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# CAUSES AND PATTERN OF MISSING PERMANENT TEETH AMONG KENYANS

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## ABSTRACT

***Objective:*** **To determine the causes and pattern of missing permanent teeth among Kenyans.**
***Design:*** **A descriptive cross-sectional study.**
***Setting:*** **Five districts in Kenya.**
***Subjects:*** **Seven hundred and twenty two persons aged 6-85 years (346 males and 376 females).**
***Methods:*** **This study was undertaken in October 2001 during the National Dental Health Action Month organised by the Kenya Dental Association. Six centres in five districts were identified and subjects randomly selected. Intra- oral examination was done visually and results were recorded on specially designed clinical examination forms.**
***Results:*** **The mean number of missing teeth in the population was 1.60. Among those with missing teeth, the mean number of missing teeth was 3.35. The most commonly missing teeth were lower molars followed by upper molars. No record of complete edentulousness in both jaws was encountered. Dental caries was the commonest cause of tooth loss (52.6%), followed by periodontal disease (27.6%). Extractions, as a form of traditional practice, accounted for 12.3% of total tooth loss. Orthodontic treatment and trauma accounted for 2.2% and 2.0% respectively of total tooth loss. The upper and lower posteriors were the commonest teeth lost due to dental caries and periodontal disease. Teeth lost due to trauma were mostly upper anteriors, whereas those extracted due to traditional practices were exclusively lower anteriors.**
***Conclusion:*** **The findings of this study show that the commonly lost teeth are molars and the principal cause of tooth loss is dental caries followed by periodontal disease. Overall, very few extractions had been done for orthodontic reasons.**

## INTRODUCTION

A person may lack a few teeth (partially dentate) or all the teeth in one or both upper and lower jaws for various reasons. Loss of teeth due to dental caries has previously been reported as the commonest cause of missing teeth among patients attending for treatment in Kenya(1-3). In Ghana, Bruce recently observed that the major reason for tooth loss across all ages was dental caries (83%) followed by periodontal disease (17%)(4).

Teeth may also be lost due to trauma, orthodontic treatment or traditional practices. In Kenya, Hassanali and Amwayi observed that the Maasai practiced traditional extraction of lower incisors so as to create space for feeding of the individual in case of tetanus or febrile illness(5). Extraction of mandibular incisors is also associated with other Nilo-Hamitic pastoralist communities in Africa(6). Extractions may also be done as part of orthodontic treatment as indicated earlier. For example, in a study among children in Nairobi, Ng'ang'a reported that orthodontic treatment accounted for 13% of tooth extractions(7). Congenitally missing teeth have also been reported among the Kenyan population(8). The various causes and patterns of tooth loss in the population may help give an indication as to the levels of oral hygiene, dental health awareness and an insight into the magnitude of dental problems and their management in Kenya. Such data may also be of value to the National Oral Health Planners for laying out strategies to improve dental health care delivery in the country, hence the purpose of this study.

## MATERIALS AND METHODS

This study was undertaken in October 2001, during the national Kenya Dental Health Action Month organised by the Kenya Dental Association (KDA). During this period, dental check-ups, emergency treatment and dental health education are organised in various centres throughout the country. Dentists usually volunteer free services to the general public. Six centres in five districts were identified for the purpose of this study. The selection of centres was primarily based on accessibility by the dentists who were to carry out the study because only one day was allocated for check-ups at each centre. The selected districts were Nairobi, Kiambu, Taita taveta, Kisii and Busia out of the twenty-seven earmarked by KDA for the Dental Health Action Month. At each centre the subjects were randomly selected for check-ups by a nurse and directed to either of the dentists in attendance at the centre.

This study was conducted to assess the causes and pattern of missing permanent teeth among Kenyans aged six years and over. The ages were verbally given by the participants and were not confirmed using birth records or other reliable age assessment methods. Clinical judgement and/or past dental history were used to determine whether a tooth was unerupted or congenitally missing. Such teeth were excluded from the sample. Examination was done in adequate lighting by direct visual inspection. Disposable gloves and wooden spatulas were used during the examination. No diagnostic aids such as study models or radiographs were used in this survey.

Prior to the survey, the participating dentists were given instructions by one of the authors (P.M., Ng'ang'a) on the requirements of the study and the methods to be used to collect the data and fill the forms. Only after they were fully conversant were they allowed to collect the data. Each examiner recorded the resulting data on specially designed clinical examination forms. The interviews were conducted in either English or Kiswahili depending on the language the interviewee understood best. In cases where the latter did not understand any of the two languages or the language of the interviewer, help from an interpreter was sought. Data analysis was done manually.

## RESULTS

The total number of subjects examined was 722 (346 males and 376 females). The age range was 6 - 85 years with a mean of 30.2 years. The number of subjects with missing teeth was 345 while the mean number of missing teeth in the sample was 1.60 (Table 5). There was no case of complete edentulousness encountered. Table 1 shows that the number of females (52%) was slightly more than that for males (48%) and most people seen were in the 25-29 year age group, constituting about 17% of the sample (Table 2). From Table 3, it can be seen that most people presented with complaints of tooth decay (58%) and gum disease (19%). Only one person presented with tooth wear one with dry sockets one with loose dentures, one with fractured teeth, two with exfoliating teeth, one with missing teeth, three with retained roots, three with trauma, two with sensitivity, three with impacted teeth, four with jaw swellings and four with discolouration of teeth.

**Table 1**

*Number of subjects seen from the five districts*

| Gender | Nairobi | Kiambu | Taita-Taveta | Kisii | Busia | Total | (%) |
|---|---|---|---|---|---|---|---|
| Males | 96 | 80 | 7 | 52 | 111 | 346 | 48 |
| Females | 62 | 109 | 15 | 73 | 117 | 376 | 52 |
| Total | 158 | 189 | 22 | 125 | 228 | 722 | 100 |

**Table 2**

*Distribution of subjects according to age groups and gender*

| | Age group (years) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gender | 6-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30-34 | 35-44 | 45-54 | 55-64 | 65 and Over | Total |
| Males | 24 | 31 | 24 | 52 | 53 | 42 | 48 | 33 | 25 | 14 | 346 |
| Females | 25 | 18 | 39 | 64 | 72 | 51 | 69 | 23 | 8 | 7 | 376 |
| Total | 49 | 49 | 63 | 116 | 126 | 93 | 117 | 56 | 33 | 21 | 722 |
| (%) | 7 | 7 | 9 | 16 | 17 | 13 | 16 | 8 | 4 | 3 | 100 |

**Table 3**

*Reasons given by patients for attending the dental check-ups*

| Reason for attendance | Nairobi | Kiambu | Taita-taveta | Kisii | Busia | Total | (%) |
|---|---|---|---|---|---|---|---|
| Dental check-up | 47 | 41 | 1 | 12 | 32 | 133 | 16 |
| Tooth decay | 79 | 136 | 19 | 100 | 141 | 475 | 58 |
| Gum disease | 35 | 42 | 5 | 27 | 47 | 156 | 19 |
| Malaligned teeth | 4 | 6 | 0 | 3 | 10 | 23 | 3 |
| To receive toothpaste | 0 | 2 | 0 | 0 | 0 | 2 | 0 |
| Curiosity | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Others* | 9 | 4 | 1 | 8 | 7 | 29 | 4 |

*Tooth-wear, jaw swellings, impacted teeth, dry sockets, sensitivity, missing teeth, trauma, fractured teeth, discoloured teeth, exfoliating teeth, loose dentures and retained roots

**Table 4**

*Distribution of missing teeth according to gender*

| Type of teeth | Male | Female | Total | (%) |
|---|---|---|---|---|
| Maxillary anteriors | 47 | 43 | 90 | 8 |
| Maxillary premolars | 52 | 60 | 112 | 10 |
| Maxillary molars | 114 | 141 | 255 | 22 |
| Mandibular anteriors | 135 | 95 | 230 | 20 |
| Mandibular premolars | 38 | 33 | 71 | 6 |
| Mandibular molars | 157 | 242 | 399 | 34 |
| Total | 543 (47%) | 614(53%) | 1157 | 100 |

**Table 5**

*Mean distribution of missing teeth according to causes*

| Reason for missing teeth | Dental caries | Periodontal disease | Orthodontic indications | Traditional practice | Trauma | Others |
|---|---|---|---|---|---|---|
| No. of missing teeth | 609 (53%) | 319 (28%) | 26 (2%) | 142 (12%) | 23 (2%) | 38 (3%) |
| Mean no. of missing teeth in total sample (n=722) | 0.84 | 0.44 | 0.04 | 0.20 | 0.03 | 0.05 |
| Mean no. of missing teeth in subjects with missing teeth(n=345) | 1.77 | 0.92 | 0.08 | 0.41 | 0.07 | 0.11 |

**Table 6**

*Causes of tooth loss*

| Cause of tooth loss | Maxillary teeth | | Mandibular teeth | | | |
|---|---|---|---|---|---|---|
| | Anteriors | Posteriors | Anteriors | Posteriors | Total | (%) |
| Dental caries | 28 | 236 | 10 | 335 | 609 | 53 |
| Periodontal disease | 41 | 104 | 72 | 102 | 319 | 28 |
| Orthodontic treatment | 4 | 11 | 0 | 11 | 26 | 2 |
| Traditional practice | 0 | 0 | 142 | 0 | 142 | 12 |
| Trauma | 13 | 2 | 6 | 2 | 23 | 2 |
| Others | 4 | 14 | 0 | 20 | 38 | 3 |
| Total | 90 | 367 | 230 | 470 | 1157 | 100 |

Table 4 shows that mandibular molars were the most commonly missing teeth followed by the maxillary molars, while upper anteriors were the least commonly missing teeth. In general, females had more missing teeth than males.

Dental caries and periodontal disease accounted for the highest mean number of missing teeth in the study sample, 0.84 and 0.44 respectively (Table 5).

Table 6 shows that dental caries was found to be the commonest cause of tooth loss (53%) followed by periodontal disease (28%). Extractions as a form of traditional practice, accounted for 12% of total tooth loss. Both orthodontic treatment and trauma recorded 2% respectively of total tooth loss and the upper and lower posteriors were the commonest teeth lost due to dental caries and periodontal disease. Extractions for orthodontic reasons had mostly been performed on posterior teeth. Teeth lost due to trauma were commonly upper anteriors while all teeth reportedly extracted due to traditional practices were lower anteriors.

## DISCUSSION

Prior to the annual National Dental Health Action Month, members of the public had been invited for dental check-ups through posters and mass media. Those who attended were not limited to specific ages and subjects were randomly directed to the calibrated dentists. However, there were some limitations such as subjects who could not tell their ages and/or remember why they had lost some teeth. It is also possible that some of those who attended had some dental ailments and those who didn't have any problem may not have attended. This could have led to some sample bias. Another major limitation of this study was the small number of study centres selected in comparison with all the centres earmarked for the National Dental Health Action Month. This would have made the data collected not to be a true representation of all the patients seen during the National Dental Health Action Month.

Most people seen were females (52%) and this could explain the higher number of tooth loss in females (53%) than in males (47%). Dental caries (53%) was established as the commonest cause of tooth loss followed by periodontal disease (28%). This is in agreement with other studies done elsewhere(1-3). Bearing in mind that dental caries and periodontal disease may not be on the increase in Kenya(9,10), sugar consumption and other factors that predispose to these conditions need to be monitored constantly. Extractions as a form of traditional practice, which accounted for 12% of total tooth loss, indicates a need to establish, within specific communities, to what extent this tradition is being practised (16). Planned orthodontic extractions are usually done to relieve crowding or to compensate for a skeletal discrepancy(11). The 2% figure and a mean number of 0.08 (amongst those with missing teeth), suggests that orthodontic extractions accounted for minimal tooth loss.

A study done among school children in Nairobi showed that 5.6% of extractions had been performed as part of orthodontic treatment (7) with mean number of missing teeth (amongst those with missing teeth) being 1.9. However, caution should be taken when trying to compare the two values because of the differences in the study populations. The high vulnerability of upper anterior teeth to trauma is in agreement with the findings of a study done recently by Ng'ang'a *et al*.(8), which showed that the commonly traumatized teeth were upper anteriors. Lack of a case of complete edentulousness should not be taken to imply that the prevalence of this condition is low. Since the public had been invited to come for the dental check-ups, individuals without any teeth may not have found it necessary to attend. This study shows that there is a need to sensitise the population on prevention of tooth loss. They should be informed of the modalities of treatment as most people visit dentists to have tooth extraction(12).

In this regard, the Kenya Dental Association (KDA) does well to organise a Dental Health Action Month every year in an attempt to enhance dental health awareness(13). Chindia *et al.* in a study of University students in Kenya (14), noted that there was lack of adequate oral health care practises, poor knowledge of the importance of dental check-ups and conservative dental treatment. Further, the authors reported that the need to visit a dentist was generally prompted by pain. This may partly explain why most people in our study had undergone extractions. This is unfortunate because root canal treatment can save many teeth. Maina and Ng'ang'a, in a study to evaluate the depth of knowledge of root canal treatment and pulpotomy by dentists in Kenya (15), found that one of the main reasons for high tooth mortality was inadequacy of dental health personnel coupled with a lack of facilities for restorative procedures in most public hospitals. There is need to address the various factors implicated in tooth loss in order to reduce tooth mortality. The public should be encouraged to seek professional advice early. The importance of saving teeth should be emphasised.

## CONCLUSION

Within the limitations of this study, it can be concluded that molars were the most commonly missing teeth and that dental caries and periodontal disease were the leading causes of tooth loss in the study population. As a follow-up to this study, it is recommended that a more representative sample of the general population be assessed.

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