

# REASONS FOR TOOTH EXTRACTION IN URBAN AND RURAL POPULATIONS OF SAUDI ARABIA

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## ABSTRACT

*An epidemiological survey was carried out to ascertain the reasons and the factors that contribute to dental extractions in a rural and an urban population of Saudi Arabia. A total of 820 individuals (400 in an urban area and 420 in a rural area) aged between 20 and 80 years were included in the study. Eight dentists in the region obtained personal and demographic data and clinical details from these randomly selected subjects enrolled for the study. A total of 2800 extractions were accounted in this study from those subjects. The results showed that caries and its sequelae were responsible for more tooth loss in younger age groups in urban and rural population while extraction consequent to periodontal problem increased with age. As far as the type of tooth extracted, the most frequently extracted were mandibular posterior teeth in rural areas (40.57%) and maxillary posterior teeth in urban areas (56.0%) followed by maxillary anteriors (11.43%) and mandibular anteriors in rural areas (10.0%) respectively, which was statistically significant. Extractions from periodontal problems were more common among those with only primary education while a high frequency of extraction for orthodontic purposes was noticed in urban females with primary education. However extractions from caries followed a uniform pattern in all groups with minimum number of individuals with secondary and tertiary level of education. The observations of the study indicate that caries is the most frequent reason for tooth extraction in young population both in rural and urban populations. Extraction due to periodontal reasons predominated in the age group above 40 years.*

**Key words:** *Tooth extraction; tooth loss; epidemiology; dental caries; periodontal disease*

## INTRODUCTION

Understanding the pattern and the causes for tooth loss in a population is important for development of dental health services. Surveys to determine the reasons for tooth extraction have been carried out in many countries. Most of these surveys were similar as they investigated the amount of tooth loss, the reasons behind extraction, and the distribution of tooth loss according to age, gender and tooth type.<sup>1,2</sup> Dental caries and periodontal disease were the predominant reasons for tooth extraction<sup>3-5</sup>; other reasons include trauma, orthodontic and prosthetic reasons and endodontic failures. Most of the studies suggested that caries and its consequences affected tooth loss throughout life while the rate of tooth loss due to periodontal disease increases with age. Orthodontics has replaced caries as the common reason for extraction in young populations, less than 20 years of age.<sup>6-8</sup>

Reasons for tooth extraction have large geographical and cultural differences between countries. Even though periodontal disease was found to be the most frequent reason for tooth extraction in Germany and Canada<sup>9,10</sup>, the proportions of caries and periodontal disease are almost the same in Italy and Singapore.<sup>7,11</sup>

While dental caries and periodontal disease are the main reasons for tooth extractions, age, gender, socio-economic, behavioural and attitudinal characteristics tend to influence the tooth retention profile of the population. Studies have shown that subjects of low income and education are more likely to be edentulous than their counterparts of higher income and education.<sup>12</sup> A study on correlation between gender and tooth extraction reasons showed more tooth loss in less educated rural male populations.<sup>13</sup>

The relationship between type of habitat (urban and rural areas) and tooth extraction reasons are of

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special interest.<sup>14</sup> Studies have shown that, people living in rural areas, have less access to dental care services than the urban dwellers. This leads to accumulation of tooth extraction needs in the rural population.<sup>15,16</sup>

Limited numbers of epidemiological studies were carried out to determine the prevalence of oral diseases in Saudi Arabia. Dental Caries remains as the major dental health problem in Saudi Arabia. According to WHO estimation, Saudi Arabia has a total population of 25 million with 85 percent living in urban areas. The dentist to population ratio is 2.5 per 10000 individuals which is far below the acceptable standard recommended.<sup>17</sup>

Few studies that have been done in the past to assess the reasons for tooth extraction in Saudi Arabia were done in cities and speciality health care settings.<sup>18-22</sup> Caries and periodontal disease have been reported as the major reasons for tooth extraction in most of these studies.<sup>20,21</sup> Studies focusing on the urban and rural areas of the country may provide a better understanding of the demand for dental care in the whole population. So far no study has been conducted to compare the prevalence of dental diseases among rural and urban population of Saudi Arabia. Hence the present study was undertaken to describe, with respect to age, gender, educational level and tooth type, the reasons for tooth extraction in an urban and a rural area of Saudi Arabia.

## METHODOLOGY

The present study was undertaken to extrapolate the reasons for dental extractions in urban and rural populations in Saudi Arabia. An attempt was also made to correlate the factors related to dental diseases and its impact on the frequency of dental extraction among the various subgroups such as age, sex, educational level and tooth type in the study population.

The study comprised a total of 2800 extractions in 820 patients (400 teeth in urban areas and 420 teeth in rural areas). The reasons for extraction were classified into a) caries, b) periodontal disease, c) orthodontic, d) prosthodontic, e) trauma and f) other (patient request).

The initial study was carried out in Al-Baha Dental centre, Saudi Arabia. Al-Baha city is situated in the South-Western region of the kingdom of Saudi Arabia. It is the smallest of the Kingdom's provinces (11,000 sq

kms) with a population of 533,001. Subjects reported at the dental centre for extraction were considered for the study for a period of six months from March to August 2007. Recording of the data was done using a questionnaire. The questionnaire composed of demographic data, educational level, status of the dentition and reasons for extraction.

Eight dentists working at the dental centre did the examination and data recording. A printed manual containing the instructions and criteria were supplied to the examiners. The questions were written in English and the Dentist translated the questions to those who do not speak English. The filled questionnaires forms were collected from the examiners. A similar questionnaire was distributed at Central Hospital and King Fahd Hospital in Riyadh. Riyadh is the capital and the largest city of Saudi Arabia with an area of 412,000 sq km and a population of 6,400,000. Before the start of the study, the questionnaire was tested in a limited number of subject's. During the survey maxillary and mandibular third molars were excluded from the study, mainly due to their congenitally missing and/ or impacted nature.

The subjects were grouped into six age groups from 20-80 years of age (a. 20-30 years, b. 31-40 years, c. 41-50 years, d. 51-60 years, e. 61-70 and f. 71-80 years). Level of education was classified on a numerical scale from 1-3 (1. No formal education, 2. Primary education and 3. University education). The type of teeth extracted were recorded, based on its location as maxillary anterior, maxillary posterior, mandibular anterior and mandibular posterior.

The data were processed and analyzed statistically to find the correlation with the variables using Statistical Package for Social Sciences (SPSS Inc., USA) version 13.0. Percentage distributions of the variables were used to interpret the data with the help of statistical tables and graphs. The data were analyzed for frequency distributions. The Chi-square test was used for comparisons among male and female subjects. Differences were considered significant at *p*-values less than 0.05.

## RESULTS

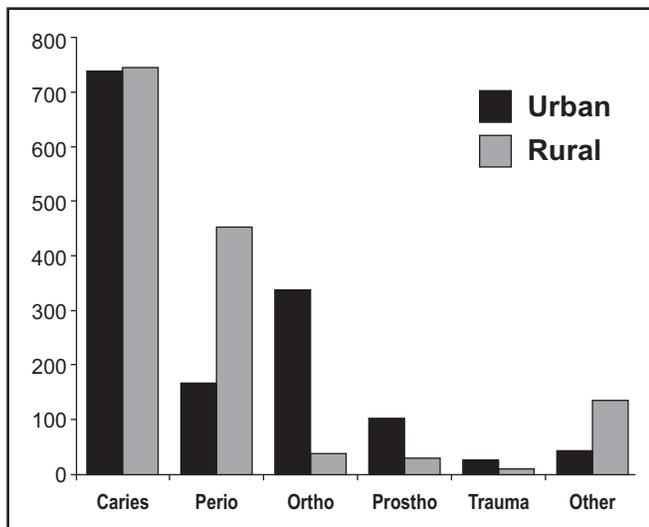
Rural population lost more teeth due to periodontal disease (32.29%) than urban (11.71%) and this was

TABLE 1: REASONS FOR TOOTH EXTRACTIONS (NUMBERS AND PERCENTAGES)

| Reason for extraction   | Urban  |            | Rural  |            |
|-------------------------|--------|------------|--------|------------|
|                         | Number | Percentage | Number | Percentage |
| Caries                  | 736    | 52.57%     | 744    | 53.14%     |
| Periodontal             | 164    | 11.71%     | 452    | 32.29%     |
| Orthodontic             | 336    | 24.00%     | 36     | 2.57%      |
| Prosthodontic           | 100    | 7.14%      | 28     | 2.00%      |
| Trauma                  | 24     | 1.71%      | 8      | 0.57%      |
| Other (patient request) | 40     | 2.86%      | 132    | 9.43%      |

TABLE 2: TYPE OF TOOTH (SEXTANT) EXTRACTED IN URBAN AND RURAL POPULATION

| Tooth Type      | Urban  |            | Rural  |            |
|-----------------|--------|------------|--------|------------|
|                 | Number | Percentage | Number | Percentage |
| Upper Anterior  | 116    | 8.29%      | 160    | 11.43%     |
| Upper Posterior | 784    | 56.00%     | 532    | 38.00%     |
| Lower Anterior  | 84     | 6.00%      | 140    | 10.00%     |
| Lower Posterior | 416    | 29.71%     | 568    | 40.57%     |

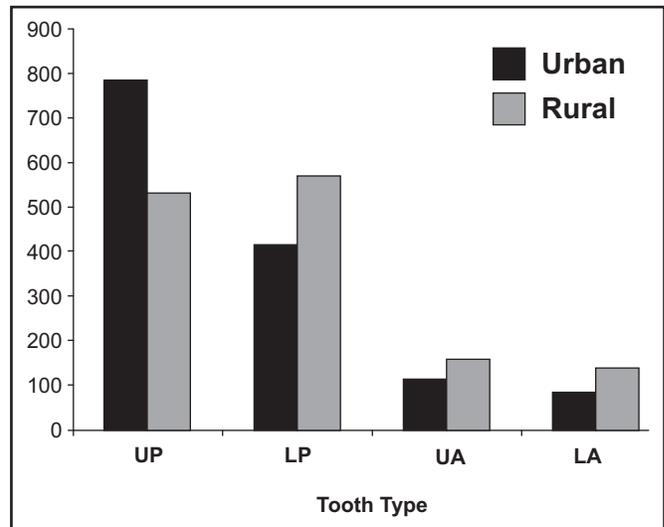


Perio: Periodontics, Ortho: Orthodontics, Prosth: Prosthodontics)

**Fig 1: Reasons for extractions among rural and urban population.**

more prevalent in rural males (19.71%) than the males from urban area (4.57%). The female population in rural areas also showed significant difference (12.5% than their counterparts in urban areas (7.14%). Differences between tooth loss due to caries between the sexes were not statistically significant (Table 1)

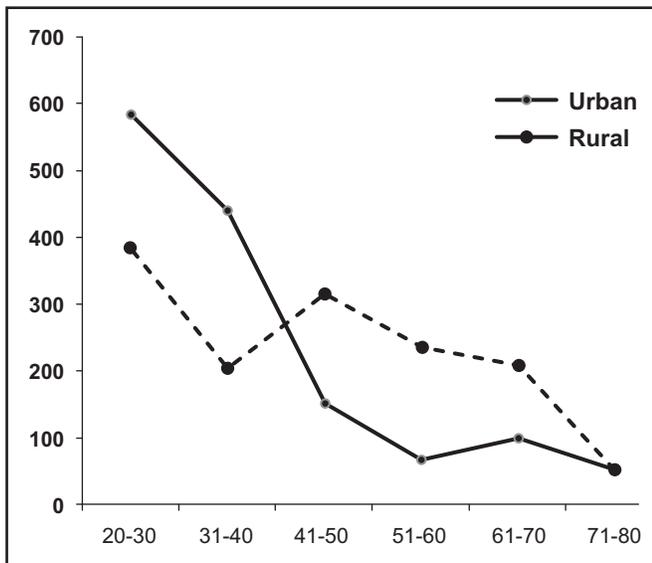
In general, rural population lost teeth due to periodontal disease (32.29%) more than the urban



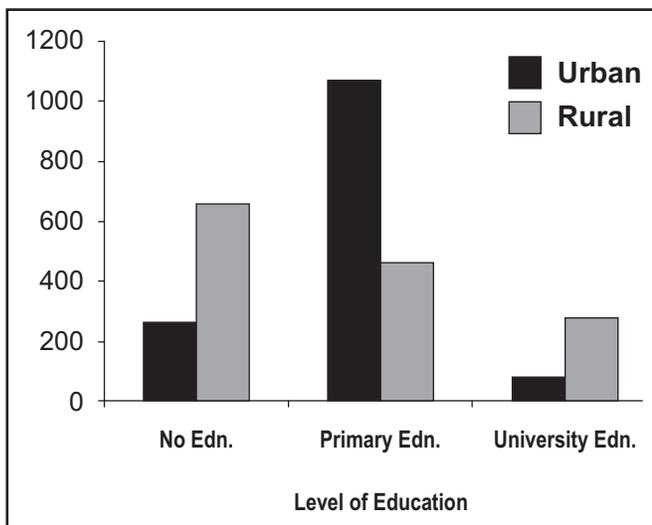
UP: Maxillary Posterior teeth, LP: Mandibular posterior teeth, UA: Maxillary anterior teeth, LA: Mandibular anterior teeth).

**Fig 2: Distribution of extracted tooth type among urban and rural population.**

population (11.71%) as seen in Fig (1), male subjects having more extraction than females (19.71% vs 12.57%) in the rural population. For the same reason, rural women lost more teeth (12.57%) than did the urban women (7.14%), as well as between rural and urban males (19.71% vs 4.57%).



**Fig 3: Age-wise distribution of extractions among rural and urban population**



**Fig 4: Distribution of extractions in terms of educational level**

Among other reasons, more extractions were performed for orthodontic treatment in urban areas (24.0% vs 2.57%) and a statistically significant difference was found between females in urban and rural areas (18.57% vs 2.0%). Tooth extraction for prosthetic reasons showed significant difference between urban and rural areas (7.14% vs 2.0%), while no significant difference was found between males and females in urban areas and almost all extractions for prosthodontic reasons were done for males in rural areas (Table 1 and Figure 1).

Concerning the distribution of tooth loss according to age, the age group with most extracted teeth is 20-30 years of age in both populations as seen in Fig (3). It is important to emphasize that the teeth that were extracted was mainly due to caries. The results also showed an increase in tooth extraction for prosthetic reasons with age (>50 years).

The relationship between reasons of extraction and the level of education showed significant difference between tooth extractions in urban population with primary education than the rural areas, whereas people in rural population with no education extracted more teeth than their urban counterparts (Fig 4).

Regarding the tooth type and reasons for extraction, upper anterior teeth were extracted more in rural population than urban areas (11.43% vs 8.29%), the same result was seen for upper posterior teeth also (56.0% vs 38.0%). But in the case of lower anterior and posterior teeth, extractions were done more in rural population compared to their urban counterparts (10.0% vs 6.0% and 40.57% vs 29.71%) respectively (Table 2 and Fig 2).

## DISCUSSION

Epidemiological data on dental health is scarce from Saudi Arabia and studies of this kind would benefit proper dental care management and administration in this region.<sup>18-20, 23</sup> The present study was undertaken to explore the reasons for tooth extraction in an urban and a rural area of Saudi Arabia with respect to age, gender, educational level and tooth type. The observations of the present study showed that, caries was the major cause of tooth loss in the younger population, both in urban and rural areas. With an increase in age, the incidence of extraction due to periodontal disease also increased and rural male population lost more teeth than their urban counterparts. This is in agreement with several other studies.<sup>12, 16, 24-27</sup> Takala et al<sup>24</sup> in a study among the rural population of Finland found that caries was the reason for 70% of extractions, periodontal disease for 20% and prosthetic reasons for 10% of extractions.

In the studied populations, periodontal disease was not the major cause of tooth loss in the younger population, since at that age, it is less often manifested. With an increase in age, the incidence of periodontal

disease also increases, while the prevalence of caries reduces due to stabilisation of oral hygiene and nutrition habits. This study confirmed the trend that periodontal disease is the most frequent reason for tooth extraction in patients over 45 years of age as shown in previous studies.<sup>2,12</sup>

A direct relationship was found with the frequency of extraction and the level of education. Extractions due to periodontal and orthodontic problems were more prevalent among those with primary education only. However extractions due to caries followed a uniform pattern in all groups with minimum number of individuals with secondary and tertiary level of education. Paulander *et al*<sup>28</sup> studied the association between level of education and oral health status and found that educational level was shown to influence the oral conditions and should be considered in assessing risk, and in planning appropriate preventive measures. This study also points out the lack of awareness among the group of individuals with lower level of education. These observations highlight the importance of disseminating oral hygiene education among poorly literate individuals.

A noticeably high frequency of extraction due to orthodontic reasons in urban female population suggests a positive motivating factor for orthodontic treatment, whereas a low extraction rate in rural population may be due to unavailability of orthodontic treatment or attributed to poor preventive dental treatment and motivation from the dental professionals.

Although urban and rural subjects in this survey had similar number of missing teeth, more teeth indicated for extraction were detected in the rural females than in their urban counterpart. This finding is in accordance with that of a study on Northern Chinese adults.<sup>15</sup> Higher numbers of teeth were lost in women than in men in many countries, but the reasons are still unclear.<sup>29</sup> In the present study, women had less extraction due to periodontal disease than caries which is in agreement with other studies.<sup>30,31</sup>

In the rural areas, the dental professionals mainly provide relief from dental pain by tooth extraction, rather than attempting any treatment which would involve the retention of such teeth. Restoring carious teeth may not be a priority in rural areas due to lack of information or the resources.

Efforts to preserve more natural teeth of the population should focus on the prevention and treatment of caries and periodontal diseases. Besides the preventive measures, dental education programmes for the population together with dental professionals needs to be implemented, in the purpose of improving oral hygiene and insisting on conservative therapy than extraction.

## CONCLUSION

The results of the present study indicate that caries is the most frequent reason for tooth extraction in young population both in rural and urban populations, with the number of extractions due to periodontitis increasing over the age of 40.

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