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ORAL HEALTH STATUS AMONG KENYANS IN A RURAL ARID SETTING: DENTAL CARIES EXPERIENCE AND KNOWLEDGE ON ITS CAUSES
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B.A. KASSIM, M.A. NOOR and M.L. CHINDIA

ABSTRACT

Objective: **To determine the dental caries experience and knowledge on the causes and preventive measures for dental diseases.**

Design: **A community based cross-sectional descriptive study.**

Setting: **Elwak sub-district hospital, North Eastern Province, Kenya.**

Subjects: **One hundred and forty one adults who presented themselves during a dental check up at a sub-district hospital and gave written consent.**

Main outcome measures: **Dental caries status and knowledge on its causes and preventive measures. The importance of outreach programmes in obtaining information as well as helping to alleviate the pain and suffering caused by dental diseases among communities living in remote areas is also revealed.**

Results: **Of the one hundred and forty one individuals, who were included in the study, 63.1% were women and 36.9% were men. Their ages ranged between 18 and over 65 years. 41.1% were in the 18-24-year age bracket. Regarding the oral health knowledge, 43% did not know any causes of dental diseases while 36%, 17% and 12% knew that diet, "dirt" on teeth and bacteria were possible causes, respectively. Fifty percent did not know any preventive measures for dental diseases while the rest indicated abstention from the consumption of sugary foods; and only 0.8% mentioned use of fluoridated toothpaste as a preventive measure for dental caries. 56.7% of the subjects were caries free. The mean DMFT for all ages was 3.4. Of those with caries 72.1% were women.**

Conclusion: **There is a low level of oral health awareness and a moderately high level of dental caries experience in this community with women apparently carrying the biggest burden of dental caries.**

INTRODUCTION

Though great strides have been taken globally in the fight against oral diseases, problems still persist especially among poor, disadvantaged and socially marginalised communities (1). The situation is particularly severe in developing countries where the priority given to oral health is low because of budgetary constraints and a multitude of other pressing health problems. In Kenya, oral health accounts for only 0.0016% of the ministry of health budget (2). North Eastern Kenya which has remained marginalised since independence appears to have literally remained lowest in the priority list regarding oral health provision. In this area, access to oral health facilities and trained oral health manpower is severely limited. As at 2002 the province, which is Kenya's third largest, and with an estimated population of 1.2 million (3), was served by only two dentists and two dental technologists (2). In fact, at the time of

this study, there were no oral health service providers in the region.

Though a nationwide oral health survey has not been carried out in Kenya, some parts like Nairobi have enjoyed a considerable amount of research. Most rural areas are yet to attract the attention of researchers. There is anecdotal information that the inhabitants of North Eastern Kenya, who are largely ethnic Somalis, generally experience high levels of dental caries. Noor in a study among an urban Somali community in Nairobi also showed that 78.5% of the females and 55.7% of the males had dental caries (4). Ng'ang'a *et al.*, also found 52% of a group of school children in North Eastern Province (NEP) to have had caries (5). Traditionally, the community's diet comprises of milk and meat but with the encroachment of modern life styles, refined carbohydrates now form part of every family's daily diet. While the culture of snacking is still uncommon, the community naturally has a high tendency for consumption of sugar-sweetened tea; and many adult males apart from taking this beverage also frequently consume the sugar while chewing "Khat" (*Cartha edulis*) as a pastime and for refreshment. Apart from the sugary beverages that are aetiologically associated with the causation of dental caries, "Khat" itself has been found to lead to adverse oral effects including oral mucosal lesions, dryness of the mouth, discolouration of teeth, poor oral hygiene, periodontal disease and tooth wear (1).

Outreach programmes initiated by professional organisations such as the Kenya Dental Association (KDA) hold enormous potential for obtaining fairly accurate health information. Such information can be used to assess the need for general/oral health services among communities living in relatively inaccessible parts of any country. Moreover, as previous efforts to conduct more comprehensive research in such areas have been limited, collecting data during outreach health provision projects should be a very useful way of obtaining research information. This article, therefore, presents information emanating from data compiled during an outreach health care provision project in a disadvantaged community in the North Eastern Province of Kenya.

MATERIALS AND METHODS

This was a community-based cross-sectional descriptive study of 141 adult subjects who voluntarily presented themselves at the Elwak sub-district hospital. All the cases signed informed consent forms individually and were examined to determine their dental caries experience. This outreach project was executed with the aim of identifying the commonly occurring oral health conditions and diseases while at the same time offering dental health education and appropriate emergency treatment where feasible.

Oral examination was performed under natural light using probes and mouth mirrors and caries diagnosed by only one examiner (KBA) who was trained and calibrated. The information was recorded in forms designed using WHO guidelines (6) and caries was recorded as present when a tooth showed visible signs of cavitation, undermined enamel or detectably softened floor or walls. Where any doubt existed, the tooth was recorded as sound. Teeth were recorded as missing due to caries only if the patient gave a history of a cavity prior to the extraction. Throughout the process, disposable gloves and facemasks were used and instruments sterilised by a dental nurse using a portable autoclave.

In addition, a questionnaire was administered to evaluate the participants' knowledge on the causes and prevention of dental caries and gum diseases. In the questionnaire, five items (bacteria, diet, dirt on teeth, hereditary factors and lack of knowledge) focused on the knowledge of the causes of dental decay and gum disease, while four items (avoiding sugary foods, cleaning teeth, use of fluoride tooth paste, and lack of knowledge) dealt with knowledge on the prevention. The age, gender and level of education were also profiled as possible determinants of the study objectives. Data analysis was then done using excel and SPSS-PC computer software version. The chi-square test of significance was carried out to determine the significance of the associations.

RESULTS

Among all the subjects who presented for the check up, 141 satisfied the study inclusion criteria among whom majority were female (63.1%) while male constituted 36.9%. Most of the study subjects (41.1%) were in the 18 to 24 year age bracket (Table 1). The level of education was thought to have been an important factor that could determine oral heath knowledge among the respondents and was also recorded. However, although the percentage of those

Table 1

Socio-demographic characteristics of the study population

Characteristic	No.	(%)
Age (years)		
18-24	58	41.1
25-34	38	27.0
35-44	19	13.5
45-54	11	7.8
55-64	8	5.7
65+	7	5.0
Total	141	100.0
Sex		
Male	52	36.9
Female	89	63.1
Total	141	100.0
Level of education		
Illiterate	92	65.2
Literate	49	34.8
Total	141	100.0

who were illiterate and had dental caries was higher than that of the literate, the difference was found to have been statistically insignificant (x^2=1.304, p>0.05). Table 1 categorises the subjects according to their socio-demographic characteristics and indicates that 65.2% of the subjects were illiterate. Very few (10.6%) had attained high school level and above.

Oral health knowledge: Forty three percent of the subjects had no knowledge on the causes of dental decay and gum diseases while 36% thought that diet had a role and only 17% and 12% mentioned "dirt" on teeth (failure to brush) and bacteria as possible causes of dental disease respectively. On being asked about which preventive measures to take, 50% did not know any appropriate preventive measures for dental caries and gum disease. The rest indicated the avoidance of sugary food consumption and brushing the teeth as a way of preventing these diseases. Less than 1% mentioned fluoridated tooth paste as a preventive measure (Table 2).

Table 2

Knowledge on preventive measures for dental decay and gum disease

Response	No.	% of Responses	% of Cases
Avoiding sugary foods	33	24.1	27.7
Brushing the teeth	35	25.5	29.4
Using fluoride toothpaste	1	0.7	0.8
Do not know	68	49.6	57.1
Total	137	100.0	

Dental caries experience: Out of the 141 subjects 56.7% were caries free while 43.3% had caries experience. The percentage of females with dental caries was higher than that of the males (49.4% verses 32.7%) but this again was not statistically significant (x^2=3.75, p=0.053). Of those with caries, 72.1% were women and 27.9% were men among whom the 35 to 44 year age group was the most affected. Figure 1 demonstrates the relative frequency of dental caries by age. The mean DMFT was highest in the 45 to 54 year age group (11.4) and lowest in the above 65-year age group (1.6). The mean DMFT for all ages was 3.4.

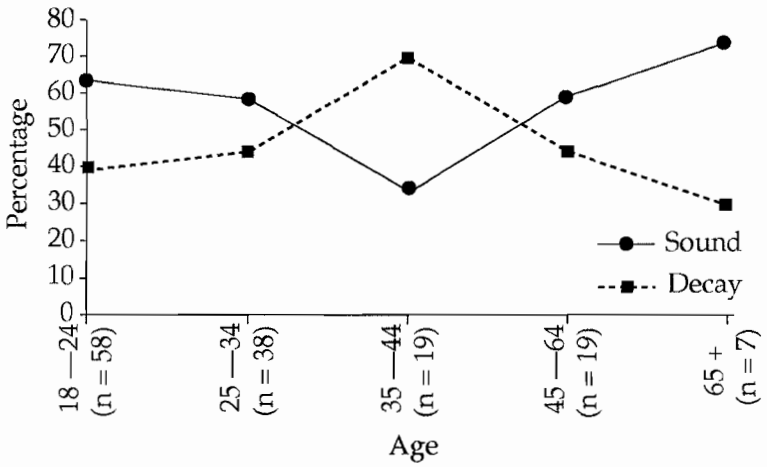
DISCUSSION

Dental caries develops in the presence of four interacting variables, namely, cariogenic bacteria, sugar, susceptible tooth surfaces and time (7). Prevention of dental caries is largely centered on the elimination of these variables or the disruption of their interaction and appropriate use of fluoride (8). As an integral part of general health, the need to prevent dental ill-health and the provision of treatment whenever disease occurs can never be overstated. It is assumed that for the effective prevention of any disease, individuals and the community need to be equipped with knowledge on the causative agents and how to prevent these agents from causing the disease. For instance, the individuals in this case need to know that dental caries is caused by bacterial plaque and sugar and to prevent it, they need to brush their teeth quite often and minimise the intake of sugary foods and use fluoride where appropriate.

The present study has revealed that 43% of the participants had no knowledge on the causes of dental decay and gum diseases; and 50% did not know any appropriate preventive measures. Though the high illiteracy rate would partly explain

Figure 1

Relative frequency of dental caries by age



this scenario, the findings need to be viewed against a background of a number of disadvantages, including, the high illiteracy rate, poverty and the shortage or lack of community oral health workers and other oral health manpower. North Eastern Kenya has traditionally been termed as a "hardship" zone due to the arid climate and endemic insecurity among other reasons. Elwak, where the data were collected has particularly experienced brutal inter-clan fighting attended by loss of lives and property. This has created deplorable poverty levels. According to a recent nationwide economic survey, 64.2% of the province's population live below the poverty line (9); and with an illiteracy rate of 94% among women and 71% among men, the region has by far the highest illiteracy rate in the country (10). Like in most other developing countries the area has also not been spared by the low priority given to oral health due to a multitude of other health problems (11).

The study has also revealed that females may have a higher prevalence of dental caries (72.1%) than their male counterparts. This appears to be a widespread phenomenon as the same has been documented before for rural women in this country (12) and different possible reasons given for this occurrence (4). Due to cultural impediments, the literacy level among the Somali women is depressingly low. Consequently, most of them remain unemployed and stay at home to take care of children. This is thought to encourage the consumption of cheap confectionaries leading to high caries levels. They also suffer from low levels of oral health awareness as a direct result of illiteracy and lack of oral heath care providers. Noor has reported, in an urban Somali community, a caries prevalence of 70% (4) while the present study reveals 43.3% caries prevalence in a rural community. This is a phenomenal difference observed within members of the same community living in different parts of the same country. In our opinion, this lends further credence and adds to the knowledge that differences exist in the prevalence of dental caries not only in different parts of the world but even within the same country and community because of fundamental environmental differences (1,13). Age group may also be a determinant of the dental caries experience in this population. The mean DMFT of 3.4 for all ages is high for African countries where the disease is still reported to be less common and less severe as compared to European, Asian and Latin American countries (1). The DMFT of 1.9 for the 18 to 24 year age group is; however, lower than the WHO goal of DMFT 3 for 12 year olds by the year 2000 though the two age groups cannot be exactly compared. Ng'ang'a *et al.*, reported a mean DMFT of 3.0 for a group of children aged 12 to 18 years from the same area and community sixteen years ago (5). In spite of the age group difference, the results may indicate a decline in the caries experience for teenagers and young adults in the community.

Conversely, these results need to be interpreted with the drawbacks of the DMFT index in mind. In as much as dental caries accounts for the majority of tooth extraction in all ages (14), other

Table 3

Number and percentage (%) of dental caries by age group

Age group (years)	Sound		Decayed	
	No.	(%)	No.	(%)
18 – 24 (n=57)	36	62.1	22	37.9
25 – 34 (n=37)	22	57.9	16	42.1
35 – 44 (n=18)	6	31.6	13	68.4
45 – 64 (n=18)	11	57.9	8	42.1
65 + (n=7)	5	71.4	2	28.6
All ages (n=141)	80	56.7	61	43.3

Table 4

DMFT status by age

Age group (years)	Decayed teeth	Missing teeth	Mean DMFT
18 – 24	64	46	1.9
25 – 34	59	47	2.9
35 – 44	72	22	5.2
45 – 54	44	70	11.4
55 – 64	9	19	3.5
65+	6	5	1.6
All ages	254	209	3.4

dental caries accounts for the majority of tooth extraction in all ages (14), other causes of tooth loss do exist and could inflate the M component of the index. Periodontal disease in particular is a major cause of tooth loss in patients over forty years old (15). Other causes include preprosthetic treatment, orthodontic reasons, trauma and removal of wisdom teeth (14).

The Somali community seems to differ from other pastoral groups living in northern Kenya in dental caries experience. Carl and Zambon found the disease to have been rare among the Rendille and the Samburu of Northern Kenya. A particular type of tree from which they get their tooth brushing sticks has been suggested to play a significant role (16). Ng'ang'a *et al.*, found a mean DMFT of 3.0 for a group of Somali children in Mandera. Why these differences exist is not clear. However, the fact that the Samburu and Rendille lead more traditional life styles than the study population may make the whole difference. Socio-economic factors are widely documented to have an impact on dental caries. In the United Kingdom, for instance, caries has been found to be highest in children living in areas of socio-economic deprivation (1). Lallo *et al.*, also demonstrated that a relationship exists between dental caries and development; and that countries in the throes of socio-economic transition have the highest DMFT scores (17). Further, Carvalho *et al.*, revealed that economically privileged children in Belgium are 2.5 times more likely to be caries free in comparison with non-privileged ones (18).

In conclusion, the study reveals a typical rural Kenyan setting where there is a limited access to oral health services and the individuals have a high caries level. The lack of oral health awareness among the study population is equally worth noting and may be an issue that is not peculiar to this region. The findings, however limited, may also bring to light the magnitude of the problem that exists and holds enormous potential for health service providers and other interested groups.

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