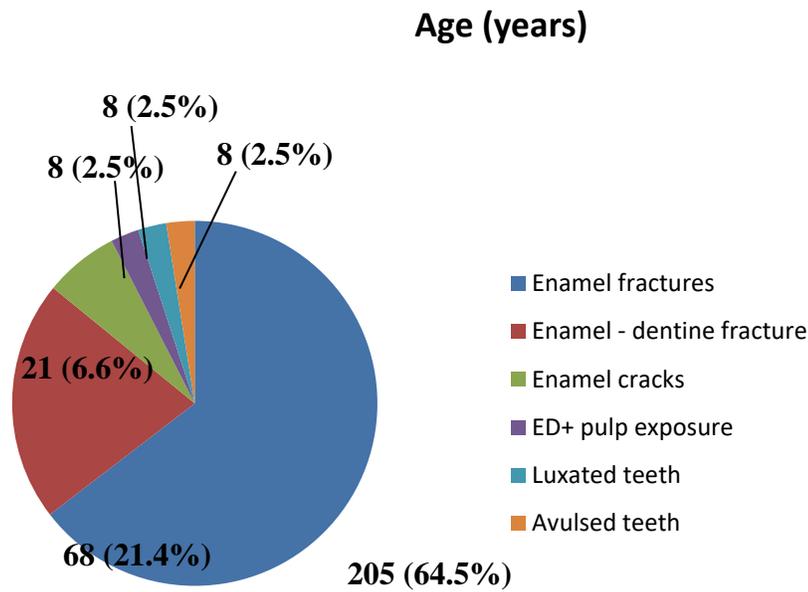
<b>Oral symptoms domain items</b>	
<b>Dimensions and Items</b>	<b>Untreated Dental Injury, n (%)</b>
<b>Pain</b>	
CPQ <sub>11-14</sub> = 0	91 (46.4)
CPQ <sub>11-14</sub> = 1	105 (53.6)
<b>Pain on brushing</b>	
CPQ <sub>11-14</sub> = 0	102 (52.0)
CPQ <sub>11-14</sub> = 1	94 (48.0)
<b>Functional limitation domain items</b>	
<b>Dimensions and Items</b>	<b>Untreated dental injury, n (%)</b>
<b>Sleep disturbance</b>	
CPQ <sub>11-14</sub> = 0	148 (75.5)
CPQ <sub>11-14</sub> = 1	48 (24.5)
<b>Chewing difficulty</b>	
CPQ <sub>11-14</sub> = 0	92 (46.9)
CPQ <sub>11-14</sub> = 1	104 (53.1)
<b>Emotional well-being domain items</b>	
<b>Dimensions and Items</b>	<b>Untreated dental injury, n (%)</b>
<b>Shy and embarrassed</b>	
CPQ <sub>11-14</sub> = 0	107 (54.6)
CPQ <sub>11-14</sub> = 1	89 (45.4)
<b>Concerned about what others think/say</b>	
CPQ <sub>11-14</sub> = 0	107 (54.6)
CPQ <sub>11-14</sub> = 1	89 (45.4)
<b>Social well-being domain items</b>	
<b>Dimensions and Items</b>	<b>Untreated dental injury, n (%)</b>
<b>Low concentration in school</b>	
CPQ <sub>11-14</sub> = 0	162 (83.2)
CPQ <sub>11-14</sub> = 1	33 (16.8)
<b>Avoid smiling/laughing</b>	
CPQ <sub>11-14</sub> = 0	115 (58.7)
CPQ <sub>11-14</sub> = 1	81 (41.3)
<b>Did not want to talk to other children</b>	
CPQ <sub>11-14</sub> = 0	152 (77.6)
CPQ <sub>11-14</sub> = 1	44 (22.4)
<b>Did not want to spend time with others</b>	
CPQ <sub>11-14</sub> = 0	150 (76.5)
CPQ <sub>11-14</sub> = 1	46 (23.5)
<b>Teased by other children</b>	
CPQ <sub>11-14</sub> = 0	118 (60.2)
CPQ <sub>11-14</sub> = 1	78 (39.8)

**Table 7: Quality of Life domains of participants who were aware of their traumatized anterior teeth.**

<b>Oral symptoms domain</b>	
<b>Dichotomized CPQ<sub>11-14</sub></b>	<b>Number of respondents, n (%)</b>
CPQ <sub>11-14</sub> = 0	72 (36.7)
CPQ <sub>11-14</sub> = 1	124 (63.3)
<b>Functional limitations domain</b>	
<b>Dichotomized CPQ<sub>11-14</sub></b>	<b>Number of respondents, n (%)</b>
CPQ <sub>11-14</sub> = 0	85 (43.4)
CPQ <sub>11-14</sub> = 1	111 (56.6)
<b>Emotional well-being domain</b>	
<b>Dichotomized CPQ<sub>11-14</sub></b>	<b>Number of respondents, n (%)</b>
CPQ <sub>11-14</sub> = 0	86 (43.9)
CPQ <sub>11-14</sub> = 1	110 (56.1)
<b>Social well-being domain</b>	
<b>Dichotomized CPQ<sub>11-14</sub></b>	<b>Number of respondents, n (%)</b>
CPQ <sub>11-14</sub> = 0	83 (42.3)
CPQ <sub>11-14</sub> = 1	113 (57.7)
<b>Overall CPQ<sub>11-14</sub> score</b>	
<b>Dichotomized CPQ<sub>11-14</sub></b>	<b>Number of respondents, n (%)</b>
CPQ <sub>11-14</sub> = 0	30 (15.3)
CPQ <sub>11-14</sub> = 1	166 (84.7)



**Fig 1: Age and gender distribution of children with trauma to anterior teeth.**



**Fig 2: Distribution of types of trauma to anterior teeth in the children.**

## Discussion

The prevalence of dental trauma in various epidemiological studies globally has been found to differ considerably. The prevalence of trauma to anterior teeth reported in this study (20.2%) is similar to the findings in previous studies where the prevalence ranged between 17.1% and 23.7% in adolescents (Garcia-Godoy, 1981; Kaste *et al.*, 1996; Nicolau, Marcenes and Sheiham, 2001; Marcenes, Zobot and Traebert, 2001; Traebert *et al.*, 2012). Prevalence rates in adolescents have been reported to be as low as 11.7% and as high as 58.6% (Marcenes *et al.*, 1999). The prevalence in this study was noted to be similar to the prevalence in a study in Benin-City while it was higher than the prevalence in some other studies conducted in Nigeria (Naqvi and Ogidan, 1990; Otuyemi, 1994; Adekoya-Sofowora *et al.*, 2005; Agbelusi and Jeboda, 2005; Ajayi, Denloye and Abiodun Solanke, 2010). Various epidemiological studies in Nigeria had however been reported to have their prevalence ranging between 6.5 and 19.5% as cited by Adekoya-Sofowora *et al.*, (2000). Studies by the same investigators or studies using the same diagnostic protocol show variations between and within countries (Locker, 2005). These variations may be due to a number of factors and these include variations in methodology, different ages of the population studied, the type of dentition, differences in diagnostic classifications, geographical and behavioural differences in study locations (García-Godoy, Sánchez and Sánchez, 1981; Bastone, Freer and McNamara, 2000; Locker, Jokovic and Tompson, 2005; Adekoya-Sofowora *et al.*, 2009).

Various reasons can be adduced for the higher prevalence observed in the present study. The age and gender distribution of the population of Nigeria by the National Bureau of Statistics reflected a high proportion of children and young persons in the population. Those under 15 years of age constituted about 45 percent of the total population, while figures revealed that half of Nigerian females are below 19 years (Population Reference Bureau, Accessed 2013). These children and adolescents are susceptible to trauma as they grow with their parents having insufficient knowledge about safety

as well as what to do when it comes to dental injuries as observed in this study.

Furthermore, the Nigerian economy appears to be improving and many more children as a result of improved lifestyles attend schools with better outdoor sporting facilities, thus indulging in contact sports leading to falls and collisions amongst other aetiologies. Violence may be attributed to excessive exposure to the media and internet facilities- the television, computers and access to phones, as well to an improved socioeconomic status in the home. An overcrowded household may yet be another reason for increase in prevalence figures in this study as corroborated in a study by Marcenes and Murray (2002). This may however be peculiar to developing countries. In this study, there was a male preponderance of 1.3:1.0 as regards trauma to anterior teeth which agreed with several studies where epidemiologic data which indicated a male preponderance with respect to traumatized teeth was recorded due to their greater physical activities (Naqvi and Ogidan, 1990; Traebert *et al.*, 2003; Adekoya-Sofowora *et al.*, 2005; Ajayi, Denloye and Abiodun Solanke, 2010).

Concerning the type of teeth involved, the type of trauma and how many teeth involved, the maxillary incisors were the most frequently traumatized teeth with the maxillary centrals being predominant (76.5%). This is in concordance with findings from previous studies (Bastone, Freer and McNamara, 2000; Cortes, Marcenes and Sheiham, 2001; Udoye, 2006). The earlier eruption sequence of the central incisors exposes them to the risk of trauma for a longer period as suggested by Denloye (1996) while Okpo (1985) further explained that the upper central incisor teeth, being in the anterior aspect of the face, are in the direction of body movement, generally making them to receive more trauma than the lateral incisor teeth or the canine teeth. Interestingly, cases of traumatized canines were observed in this study which was contrary to the findings of Naqvi and Ogidan (1990), Ajayi, Denloye and Abiodun Solanke (2010) and Bendo *et al.*, (2010). The eruption of canine teeth is usually much later than the incisor teeth especially in the upper jaw (Naqvi and Ogidan, 1990). Also, as a result of their position in the dental

arch, the canine teeth are well protected from the angle of direction of the impacting force (Naqvi and Ogidan, 1990). Their involvement may be due to a greater impacting force on the face or the angle of impact involving the canine region.

Fracture of the enamel only was the most common type of traumatic dental injury which is in close keeping with previous studies and single tooth injury was predominant in all the age groups as reported by some previous studies (Marcenes, Zobot and Traebert, 2001; Adekoya-Sofowora *et al.*, 2009; Ajayi, Denloye and Abiodun Solanke, 2010). Cases of enamel cracks observed in this study perhaps also contributed to the increased prevalence as majority of other field studies only reported on enamel fractures.

Fall was the principal cause of dental trauma in this study and most of the traumatic dental injuries occurred at home followed by injuries occurring in school. This agreed with many studies (Stockwell, 1988; Celenk *et al.*, 2002; Sandalli, Cildir and Guler, 2005; Adekoya-Sofowora *et al.*, 2009). Ajayi, Denloye and Abiodun Solanke (2010) also reported that falls accounted for the majority of the causes of trauma to anterior teeth.

Fall was slightly more prevalent in the male gender, likewise sports and violence while collision, biting on firm food and road traffic crash were more prevalent in the female gender. However, in a study by Baghdady, Ghose and Alwash (1981), there was no significant difference found between the genders as regards the aetiology of trauma. Further studies on this will be of benefit. The reason for these falls at home and schools may however not be farfetched. Although there is no evidence to show that the homes and schools are not safe, many homes are undergoing changes. With newer building materials made available, the newly built or renovated homes and schools make use of ceramic floor tiles which have been noted to be dangerous. Many of them are polished tiles which are glossy and slippery thus making an individual trauma-prone. Children are likely to get injured on such grounds especially during play.

Conversely, there is a growing indication that occurrence of oral and dental injuries in schools is on the increase and these occur often during children's play or leisure activities in schools in comparison to home (Ravn, 1974; Oikarinen and Kassila, 1987; Peterson, Andersson and Sorensen, 1997; Skaare and Jacobsen, 2003). This may be attributed to the fact that so many hours are being spent in school these days compared to times in the past when children got home early from school. It is thus possible that in some years from now, studies may record traumatized anterior teeth more in school than at home if allowed to play in school unsupervised.

### **IMPACT OF TRAUMATIC DENTAL INJURIES ON QUALITY OF LIFE**

The quality of life of majority (84.7%) of the participants with trauma to anterior teeth in this study was seen to be negatively impacted by traumatic dental injuries thus denoting a poor oral health related quality of life. This was found to be in consonance with previous studies that confirmed that traumatic dental injuries negatively impact oral health related quality of life (Marcenes and Murray, 2003; Ramos-Jorge *et al.*, 2007; Fakhruddin *et al.*, 2008; Traebert *et al.*, 2012). Cortes, Marcenes and Sheiham *et al.*, (2002) in a study in Brazil and Fakhruddin *et al.*, (2008) in Canada established that children with untreated traumatic dental injuries were more likely to suffer an adverse impact on their daily life than those without trauma. Another more recent study in Brazil by Ramos-Jorge *et al.* (2014) found a significant association between the presence of traumatized treated teeth and children's quality of life.

A high proportion of respondents in this study experienced pain and chewing or biting difficulties than other CPO<sub>11-14</sub> item impacts. This was similar to the study by Fakhruddin *et al.* (2008) who, on analysis of the CPO<sub>11-14</sub> impact on an item by item basis reported that the most prevalent impact on oral health related quality of life of school children in Ontario was pain while the second most prevalent impact was difficulty chewing or biting. Also, Bendo *et al.* (2010) reported that dental pain and difficulty

with chewing or biting were more prevalent amongst the Brazilian school children seen in their study. This research revealed that many of the respondents also expressed dissatisfaction with the appearance of their untreated injured teeth by being shy and embarrassed, concerned about what other people thought or said about them and avoiding smiling or laughing when around other children than the item impacts in other domains. This was also in agreement with the findings of Fakhruddin *et al.* (2008) and Bendo *et al.*, (2010)

These children were aware of their traumatized teeth so they may have compared these features with those of their friends. By the age of 11 or 12, children have a clear understanding of complex emotions such as worry, shame, and jealousy, and their concept of 'self' acquires sophisticated dimensions such as romantic appeal and popularity with peers (Bee, 1998). There may have been some erosion of their self-confidence as a result of this and they may have been so conscious of themselves such that they begin to be withdrawn. Their relationships with and among their peers are an important part of their perceptions about their health and quality of life such that judgments of their appearance from their peer group and close friends affect their emotional state and relationships with other people (Bee, 1998; Jokovic, Locker and Guyatt, 2005).

These years also correspond to the onset of puberty. They then enter a period of early adolescence that is characterized by the increasing centrality of peer crowd and clique dynamics in children's lives and their pre-occupation with others' views of self (Hetherington, Parke and Locke, 1996; Bee, 1998). Thus, age-specific self-report measures were required to accommodate differences in children's self-concept, understanding of feelings, and ability to interpret other people's behaviour across the 6 to 14-year age range (Bee, 1998; Jokovic, Locker and Guyatt, 2005). Traumatic dental injuries that result in pain and discomfort, discoloration and other aesthetic alterations lead children to avoid smiling or speaking in a natural way, perhaps affecting self-concept and social relationships (Traebert *et al.*, 2012).

Analysing the results by domains, the negative impact of traumatic dental injuries on oral health related quality of life was greatest on oral symptoms in the respondents. This was similar to the study by Traebert *et al.*, (2012). Fakhruddin *et al.*, (2008) and Bendo *et al.*, (2010) however reported findings at variance with this study stating that the children experienced the greatest impact of traumatic dental injuries on their oral health related quality of life in the social well-being domain which was the next most prevalent domain CPQ<sub>11-14</sub>, domain impact seen in this study.

Poor oral health related quality of life was also noted to be more prevalent amongst the females. This may be so because the female gender has been observed to be more sensitive and particular about their appearance and aesthetics. Also, participants in private schools and the high socio-economic class were noted to have their quality of life more negatively impacted by trauma to their anterior teeth than those in the public schools and in other social classes. This maybe because they belong to a class of people that are more knowledgeable and better informed. They may thus have a better sense of self-awareness becoming more self-conscious about their appearance around their peers or in the society. All these may be contributory to these participants experiencing the impact of traumatic dental injuries on their quality of life more than the participants in the public schools or in other social classes.

## Conclusion

This study helped to document the impact trauma to anterior teeth has on adolescents' daily lives, i.e. their oral health-related quality of life with treatment being severely neglected resulting in a substantial negative impact on children's quality of life.

There is a likelihood of an increase in the continuum of dental trauma, its sequelae and its negative impact on oral health related quality of life if the status quo of pattern of late and/or lack of presentation remains.

Strategies in educating as regards awareness and prevention of dental trauma as well as prompt

presentation to the dental clinics for treatment need to be emphasized upon as time is always of the essence.

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