J Nepal Health Res Counc 2025 Jan-March; 23 (66): 101-107

Comparison of Demographic Characteristics of Complete Edentulism Cases

Bishal Babu Basnet,[1] Indra Kumar Limbu,[1] Prakash Kumar Parajuli[1]

[1]Department of Prosthodontics and Crown-Bridge, BP Koirala Institute of Health Sciences, Dharan, Nepal.

ABSTRACT

Background: Complete edentulism is terminal outcome of tooth loss which itself is multifactorial entity. The periodic comparison of demographic variables in the complete edentulous cases attending dental hospital can give an insight into the status of oral health care, awareness of dental treatment and burden of disease in the community.

Methods: This is a hospital-based study on secondary data of all the cases attending for complete denture therapy from January to December of three years viz. 2012, 2017 and 2022. Proportion of gender, age-specific distribution, geographic residence of patients is presented in percentage. The mean age of patients among three years is compared using One-way ANOVA at 95% confidence interval at level of significance at 0.05.

Results: A data of 830 patients were extracted for analysis. The demographic parameters were obtained and analysed using SPSS 11.5. In all years, male and female patients were almost equal. The number of patients has increased markedly from 2012 to 2017 but plateaued towards 2022. The mean age of patients being edentulous (65.71±10.38 years in 2012, 66.44±8.75 years in 2012 and 66.38±8.83 years in 2022) has not changed significantly ($p > 0.05$) over ten years.

Conclusions: In ten years' time, demand of conventional complete denture has slightly increased, mean age of edentulism remained stagnant and patients from remote hill areas had to visit faraway hospitals for denture therapy. Large scale studies in community are needed to find out the disease burden and determinants of complete edentulism in Nepalese population.

Keywords: Complete denture; dental care; edentulism; oral health.

INTRODUCTION

The World Health Organization (WHO) recognises edentulism as a significant health concern impacting not only oral health but also general health status and quality of life.[1] While improvements in oral health care and access to dental services have led to increased retention of natural dentition, a marked increase in tooth loss is anticipated due to increase in deleterious habits, dietary pattern sand sugar intake.[2] Previous data prediction has showed increase in demand of complete denture in USA.[3] However, in context of Nepal, the prevalence of complete edentulism, its associated factors and future disease trends at a national level remain unevaluated. In the absence of large-scale studies, this hospital-based research aims to examine differences in socio-demographic characteristics among population seeking complete denture therapy across three different years (2012, 2017 and 2022). Additionally, the turnover of patients in dental hospital before and after the COVID-19 pandemic is evaluated.

METHODS

Ethical clearance was obtained from the institutional review committee (218/080/081-IRC, 6/11/2023). The study is an observational and cross-sectional study, conducted using secondary sources. It involved retrospective extraction of hospital records for all completely edentulous cases that attended Department of Prosthodontics, BPKIHS from January 1st to December 31st of year 2012, 2017 and 2022.

A non-probability, convenience sampling technique was employed, where all complete edentulous patients who met the inclusion criteria during the specified years (complete enumeration) were included in the study. The hospital records with legible details of the patients

Correspondence: **Dr Bishal Babu Basnet, Department of Prosthodontics and Crown-Bridge, BP Koirala Institute of Health Sciences, Dharan, Nepal. Email: bishal.basnet@bpkihs.edu, Phone: +9779842284279.**

who came for complete denture therapy were included in the study. The age, gender, ethnicity and geographic location from selected cases were extracted for analysis. Ethnicity was determined based on reported surnames of the patients, and when incomplete, it was categorized as "others". The collected information was entered into Microsoft excel 2010 and further analysed using SPSS 11.5 version.

The total sample size across the three years included 830 cases from the aforementioned periods (2012: 207, 2017: 302, 2022: 321). Three patients aged 31, 35 and 38 years were excluded for age-related description due to incomprehensible record. Additionally, a patient aged 27 years was edentulous due to a developmental disorder and thus excluded. Similarly, the hospital records could not be extracted for addresses of 16 patients whereas two patients were from India in 2022 and were excluded.

Age group was classified into three groups viz., 40-59 years, 60-79 years and ≥80 years. Gender distribution, age-specific distribution, ethnic distribution, geographic residence of patients across three different years is presented in percentage.

Comparison of mean age of patients over three years was done by using One-way ANOVA at a 95% confidence interval. A comparison of mean age between male and female patients within a particular year was conducted using the independent sample t test. Chi-square test was employed to compare the proportions of ethnicity across three years. A relation was considered significant when p-value was less than 0.05.

RESULTS

A total of 830 completely edentulous patients' data were evaluated across three different years. Total number of patients increased by 95 patients from year 2012 to 2017 but the difference was minimal (19 patients) from 2017 to 2022 (Table 1). In all years, attendance between males and females remained almost equal.

The mean age of patients seeking complete denture therapy in 2012, 2017 and 2022 were 65.71±10.38 years, 66.44±8.75 years and 66.38±8.83 years respectively. One-way ANOVA showed no statistical difference in mean age ($p > 0.05$).

Comparison among three age groups revealed that majority of the patients belonged to the 60 -79 years in all three years (Fig 1), 40 – 59 years group showed slight fluctuations across these years whereas ≥80 years population remained smallest with minimal changes over time as depicted in figure 1.

There was not significant difference in mean age of edentulous male ($F = 0.097$, $p = 0.91$) and female ($F = 0.701$, $p = 0.50$) patients attending for complete denture among the three years, 2012, 2017 and 2022. Within the same year, the mean age of female patients was significantly lower ($p < 0.05$) than that of males, as shown in table 3.

Distribution of location was divided into Sunsari district and districts other than Sunsari. Table 4 shows that majority of patient hailed from Sunsari district with rising trend of patients from districts other than Sunsari, increasing from 70 (34.65%) in 2012 to 134 (42.41%) in 2022. Among patients from Sunsari district, numbers of patients belonging to Dharan Submetropolitan city were 84 (64.12%), 141 (76.63%) and 124 (68.13%) in 2012, 2017 and 2022 respectively. The distribution of completely edentulous patients from different districts are presented in table 4 and the major hill districts are marked in the map (Figure 2).

Almost half of the patients in all three years belonged to Aryan ethnic group, followed by Mongoloids and Newars (Table 5). The ethnicity proportions have changed significantly across the years 2012, 2017, and 2022 ($p = 0.04$).

Table 1. Comparison of year-wise distribution of completely edentulous patients.

Gender	Year 2012	Year 2017	Year 2022
Female	99 (47.83%)	150 (49.67%)	170 (52.96%)
Male	108 (52.17%)	152 (50.33%)	151 (47.04%)
Total	207	302	321

Table 2. Comparison of mean age in three different years. (N=826),

Parameters age in years	Year 2012	Year 2017	Year 2022
Mean ± SD	65.71±10.38	66.44±8.75	66.38±8.83
95% CI upper bound - Lower bound	67.13 - 64.29	67.44 - 65.45	67.36 - 65.40
Range	42-89	40-87	40-89
F = 0.217, p =0.81 (One-way ANOVA test)			

Table 3. Comparison of mean age between genders in three different years.

Year	Mean ± SD (in years)		95% CI Upper bound - Lower bound		P-value*
	Female	Male	Female	Male	
2012	63.94±10.56	67.33±9.99	66.06 -61.83	69.24 - 65.43	0.018
2017	65.01±8.72	67.84±8.58	66.43 - 63.60	69.22 - 66.46	0.005
2022	65.28±8.58	67.63±9.08	66.58 - 63.98	69.10 - 66.17	0.018
P-value †	0.50	0.10			

*p <0.05, statistically significant, independent sample t test;

† p >0.05 not significant, one-way ANOVA

Table 4. Distribution of reported permanent address of patients in three different years.

Address of the patient	2012 (N=202)		2017 (N=294)		2022 (N=316)	
Sunsari	132 (65.35%)		186 (63.27%)		182 (57.59%)	
Morang	30		41		42	
Dhankuta	10		23		24	
Bhojpur	7		7		19	
Khotang	3		11		13	
Jhapa	3		13		9	
Udayapur	8		1		5	
Ilam	2		1		1	
Saptari	1		1		1	
Sankhuwasabha	3		1		3	
Taplejung	2	Other districts total 70 (34.65%)	0	Other districts total 108 (36.73%)	3	Other districts total 134 (42.41%)
Terhathum	0		3		9	
Okhaldhunga	0		2		1	
Sarlahi	0		1		1	
Mahottari	1		0		0	
Kathmandu	0		1		0	
Chitawan	0		1		0	
Dhanusha	0		1		0	
Panchthar	0		0		1	
Solukhumbu	0		0		1	
Jumla	0		0		1	

Table 5. Distribution of edentulous patients according to ethnicity in three different years.

Ethnicity of patients	Year 2012	Year 2017	Year 2022
Aryans	113 (54.59%)	168 (55.63%)	170 (52.96%)
Mongoloids	63 (30.43%)	79 (26.16%)	110 (34.27%)
Newars	23 (11.11%)	42 (13.91%)	39 (12.15%)
Others	8 (3.86%)	13 (4.30%)	2 (0.62%)
Total	207	302	321

Chi-square statistic = 13.206, df = 6, p =0.04

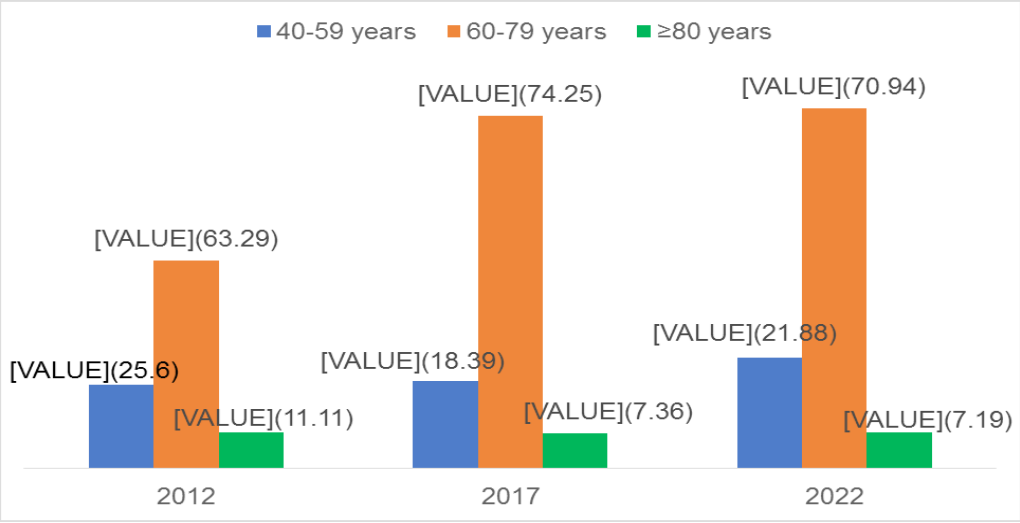

Figure 1. Distribution of patients according to age group in the year 2012, 2017 and 2022, number in parentheses represent percentage.

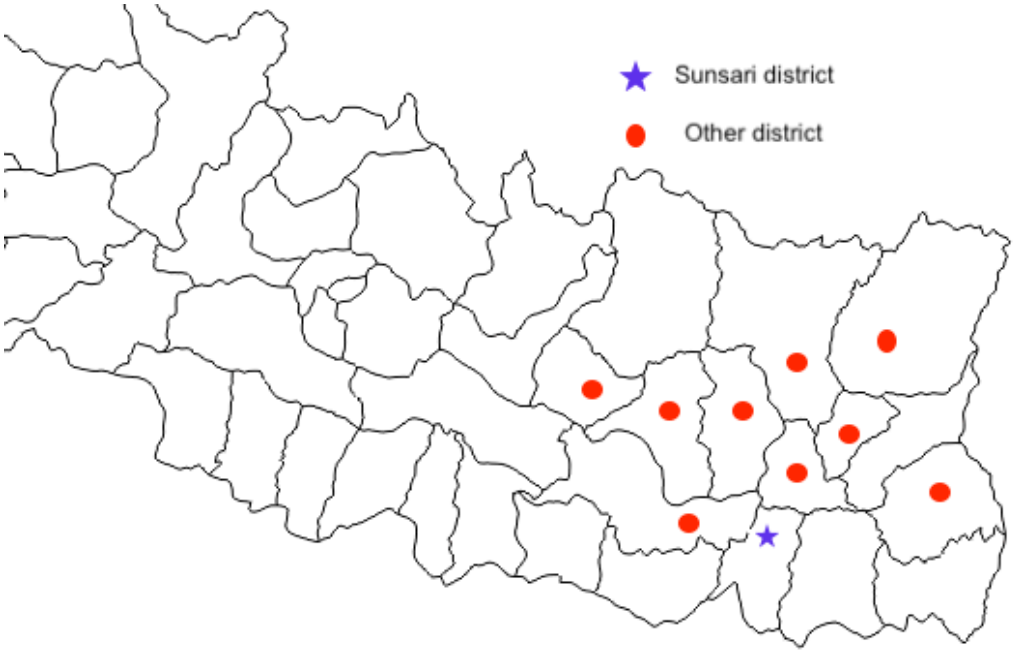

Figure 2. showing the hill districts from where patients travel for complete denture therapy. Only districts with attendance in at least two studied years and at least 2 cases in a year are marked in the map.

DISCUSSION

Edentulism is a significant public health issue among the elderly, impacting primary care practices. Tooth loss can impair mastication, speech, and aesthetics, severely affecting patients' quality of life.[4] Oral health has been linked to general chronic diseases. The coexistence of two or more chronic conditions also referred to as multimorbidity is rising in ageing population and health care needs should be addressed differently in these population.[5] In 2002, Douglass et al.[3] did projection study from the past data and speculated increase in demand of complete denture in 2020. In the developed countries quantification of complete edentulism has been done as a part of national survey. One such study reported overall age and sex-standardized prevalence of edentulism ranging from 7.6% (Myanmar and Bangladesh) to 15.2% (Brazil) and almost equal proportion between gender (male 50.4% and female 49.6%).[6] While our hospital-based study is smaller in scale, it revealed a balanced gender proportion over a decade. Contrary to our findings, higher prevalence of complete denture need among female older adults was reported in Brazil[7] and Ghana[8] and lower in Saudi Arabia[9] in comparison to male counterparts. The difference could be attributed to socioeconomic status and gender discrimination which could be barring females from attending dental hospitals. In our study, the proportion of females increased from 47.83% in 2012 to 52.96% in 2022. Xiao et al.[10] suggested reasons for higher prevalence among females linking it to post-menopausal osteoporosis and higher esthetic concerns in high-income females. The other reasons maybe increased oro-dental awareness, enhancement in income and influence of social media.

Edentulism among young adults, be it partial or complete, is expected to decline in future due to advancements in dental science, socioeconomic improvements, and increased awareness, but marked rise is expected in older age groups by 2040 as outlined by a study.[11] Merely based on hospital-based records of three years, we cannot predict the future trends in our country. However, a continuation of rise in proportion of edentulism cases in 60 – 79 years age group can be expected in next decade with population growth and longer span of people's lives.

Latest census of Nepal reported that the proportions of 40 – 59 years, 60 – 79 years and >80 years age group were 19.45%, 9.22% and 0.99% respectively.[12] The burden of edentulism lies in the 60 – 79 age group in our study. Thus, the actual conversion from our findings in census could be alarming.

As we have taken patients seeking complete denture therapy for the first time, this age can be considered as the mean age of being toothless. The mean age of complete edentulous patients in our study did not significantly differ over the decade indicating a stagnation of oral healthcare's ability to delay tooth loss. In the year 2022, the mean age of complete edentulism was 66.38±8.83 years. This is very much similar to the finding from a study done in Nepalese population which stated the mean age as 66.67±10.66 years.[13]

The attention should be drawn towards more comprehensive community-based surveys to ascertain actual prosthetic needs. Notably, our study revealed an urban hospital's reach to distant hill districts. It maybe argued that either privileged patients or those in dire needs for denture services visited to the distant dental hospitals. This alarms that actual disease prevalence in these areas maybe higher.

While conventional complete denture provision was observed in our study, modern treatment options such as two implants and bar attachment, two or four implants and bar, completely fixed hybrid denture, implant supported overdenture and early and immediate implants merit consideration.[14] Oral satisfaction with implant-supported rehabilitation was reported to be significantly higher than that with conventional complete prostheses.[15] However, Eregie et al. in a comparative study concluded that conventional complete dentures still remain a viable treatment option in the management of complete edentulism as it significantly improves the oral health related quality of life (OHRQoL) of patients.[16] Thus, importance of conventional complete denture cannot be overlooked in countries like ours with disparity in distribution of health care system and poor income of population. Complete denture may indeed improve dieatary intake, masticatory efficiency and social acceptability in the edentulous patients.[8]

Dental educators have started casting doubts on whether complete denture training be discontinued from dental curricula,[14] but with increase in the global prevalence of complete edentulism and inability to opt costly treatments in low-income and middle-income regions, importance of conventional denture therapy cannot be neglected.

In analyzing patient turnover, we observed a different trend in 2017-2022 compared to 2012-2017 partly attributed to the econonomic impact of COVID-19 pandemic in the former. Increased availability of dental

services in urban areas may also had served to lessen the number of patients from these privileged areas.

Limitations of our study include reliance on paper-based past hospital records, leading to missing or incomprehensible data. Being hospital-based, it provides a limited societal perspective, necessiating larger community-based surveys akin to those in developed nations to quantify the disease burden accurately. We also recommend digital record keeping in the hospitals with extensive information so in depth studies can be plausible in future.

CONCLUSIONS

Over a decade, demand for conventional complete denture exhibited a slight increase, while the mean age of edentulism was not significantly changed. Disparities in denture service pose challenges for the elderly, necessiating extensive travel for dental treatment. Also, sociodemographic factors related to access, quality, ease and cost of treatment need to be taken in account. Large-scale national surveys are crucial to understand multiple factors associated with complete edentulism in Nepal's population.

ACKNOWLEDGEMENTS

The authors would like to extend the gratitude to the nurses in the department, Dhan Kumari Rai and Santosh Kumari Limbu for their assistance in gathering and providing past hospital records.

CONFLICTS OF INTEREST

There are no conflicts of interest.

REFERENCE

1. Petersen PE, Yamamoto T. Improving the oral health of older people: the approach of the WHO Global Oral Health Programme. Community Dent Oral Epidemiol 2005; 33: 81–92. doi: https://doi.org/10.1111/j.1600-0528.2004.00219.x

2. Qin X, He J, He H, Yuan X, Su X, Zeng X. Long-term trends in the burden of edentulism in China over three decades: A Joinpoint regression and age-period-cohort analysis based on the global burden of disease study 2019. Frontiers in Public Health. 2023 Apr 27;11:1099194.doi: https://doi.org/10.3389/fpubh.2023.1099194

3. Douglass CW, Shih A, Ostry L. Will there be a need for complete dentures in the United States in 2020? *J Prosthet Dent* 2002; 87: 5–8. doi: 10.1067/mpr.2002.121203

4. Al-Rafee MA. The epidemiology of edentulism and the associated factors: A literature review. J Family Med Prim Care 2020;9(4):1841-3. https://doi.org/10.4103/jfmpc.jfmpc_1181_19

5. Gill B, Harris A, Tredwin C, Gill P. Multimorbidity and oral health: need for new models of care. Fam Med Com Health, 2020;**8(4)**:e000387. doi: https://doi.org/10.1136/fmch-2020-000387

6. Tyrovolas S, Koyanagi A, Panagiotakos DB, Haro JM, Kassebaum NJ, Chrepa V, et al. Population prevalence of edentulism and its association with depression and self-rated health. *Sci Rep* 2016; 6: 37083. doi: 10.1038/srep37083

7. da Veiga Pessoa DM, Roncalli AG, de Lima KC. Economic and sociodemographic inequalities in complete denture need among older Brazilian adults: a cross-sectional population-based study. *BMC oral health 2016*; *17*(1): 5.doi: 10.1186/s12903-016-0233-9

8. Hewlett SA, Yawson AE, Calys-Tagoe BN, Naidoo N, Martey P, Chatterji S, et al. Edentulism and quality of life among older Ghanaian adults. BMC Oral Health 2015; 15:48. doi: 10.1186/s12903-015-0034-6

9. Shammas M, Muhcu NK, Alzahrani EA, Alsaadi RA, Alshaqha EM, Balkhyoor JA, et al. Screening and allotting completely edentulous patients using prosthodontic diagnostic index in a dental school, Jeddah, Saudi Arabia. J Clin Diagn Res. 2021 15(5): ZC15-ZC20 doi: https://doi.org/10.7860/JCDR/2021/48343.14878

10. Li X, Man J, Chen H, Yang X. Spatiotemporal trends of disease burden of edentulism from 1990 to 2019: A global, regional, and national analysis. *Front Public Health* 2022;10:940355. doi: 10.3389/fpubh.2022.940355

11. Cardoso M, Balducci I, Telles D de M, Lourenco EJV, Lafayette N Jr. Edentulism in Brazil: trends, projections and expectations until 2040. *Ciênc Saúde Coletiva* 2016; 21(4): 1239–46. doi: https://doi.org/10.1590/1413-81232015214.13672015

12. Central bureau of statistics, Government of Nepal. *National population and housing census 2021 (National report)*. National Report, Kathmandu, Nepal: Government of Nepal. Assessed from: https://censusnepal.cbs.gov.np/results/downloads/national?type=data (2021, assessed 17 November 2023)

13. Pandey A, Basnet SS. Prevalence of Edentulousness among Patient visiting a Tertiary Care Centre. Nepal J Health Sci. 2024 Jan-Jun;4(1): 85-91. doi: https://doi.org/10.3126/njhs.v4i1.71099

14. Turkyilmaz I, Company AM, McGlumphy EA. Should edentulous patients be constrained to removable complete dentures? The use of dental implants to improve the quality of life for edentulous patients. *Gerodontology* 2010; 27: 3–10. doi: 10.1111/j.1741-2358.2009.00294.x

15. Fernandez-Estevan L, Selva-Otaolaurruchi EJ, Montero J, Sola-Ruiz F. Oral health-related quality of life of implant-supported overdentures versus conventional complete prostheses: Retrospective study of a cohort of edentulous patients. Med Oral Patol Oral Cir Bucal. 2015;20 (4):e450-8. doi: 10.4317/medoral.20498

16. Eregie UJ, Omo JO, Sede MA, Esan TA. Are conventional complete dentures still necessary? A comparative analysis of two groups of completely edentulous patients. Int J Prosthodont Restor Dent, 2021;11(1):9–15. doi: https://doi.org/10.5005/jp-journals-10019-1303