

Pattern of Tooth Extraction in Children Attending Tertiary Health Care Centers In Nigeria: A Prospective Study

Modupe O Ashiwaju * / Morenike O Folayan ** / Elizabeth O Sote *** / Micheal C Isikwe ****

Background: To identify the causes of tooth extraction in a tertiary pediatric center in an urban centre in Nigeria. **Method:** Data was collected prospectively from 400 children attending one of the four tertiary dental clinics. The demographic profile, the indications for tooth extraction, and the tooth extracted were noted. Data was compared with result of study conducted 21 years back in the same center, and data from two other tertiary health centers in the region. **Results:** The prevalence of tooth extraction was 58.8% in the study population. This occurred in significantly more male patients. Tooth loss was commonest amongst the 7-10 age group. Dental caries was the main cause of tooth loss for all age groups. Most patients (66.0%) lost a single tooth. The lower molars were the most frequently lost teeth (47%). Indications for tooth extraction were similar in the region. **Conclusion:** Dental caries remains the most common cause of tooth extraction. The indications for tooth extraction remain the same but the prevalence of tooth loss per cause of tooth loss had not changed over the last 21 years, and across institutions in Southwestern Nigeria.

Keywords: tooth extraction, children, Nigeria, Africa

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INTRODUCTION

Past studies show that the proportion of Nigerians attending dental hospitals and clinics for routine dental check up is low. Abiose¹ and Aderinokun² respectively reported that only about 4.4% and 3.0% of patients who reported in the dental clinics attend for routine check ups. Most patients present as a result of dental pain.

Multiple variables are known to affect patient's utilisation of health services, including dental health services. These reasons range from perception of dental treatment needs³, and availability of interventions that meets those needs.⁴⁻⁷

Even where dental services are available, multiple factors continue to impact on utilisation of these services. These factors range from patient's age,^{8,9} oral health needs and dental anxiety,^{10,11} socio-economic factors^{5,12-17} and the family structure.^{9,18-20}

One of the objectives of providing oral health care services is to help patients' retain healthy, natural, functional

teeth. In Nigeria, prevalence of tooth loss of both the primary and permanent dentition is high compared with figures from developed countries. Past studies noted prevalences ranging from 31.9%–51.5%.^{21,22} figures that are much higher than the 20% reported from Mexico²³ and 2.6% in Mexico-Americans.²⁴

The causes of tooth loss for Nigerian children include dental caries and its sequelae such as dental abscess, failed restoration and retained roots.²⁵⁻²⁹ Other identified causes of tooth loss include trauma, which may be caused by road traffic accidents, domestic falls, contact sports and games,^{22,25,26,30} periodontal disease, with periodontal disease being the least common in children,²² and for orthodontic reasons.²⁹

Folayan *et al*²⁹ however showed a shift in cause of tooth loss in their center – from caries related reasons to orthodontic reasons; and a decrease in the prevalence of tooth loss from caries. They alluded to a change resulting from increasing orthodontic needs; and a decline in need for dental extractions from caries due to availability of restorative materials and tools, and increasing availability of competent manpower including specialists.

This study assesses the cause of tooth loss in a tertiary paediatric centre in an urban center in Nigeria. It reviews the changes in pattern of tooth loss in the centre over a 21 year period; and compares this to changes observed in two other dental centers in the same region in Nigeria.

METHOD

All healthy children seen at the out patient clinic of the department of Child Dental Health of the Lagos University Teaching Hospital over a period of eighteen months were

* Modupe O Ashiwaju, Dental Department, Massey Street Children Hospital, Lagos.

** Morenike O Folayan, Department of Child Dental Health, Obafemi Awolowo University, Ile-Ife.

*** Elizabeth O Sote, Department of Child Dental Health, Lagos University Teaching Hospital, Idi-Araba, Lagos.

**** Micheal C Isikwe, Department of Child Dental Health, Lagos University Teaching Hospital, Idi-Araba, Lagos

Send all correspondence to: Modupe O Ashiwaju, Dental Department, Massey Street Children Hospital, Lagos

Email: funmash@yahoo.co.uk

recruited into the study. The Lagos University Teaching Hospital, Lagos is one of the four tertiary dental health care facilities located in Southwestern Nigeria. Any child with a medical history of chronic health disorders were excluded from the study. Also, patients presenting with exfoliated tooth without the need for extraction were also excluded from the sample.

The minimum sample size was determined using standard statistical calculation. The prevalence for tooth loss was 31.94%, confidence interval of 1.96 and a 5% degree of accuracy. The minimum sample size required for the study was 334. This was rounded up to 400.

Demographic data was recorded for each patient namely name, age, sex, address, parent's occupation and educational status. Routine dental clerking and subsequently, oral examination of all the subjects were carried out using sterile dental mouth mirror, dental probe and tweezers. Necessary investigations such as periapical radiographs, clinical pictures and study models were carried out to aid diagnosis and case management. For children who required extraction, the indications for extraction were noted. Records were also taken for number of teeth extracted for each patient during the study period.

The Data entry validation and analysis was done using SPSS statistical soft ware, measures of location and dispersions were computed for variables while frequency distributions and tabulations were used for categorical variables. Associations and differences were considered significant when p value is equal to or less than 0.05 using the chi square test. The Fisher's exact test was used where Chi square test was invalid.

Ethical approval was obtained from the Lagos University Teaching Hospital prior to study conduct. Verbal consent was also obtained from the parents or guardians prior to inclusion in the study.

RESULTS

The age range of children seen in this study was 3 to 15 years. The population consisted of 59.2% females. The prevalence of tooth extraction was 58.8%. This occurred in 235 children. Significantly more male patients had tooth extracted. The difference was statistically significant. See Table 1.

There were three age groups identified. Seventy-nine children (33.6%) were 3–6 years old, 97 children (41.3%) were 7–10 years old, and 59 children (25.1%) were 11–15 years old. Tooth loss was most common amongst the 7–10 years old age group. There was significant differences in the gender distribution of tooth extraction by age group (p = 0.01): More

Table 1. Distribution of children with/without tooth extraction by gender

	Male (%)	Female (%)	Total (%)
Tooth loss	121 (30.3)	114 (28.5)	235 (58.8)
No tooth loss	42 (10.5)	123 (30.8)	165 (41.2)
Total	163 (40.7)	237 (59.3)	400 (100)

$\chi^2 = 27.21; P = 0.0000002$

females lost tooth in the 3–6 age groups while more males lost tooth in the other age categories. See Table 2.

Dental caries was the most frequent reason for tooth extraction for all age groups. One hundred and seven (45.5%) children lost teeth due to dental caries, 40 (17%) due to dental abscess, while domestic fall and contact sport accounted for tooth extraction in 21 (8.9%) and 3 (1.3%) children respectively. Retained primary teeth was a second leading cause of teeth extraction in children aged 7–15. See Table 3.

Most patients (66.0%) lost a single tooth. Two teeth were lost by 44 children (18.7%) while 2.7% (18 children) lost 3 teeth. More teeth were lost in the mandible in both the primary (p=0.005) and permanent dentition. The lower molar teeth were the ones most frequently lost (47%). There was no loss of the upper lateral and the second premolar. See Tables 4, 5 and 6.

Table 7 shows a comparative analysis of causes of tooth extraction in the same hospital over the last 21 years and for two of the other three dental centres in Southwestern Nigeria. The causes of tooth extraction and the prevalence were quite similar. The prevalence of tooth loss from caries and its sequelae continues to remain high.

Table 2. Distribution of children That Had Tooth extracted By Age Group and Gender

Age Group	Male (%)	Female (%)	Total (%)
3 – 6	31 (13.2)	48 (20.4)	79 (33.6)
7 – 10	52 (22.1)	45 (19.1)	97 (41.3)
11 – 15	38 (16.2)	21 (8.9)	59 (25.1)
Total	121 (51.5)	114 (48.5)	235 (100)

$\chi^2 = 8.86; P = 0.01$

Table 3. Distribution of Children by Reason of tooth extraction and Age Group

Causes	Age group in years			Total	%
	3–6	7–10	11–15		
Abscess due to caries	19	15	6	40	17.0
Caries	29	46	32	107	45.5
Crowding/ Space management	-	10	2	12	5.1
Domestic fall	13	4	4	21	8.9
Odontome	-	-	1	1	0.4
Periodontal disease	-	-	3	3	1.3
Retained teeth	14	22	10	46	19.6
Sports	3	-	-	3	1.3
Supernumerary	1	-	1	2	0.9
Total	79	97	59	235	100

Table 4. Distribution of Children By Number of Tooth extracted

No of Teeth	Frequency	Percent	Total no of teeth
1	155	66.0	155
2	44	18.7	88
3	18	7.7	54
4 and above	18	7.7	83
Total	235	100	380

DISCUSSION

More males had to undertake tooth extraction during the study period; a contrast to what was observed by Kekere-Ekun and Adenubi³⁰ in the same center 21 years ago. The result of this study however correlates with observations made in more recent studies in Southwestern Nigeria.^{22,27,29,31} The same was observed in Afghan³² and Kuwait.³³ The reason for this observation can however, not be readily adduced.

Just like other reports from Southwestern Nigeria,^{22,29,30} there were more primary teeth lost in this study sample. This observation is not at variance with observations in other parts of the world.

More teeth were lost in the mandible in both dentitions just as observed in previous studies.^{22,29,30} This may be due to the fact that mandibular teeth erupt ahead of their maxillary counterparts. Gravity effects also make food debris settle more on mandibular teeth. In addition, the grooves and fissures are more pronounced in mandibular teeth thereby acting as retaining areas for food debris.

The molars were the most commonly lost tooth. The first permanent molar has been recognized as being the most caries prone tooth in the permanent dentition probably as a result of its long exposure to the oral environment.^{34,35} This however differed from observation by Folayan *et al*²⁹ who recorded more loss of anterior teeth compared to molars.

An interesting trend seen in present study similar to observations reported by Folayan *et al*²⁹ and Denloye *et al*²² is the increasing prevalence of primary incisors extracted due to retention.

The causes of tooth extraction remain the same in all the three tertiary health care centers in Southwestern Nigeria:

Table 5. Frequency of distribution Primary Tooth extraction according to type and dental arch

Type of Teeth	A	B	C	D	E	Total
Maxillae	36	14	17	20	30	117 (37.3)
Mandible	43	21	11	60	62	197 (62.7)
Total	79	35	28	80	92	314 (100)

$\chi^2 = 15.03$; $P = 0.005$

Table 7. Comparative Analysis of Causes of Tooth extraction in southwest Nigeria

CAUSE	Present Study (Lagos) (%)	Study (Lagos) Kekerekun 1985 (%)	Follow up Study (Ile-Ife) Folayan et al 2005 (%)	Study (Ile-Ife) Otuyemi et al 1991 (%)	Study (Ibadan) Denloye et al 1999 (%)
Caries/Abscess	62.5	92.2	32.8	58.2	57.5
Periodontal disease	1.3	0.3	1.7	16.0	0.5
Retained deciduous	19.6	2.8	26.9	13.9	21.3
Dental trauma	10.2	2.4	4.2	8.4	12.2
Malocclusion	6.1	2.1	32.3	2.2	7.7
Others	0.3	0.2	2.1	1.3	0.2
Total (%)	100	100	100	100	100

caries and its sequelae, closely followed by retained primary teeth.^{22, 28,36} This is similar to reports from other studies in Africa³⁷ and other global studies conducted in children and adults.^{32,38-39} However, there appears to be a decrease in the prevalence of tooth loss due to caries and its sequelae in each of these dental centers just as observed in other countries.⁴⁰ Multiple reasons could be alluded too for these observed decreases. This includes increase in availability of paediatric specialists resulting in better management of these lesions, and the possibility of increased awareness and early reporting to the clinic. It is less likely that the reason is the second as past studies have continued to point to low utilisation of dental services and delayed reporting for dental management of caries in the region.^{1,2,41} This delay in reporting possibly accounts for the continued high prevalence of teeth extraction observed in all these centers.

Also, there was an increase in tooth extraction for orthodontic reasons in two (Ile-Ife and Lagos) of the three centers where studies on changing trends in pattern of tooth extractions have been conducted.³⁹

The study apparently shows that prevalence of tooth loss due to tooth extraction is still high and much higher than what obtains in other parts of the world. Reported prevalence in developed countries are 30% in Jeddah,⁴² 2.8% in Australia,⁴³ and 16% due to caries and its sequelae in Dundee.⁴⁴

CONCLUSIONS

The prevalence of tooth extraction was 58.8% in this study population. Caries and its sequelae were the main reasons for tooth extraction with more tooth extraction amongst boys, in the 7-10 year old age group, in the primary denti-

Table 6. Frequency of distribution Permanent Tooth extraction according to type and dental arch

Type of Teeth	1	2	3	4	5	6	7	Total
Maxillae	4	-	2	8	-	5	2	21
Mandible	-	-	2	5	7	31	-	45
Total	4	-	4	13	7	36	2	66

tion, and in the mandible. Molars were the most common type of teeth extracted. The prevalence of tooth extraction from caries and its sequelae reduced over the last 21 years in the study centre (92.2% vs 62.5%) though still much higher than what obtains currently in South Western Nigeria. The high prevalence of tooth extraction in the region appears to be due to late presentation rather than poor management strategies. This observation therefore should constitute a public health concern for the region.

REFERENCES

- Abiose BO. Dental Problem of the Nigerian Child. *Int. Assoc. Dent. Child*, 17: 6–70, 1986.
- Aderinokun GA. Characteristic of children attending the dental clinic (UCH), Ibadan: An indication of community awareness and attitude to oral health. *Nig Dent J*, 9: 28–32, 1990.
- Tickle M, Worthington HV. Factors influencing perceived treatment need and the dental attendance patterns of older adults. *Br Dent J*, 182: 96–100, 1997.
- Matthew, GK. Measuring need and evaluating services. In: *Portfolio for health: The role and programme of the DHSS in health services research* (ed. G. McLachlan). London: Oxford University Press, pp. 27–46, 1991.
- Acheson D. *Independent inquiry into inequalities in health: a report*. London: The stationery office, 1998.
- Wright J, Williams R, Wilkinson JR. Development and importance of health needs assessment. *BMJ*, 316: 1310–1313, 1998.
- Sote EO. Attendance pattern and presenting oral health problems of children at the Lagos University Teaching Hospital, Lagos, Nigeria. *Nig Qt J Hosp Med*, 6: 80–84, 1996.
- McGrath C, Bedi R, Dhawan N. Factors influencing older people's self reported use of dental services in the UK. *Gerodontology*, 16: 97–102, 1999.
- Slack-Smith LM, Mills CR, Bulsara MK, O'Grady MJ. Demographic, health and lifestyle factors associated with dental service attendance by young adults. *Aust Dent J*, 52: 205–209, 2007.
- Vignarajah S. Oral health knowledge and behaviours and barriers to dental attendance of school children and adolescents in the Caribbean island of Antigua. *Int Dent J*, 47: 167–172, 1997.
- Pohjola V, Lahti S, Vehkalahti MM., Tolvanen M, Hausen, H. Association between dental fear and dental attendance among adults in Finland. *Acta Odontol Scand*; 65: 224-230. 2007.
- Lee PR, Moss N, Krieger N. Measuring social inequalities in health. Report on the Conference of the National Institutes of Health. *Public Health Rep*, 110: 302–305, 1995.
- Williams DR. Race/ethnicity and socioeconomic status: measurement and methodological issues. *Int J Health Serv*, 26: 483–505, 1996.
- Hjern A, Grindeffjord M, Sundberg H, Rosen M. Social inequality in oral health and use of dental care in Sweden. *Community Dent Oral Epidemiol*, 29: 167–174, 2001.
- Marmot M. Social determinants of health inequalities. *Lancet*, 365: 1099–1104, 2005.
- Jamieson LM, Thomson WM. Adult oral health inequalities described using area-based and household-based socioeconomic status measures. *J Public Health Dent*, 66: 104–109, 2006.
- Oredugba FA. Use of oral health care services and oral findings in children with special needs in Lagos, Nigeria. *Spec Care Dentist*, 26: 59–65, 2006.
- Christensen LB, Petersen PE, Steding-Jessen M. Consumption of dental services among adults in Denmark 1994-2003. *Eur J Oral Sci*, 115: 174–179, 2007.
- Jamieson LM, Koopu PI. Child use of dental services and receipt of dental care in New Zealand. *J Paediatr Child Health*, 43: 732–739, 2007.
- Lopez R, Baelum V. Factors associated with dental attendance among adolescents in Santiago, Chile. *BMC Oral Health*, 7: 4, 2007.
- Okoisor FE, Ana JR. Pattern of tooth loss in Nigerians. *Nig Med J*, 6: 84–87, 1976.
- Denloye OO, Dosumu OO, Arotiba JT. Causes and pattern of tooth extraction in children treated at the University College Hospital, Ibadan. *West Af J Med*, 18: 261–264, 1999.
- Casanova-Rosado JF, Medina-Solis CE, Vallejos-Sánchez et al. Lifestyle and psychosocial factors associated with tooth loss in Mexican adolescents and young adults. *J Contemp Dent Pract*, 6: 70–77, 2005.
- Ismail AI, Szpunar SM. The prevalence of total tooth loss, dental caries and periodontal disease among Mexican Americans, Cuban Americans and Puerto Ricans: findings from HHANES 1982–1984; *Am J Public Health*, 80: 66–70, 1990.
- Okoisor FE. Tooth mortality: A clinical study of causes of loss. *Nig Med J*, 7: 77–80, 1977.
- Odusanya SA. Tooth loss among Nigerians: causes and pattern of mortality. *Int J Oral Maxillofac Surg*, 16: 184–189, 1987.
- Otuyemi OD, Ndukwe KC. Pattern of tooth loss among paediatric patients in Ile-Ife. *Nigeria Med J*, 32: 10–13, 1997.
- Oginni FO. Tooth loss in a sub-urban Nigerian population: causes and pattern of mortality revisited. *Int Dent J*, 55: 17–23, 2005.
- Folayan MO, Otuyemi OD, Esan TA, Adeleke AA, Adedigba MA: Pattern of dental extraction in children in a Nigerian tertiary hospital. *J Contemp Dent Pract*, 6: 80–90, 2005.
- Kekere Ekun TA, Adenubi JO. The pattern of exodontia in children treated at the Lagos University Teaching Hospital. *Nigeria Dent J*, 6: 10–19, 1985.
- Otuyemi OD, Adetunji T. Oral health problems in Nigerian children A clinical study of 633 patients seen at Ile Ife, Nigeria. *Nigeria Med Practitioner*, 22: 3–7, 1991.
- Da'ameh D. Reasons for permanent tooth extraction in the North of Afghanistan. *J Dent*, 34: 48–51, 2006.
- Al-Shammari KF, Al-Ansari JM, Al-Melh MA, Al-Khabbaz AK: Reasons for tooth extraction in Kuwait. *Med Princ Pract*, 15: 417–422, 2006.
- Dosumu OO, Denloye OO. Pattern of permanent tooth loss in Nigerian children and their prosthetic replacement. *Afr J Med Med Sci*, 28: 31–33, 1999.
- Upadhyaya C, Humagain M. The pattern of tooth loss due to dental caries and periodontal disease among patients attending dental department (OPD), Dhulikhel Hospital, Kathmandu University Teaching Hospital (KUTH), Nepal. *Kathmandu Univ Med J (KUMJ)*. Jan;7: 59–62, 2009.
- Adeyemo WL, Oderinu HO, Oluseye SB, Taiwo OA, Akinwande JA. Indications for extraction of permanent teeth in a Nigerian teaching hospital: a 16-year follow-up study. *Nig Q J Hosp Med*, 18: 128–132, 2008.
- Sanya BO, Ng'ang'a PM, Ng'ang'a RN. Causes and pattern of missing permanent teeth among Kenyans. *East Afr Med J*, 81: 322–325, 2004.
- Akhter R, Hassan NM, Aida J, Zaman KU, Morita M. Risk indicators for tooth loss due to caries and periodontal disease in recipients of free dental treatment in an adult population in Bangladesh. *Oral Health Prev Dent*, 6: 199–207, 2008.
- Richards W, Ameen J, Coll AM, Higgs G. Reasons for tooth extraction in four general dental practices in South Wales. *Br Dent J*, 198: 275–278, 2005.
- McCaul LK, Jenkins WM, Kay EJ. The reasons for the extraction of various tooth types in Scotland: a 15-year follow up. *J Dent*, 29: 401–407, 2001.
- Denloye OO, Bankole OO, Onyiaso CO. Dental health service utilization by children seen at the University College Hospital-an update. *Odontostomatol Trop*, 27: 29–32, 2004.
- Al-Malik M, Holt RD. The prevalence of caries and of tooth tissue loss in a group of children living in a social welfare institute in Jeddah, Saudi Arabia. *Int Dent J*, 50: 289–292, 2000.
- Broadbent JM, Thomson WM, Poulton R. Progression of dental caries and tooth loss between the third and fourth decades of life: a birth cohort study. *Caries Res*, 40: 459–465, 2006.
- Levine RS, Pitts NB, Nugent ZJ. The fate of 1,587 unrestored carious deciduous teeth: a retrospective general dental practice based study from northern England. *Br Dent J*, 193: 99–103, 2002.