# An Assessment of Partial Edentulism in Rural Population Based on Kennedy's Classification

**Anand Verma[1], Sarita Pradhan Joshi[1], Anjana Maharjan[2]**

[1] Prosthodontic Unit, Department of Dental Surgery, National Academy of Medical Sciences, Bir Hospital, Kathmandu, Nepal.

[2] Department of Dentistry, Patan Academy of Health Sciences, Nepal.

## ABSTRACT

**Introduction:** Oral health plays a vital role towards the quality of life. Good oral health and prevention of tooth loss improves the diet and nutritional status. An evaluation of oral condition depicts the individual's attitude, need and the treatment facilities being provided in the community.

**Methods:** A door to door survey in the rural population of Mathurapati VDC, Kavrepalanchok district was carried out. This community based cross-sectional study aimed to evaluate the features of partial edentulism in the age group 35-64 years in a rural population based on the Kennedy's classification.

**Results:** There was no statistically significant difference in the prevalence of different classes (based on Kennedy's classification) between males and females when upper jaw was considered. In case of lower jaw, the proportion of class I and class II Kennedy's classes were significantly higher in females. The proportion of class III subjects was higher in males.

**Conclusion:** There is no significant correlation between sex and partial edentulism. Kennedy's class III is the most common class of partial edentulism in the age group of 35 to 64 years. Mandibular partial edentulism is more common than maxillary partial edentulism.

**Key words:** Epidemiology, Kennedy's classification, Partial edentulism.

## INTRODUCTION

Tooth loss occurs in the oral cavity due to various causes like dental caries, periodontal diseases, trauma, pulpal and peri-radicular diseases, and various systemic diseases. Tooth loss creates space in the oral cavity that is called edentulous space. Edentulism whether partial or complete indicates the awareness and oral health of a particular population.[1] Teeth loss affects speech, mastication and may result in poor esthetics which in turn affects the quality of life.[2] Tooth loss was long viewed as an inevitable and acceptable part of life. Recent improvements in restorative dentistry, changing attitudes toward tooth retention and advances in the prevention of oral disease have led to increased tooth retention.

In a country like Nepal with various and diversified cultures, different levels of socio-economic status combined with the non-availability of resources for dental treatment leave much to be desired especially where the treatment of partial edentulousness is concerned.

Mexico's national edentulism survey, analyzing geographic distribution and employing World Health Organization age groups, identified the oldest cohort (85+) as having the highest prevalence. This was followed by ages 75-79 and 65-69.[3] This indicates that as the population

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***Corresponding Author**

*Dr. Anand Verma, Prosthodontic Unit, Department of Dental Surgery, National Academy of Medical Sciences, Bir Hospital, Kathmandu, Nepal.*
*Phone No: 9841333846*
*E-mail: mailanandv@gmail.com*

ages, the proportion of partially dentate adults also increases. Partially edentulous patients exhibit a wide range of physical variations and health conditions.[4] Edentulism also reflects the preventive dental treatment provided in the population. The partial prosthodontic replacement of missing teeth requires the restoration for the function.[1]

Loss of tooth progresses with advance in age in both the sexes. It was found that tooth loss was absent below the age of 35 years in either sex and maximum partial denture requirement was high in males between 45-54 years and in females between 55-64 years.[5] This forms a background for the assessment of treatment needs. The aim of the study is to determine the patterns of partial edentulism in patients in the age group 35-64 years in a rural population, based on the Kennedy's classification. The study also aims to assess the sex ratio among the partially edentulous volunteers, cause for tooth loss and to compare the awareness for replacement depending on the educational status. This study will help to organize and implement adequate strategies for the prevention and the treatment of oral diseases.

## METHODS

A community based cross-sectional study was carried out in Mathurapati VDC, Kavrepalanchok district from February 2015 to January 2016 (1year) after receiving Ethical approval from the intuitional review board (IRB), National Academy of Medical Sciences, Kathmandu, Nepal. The VDC is situated 45 kilometers from Kathmandu city. The total population of people between age 35-64 years of Mathurapati is 1258 were included according National Population and Housing Census 2012.[6] Out of which 377 volunteers were chosen by simple random sampling technique. Using the random number tables, houses were identified till the desired sample size was achieved.

Data was collected by the face-to-face interview and intraoral examination by the investigators for the validation of edentulism self-reported by the participants, those who gave written informed consent. These data collected was entered into proforma sheet and then transferred to Microsoft Excel 2010 and the data analysis was carried out using SPSS version 20.0. Analyses included standard descriptive statistics. Continuous variables are expressed as mean ± SD whereas categorical variables are presented as numbers (percentages). Chi-square test was used for comparison of proportions of different variables between groups. A p-value $<0.05$ was considered statistically significant.

## RESULTS

Among the total examined sample of 377, 161 (42.7%) were males and 216 (57.3%) were females. When upper jaw was considered, there was no statistically significant difference in the prevalence of different classes (based on Kennedy's classification) between males and females. In case of lower jaw, the proportion of cases with class I and class II Kennedy's categories was significantly higher in females, when compared to males. However, the proportions of class III subjects were higher in males (Table 1).

When both the age groups were examined, it was found that Kennedy's class III was most common (Table 2). Caries was the commonest cause for loss of tooth in both the age groups (Table 3). The tooth replacement behavior was directly related with the educational status. The prevalence of replacement behavior steadily increased from illiterate category to basic primary education to secondary education and above (Table 4 and Figure 1).

**Table 1:** Distribution of partially edentulous volunteers according to sex

| Kennedy's class | Male | | Female | |
|---|---|---|---|---|
| | Upper jaw (%) | Lower jaw (%) | Upper jaw (%) | Lower jaw (%) |
| I | 9.1 | 7.2 | 7.4 | 13.5 |
| II | 13.6 | 8.6 | 20.1 | 17.6 |
| III | 75.0 | 72.7 | 68.4 | 58.2 |
| IV | 2.3 | 11.5 | 4.1 | 10.7 |

**Table 2:** Frequency of different classes of edentulism according to age

| Variables | Category of age | | P-value (Based on Chi-square test) |
|---|---|---|---|
| | 35-44 years (n = 227) | 45-64 years (n = 150) | |
| Jaw involvement (based on Kennedy's classification) | | | |
| Maxilla only | 48 | 13 | < 0.01 |
| Mandible only | 85 | 55 | |
| Both maxilla and mandible | 94 | 82 | |
| Kennedy's classification (upper jaw) | | | |
| Class I | 7 | 12 | 0.09 (NS) |
| Class II | 22 | 20 | |
| Class III | 108 | 60 | |
| Class IV | 5 | 3 | |
| Kennedy's classification (lower jaw) | | | |
| Class I | 9 | 25 | <0.001 |
| Class II | 19 | 24 | |
| Class III | 138 | 66 | |
| Class IV | 13 | 22 | |

**Table 3:** Distribution of partially edentulous volunteers by the cause for loss of teeth

| Cause for loss of teeth/tooth | Frequency | Percentage (%) |
|---|---|---|
| Caries | 326 | 86.5 |
| Periodontitis | 46 | 12.2 |
| Trauma | 3 | 0.8 |
| Others | 2 | 0.5 |

**Table 4:** Distribution of partially edentulous volunteers according to education

| Educational status | Frequency | Percentage (%) |
|---|---|---|
| Illiterate | 72 | 19.1 |
| Basic primary education | 136 | 36.1 |
| Secondary education and above | 169 | 44.8 |

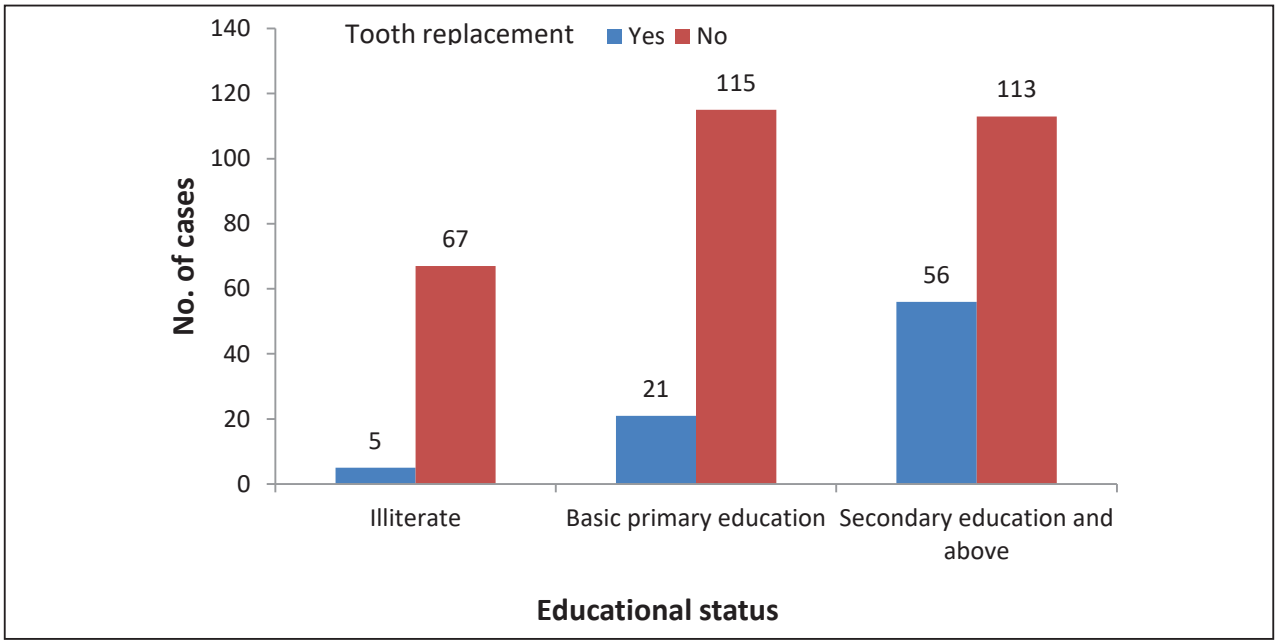


***Figure 1:*** *Correlation between replacement of missing teeth and education*

## DISCUSSION

Several non-disease factors such as attitude, behavior, dental attendance, and characteristics of the health care system plays an important role in tooth loss. Preventive strategies are of great importance to retain a healthy tooth. Various cross-sectional studies on the prevalence of edentulousness show consistently that edentulousness is associated with age, sex, education, social class, income and living area in most of the countries.[2] In the present study, volunteers of age group 35 to 64 years were surveyed. In these age group individuals of age 35 to 44 years were chosen as per the WHO guidelines as this category exhibited maximum partial edentulousness. Several studies have concluded that the maximum partial denture requirement was high in males between 45-54 years and in females between 55-64 years, which forms background to choose individuals between age group of 45 to 64 years.[5] The present study shows that the number of partially edentulous females 216 (57.3%) outnumbered the males 161 (42.7%). This is in accordance with earlier studies, which have reported more females than males having partial edentulousness.[7] The relationship between sex and various Kennedy's classes of partial edentulousness was determined by chi-square statistical analysis. Sex had no significant relationship between various Kennedy's classes of partial edentulousness. When upper jaw was considered, there was no statistically significant difference in the prevalence of different classes (based on Kennedy's classification) between males and females. In case of lower jaw, the proportion of cases with class I and class II Kennedy's categories was significantly higher in females, when compared to males ($p<0.05$). However, the proportion of class III subjects was higher in males. Females in this surveyed group had a lower level of education and unemployment status because of which they had to depend on the male of the family to take them for treatment. This could be the possible reason for more females being partially edentulous. However, some earlier studies have also shown significant sex difference in edentulism with more males becoming edentulous than females.[10, 11] These authors attributed it to the fact that males are more active than females and do not pay much attention to their oral care. It

was found that Kennedy's class III is the most frequent type of partial edentulousness (67.2%). Followed by class II (16.3%), class III and class IV were less frequent.[8] It was also noted that partial edentulousness was more common in the mandible (316) as compared to the maxilla (237).[9] This could be since the mandibular molar is the first tooth to erupt in the oral cavity, having a higher caries percentage and a higher chance of the tooth being extracted.

According to a study in Bangladesh, reason for tooth loss, dental caries was the commonest. It constituted about 586 (67.5%) followed by periodontal disease 121(13.9%) and other reasons.[10] This finding confirmed that caries remains a problem in adults of these age groups. This finding agreed with other studies in Nepal.[11,12] Our data showed that 86.5% of teeth were extracted due to caries, other studies have shown a range between 36% to 55.3%.[13] On the other hand, while our data showed that 12.2% of teeth were extracted because of periodontal disease, other studies have reported a range of 0.45% to 14.4%.[14] Findings tend to be affected by the methodology used, making comparison difficult. The other authors have reported periodontal disease as a major cause of tooth loss.[15] The fact that dental caries is the leading cause of tooth loss, may be attributed to the changes in dietary pattern, a departure from coarse/tough and fibrous diet to a more cariogenic refined carbohydrate rich food, socio economic background and lifestyle of the people over the years. Patients with carious lesions tend to seek treatment only at the onset of severe pain, since early conservative treatment options are either not appealing to them or are unaffordable. The decline observed in the percentage of teeth extracted due to periodontal disease may be related to an increased awareness of oral hygiene, education, and better access to oral hygiene aids like toothbrushes and toothpaste at affordable costs.[16]

When the educational status was considered, it was found that lower the level of the education, lesser is the number of people getting their tooth replaced. This could be since people with higher education are more concerned about their health needs and may seek dental treatment earlier when compared to those with lower educational status who may only seek dental treatment when there is an apparent morbidity. In addition, those with the higher educational status are likely to have a better financial status. Hence, they can afford the cost of dental treatments more frequently.[17]

## CONCLUSION

In the age group of 35 to 64, Kennedy's class III is the most common class of partial edentulism found. Mandibular partial edentulism is more common than maxillary partial edentulism. There is no significant correlation between sex and partial edentulism. The population with basic primary education or less had higher percentage of partial edentulousness than people with secondary education or above. Dental caries is found to be the most common cause of edentulism followed by periodontal disease. Educational status has a direct influence upon awareness for replacement.

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