

Oral Health Matters- Tooth Problem and its Treatment-seeking Behaviour Among Older Adults in India

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Abstract

Background: Growing untreated morbidities among the older adults on geriatric issues especially an optimal dental treatment has become an unfinished agenda and a long-neglected area for care and management in many low and middle-income countries. There is a continuous rise in the older population in India and at the same time, the rising of co-morbidities or multi-morbidities in the aging population creates catastrophic challenges at the individuals, household, community, and country levels, and therefore, it is important to address dental health problems and related issues in the aged population in India. The study aims to understand the prevalence of dental health problems and their health-seeking behaviour among older adults in India. Further, the study determines the factors associated with low access and under-coverage of dental health care services among the elderly populations in India

Methods: The present research used data from Building a Knowledge Base on Population Aging in India (BKPAI) which was a national level survey and was conducted in 2011, across seven states of India. The effective sample size of this study was 9541 older adults aged 60+ years. Descriptive statistics and bivariate analysis were used to fulfill the study objectives. Additionally, the study employed the Heckprobit selection model which is a two-equation model to understand the determinants of dental health problems.

Results: Older adults in the age group of 70-79 years (36.9%) and 80+ years (51.9%) reported higher dental problems compared to 60-69 years (19.9%), older women reported more dental problems (29.2%) and also used more dental aids (12.6%) compared to older men. Older adults in the age group 70-79 and 80+ years were 0.15 times and 0.40 times less likely to use dental aids respectively, as compared to 60-69 years older adults. Moreover, older women were 0.28 times more likely to use dental aids than older men. Education and wealth of older adults have a negative relationship with dental problems.

Conclusion: This study clearly emphasized that awareness of smoking-related health problems should be promoted vigorously. Further, a holistic approach is needed to prevent dental diseases that occur because of other co-morbidities. For that, integration of the oral health program with programs dealing with morbidities can act as a solution to the existing problem.

Background

According to the World Health Organization, "Oral health is a key indicator of overall health, well-being, and quality of life. It encompasses a range of diseases and conditions that include dental caries, periodontal disease, tooth loss, oral cancer, oral manifestations of HIV infection, oro-dental trauma, noma, and birth defects such as cleft lip and palate" (46). Nevertheless, growing untreated morbidities among the elderly populations on geriatric issues especially an optimal dental treatment is an unfinished agenda and a long-neglected area for care and management in many low and middle-income countries(1–3). Further, the increasing burden of oral health and dental-related disability in many developing countries has created global attention; however, still, no effective and preventive measures have been placed to

cope up with unprecedented morbidity and mortality related to it(4). By 2025, the United Nations estimation shows that approximately 1200 million people aged 65 years across the world will suffer from oral health care and related problems (2). In the case of the elderly population, the untreated oral and dental problems put more seriousness and hazardous circumstances to them. There is a continuous rise in the older population in India. For instance, the overall aged population rose from 5.6 percent in 1961 to 8.6 percent in the 2011 census and it is also expected to rise to 20 percent in 2050 (5). At the same time, the rising of co-morbidities or multi-morbidities in the aging population creates catastrophic challenges at the individuals, household, community, and country levels(5–7).

Geriatric morbidities and related disabilities have been continuously witnessing a serious global concern. In developing countries like India the situation is even more challenging where the high prevalence of chronic diseases and associated disabilities have not been adequately addressed among the older adults and where they also face high inequality in treatment coverage (5, 7). Similarly, the lack of oral and dental health care practices among older adults and its partial or no treatment-seeking-behaviour has been seen imperative especially in the Indian context, and that deeply affects the systemic health of aged individuals (8–11). Further, there is a positive relationship between chronic and infectious diseases with oral health and dental problems (4). Therefore, it is required to understand the present oral health concern with the public health approach among the aged populations in India, where this sub-population-group faces uncaring, low supportive care by own family members, and entirely depend on the institutions (12).

Furthermore, the most deprived groups (older adults) suffer unprecedented socio-economic, psychological, and uncaring vulnerability in oral health care services. Emerging challenges on this can be burdensome, when this population is associated with a greater prevalence of chronic diseases and disability. Although oral and dental health problems are more persistent and widespread among older adult people and it has become devastating in low and middle-income countries, including India (4, 8–10, 13, 14). Lack of awareness on dental health and poor health care access, dental health conspire to the older adults in the more crucial conditions. Further, deteriorated oral health among older adults may also lead to several risk factors such as frailty conditions, high prevalence of missing teeth, poor bridge, and ill-fitting dentures (15–17). Due to the continuous loss of teeth and ill-fitting dentures can produce several other health problems and also reduce a person's quality of life (9, 18–20). Increasing the risk of tooth decay among the aged population has decreased the enjoyment of food and nutritional quality and quantity (10, 21–23). The ill-fitting dentures among the population can lead to difficulty in food chewing and associated disadvantaged (24). In addition, smoking, drinking, and other substance use among older persons are also quite high that causes tooth decaying and other related oral problems (25).

Though it is a preventable disease with proper awareness, education, and management support from the government, however, a lack of adequate health policy intervention by the institutions has led to immense oral health problems among the older adult populations (14). There is evidence that shows limited and poor dental health care access to the elderly population has put at the risk for other systemic chronic and infectious diseases (3, 19). Geriatric health problems, especially oral and dental-related health care issues are very common and highly persisting amongst disadvantaged and vulnerable groups (26–30). Poor

strata of the community face unprecedented problems in accessing oral health care services and those who reside in rural areas are more vulnerable. Although it significantly varies in the prevalence of tooth loss across different socio-economic groups, age-sex, and rural-urban, however, the high prevalence rate is seen among the male elderly from the poor socio-economic strata (9, 11–13, 27, 29). Dental diseases are a significant public health menace having a substantial impact on the quality of life (20, 22). Therefore, effective and preventive care management on oral and dental health needs to be in place by ensuring every individual to quality oral health care at an affordable cost.

There may be several barriers to access to dental services and it is perceived as physical incapacity or disability, travel problems or immobile activity, lack of knowledge of dental services, and also non-availability of dental services in the low resource settings areas(2, 12, 17, 31). Further, lack of family support, caregivers, and social services creates the mismanagement of treatment among the elderly (9, 13, 32). That produces vast disparities in oral health status and healthcare-seeking behaviour across rural-urban (6, 8, 12, 14, 17). The living arrangement of the elderly has also made an influence on oral and dental health conditions. In this way, the low coverage of oral and dental care in older adults is evident in high levels of tooth loss, dental caries experience, and the prevalence rates of periodontal disease, xerostomia, and oral precancer/cancer (1, 4). Lack of regular check-up, screening, diagnosis, and treatment-related to dental care services among the older adults that have led to elevated risks for future health and dental caries.

In the low access to dental care services among the elderly population gives nuance to the policy interventions (14). Further, lack of financial support, aid, or third party payment make them also low access to oral health care and unaffordable (3, 33, 34). The high demand for dentures among the elderly population creates a dilemma especially to the lower socio-economic groups people who even cannot afford it. Concerning this, a high variation is seen across rural-urban, gender, and socio-economic groups (1, 11, 29). However, still, many developing countries are lacking such policies on oral health that can embark on several associated health problems among the older populations (2, 4, 35). And, therefore this study relies on, what are the prevailing determinants that influence in not seeking dental health care services among the older adults in India. Though very few studies on oral and dental health problems have addressed in India, however, still, a dearth of knowledge on aged person's oral and dental health treatment-seeking behaviour and its mechanism has remained in the literature. Therefore, the present study is an attempt to understand the prevalence of oral and dental health-related problems and health-seeking behaviour among the older adults in India. Further, it also aims to understand the factors that determine low access and under-coverage of dental health care services among the older adults in India.

Methods

The present research used data from Building a Knowledge Base on Population Aging in India (BKPAI) which was a national level survey and was conducted in 2011, across seven states of India. The survey was sponsored by the Institute for social and economic change (ISEC), Tata Institute for social sciences (TISS), Institute for economic growth (IEG), and UNFPA, New Delhi. The survey gathered information on

various socio-economic and health aspects of ageing among households of those aged 60 years and above. Seven major regionally representative states were selected for the survey with the highest 60 + years population than the national average. This survey was carried out on a representative sample in the northern, western, eastern, and southern parts of India following a random sampling process.

The primary sampling unit (PSU) was villages for rural areas and urban wards in urban areas. The sample of 1280 elderly households was fixed for each state. Further details on the sampling procedure, the sample size is available in national and state reports of BKPAI, 2011 (36). For the current study, the effective sample size was of 9541 older adults residing in seven states aged 60 + years were selected.

Outcome variables

There were two outcome variables used in the present study. First, whether older adults were having any difficulty in teeth (chewing)? Secondly, whether older adults use dentures as an aid?

Predictor variables

The explanatory variables were categorized as per the literature cited in the introduction section. Smoking tobacco (no or yes), chewing tobacco (no or yes), alcohol consumption (no or yes), diabetes (no or yes), hypertension (no or yes). Age (60–69, 70–79 and 80+), gender (men and women), marital status (not in a union and currently in a union), education (none, below five years, 6–10 years and 11 + years), working status (no, yes and retired), economic independence (independent, pension and dependent), living arrangement (alone, with a spouse, with children and others), wealth (poor, middle and rich), religion (Hindu, Muslim, Sikh, and others), caste (scheduled caste/scheduled tribe (SC/ST) and non-SC/ST), residence (rural and urban) and states (Himachal Pradesh, Punjab, West Bengal, Orissa, Maharashtra, Kerala, and Tamil Nadu).

Statistical analysis

Descriptive statistics and bivariate analysis were used to perform preliminary analysis. Additionally, the study employed the Heckprobit selection model which is a two-equation model. First, there is a selection model (in this study, referring to “Do you have any of the difficulty in teeth (chewing)? (yes or no)”). Secondly, there is an outcome model with a binary outcome (in this study refers to “Do you use denture as an aid? (yes or no)”). The model provides a two-step analysis and deals with the zero-sample issue, based on that, it can also accommodate the heterogeneity (i.e., shared unobserved factors) between older adults and then address the endogeneity (between difficulties in teeth (chewing) and opting for denture as an aid) for older adults in India. The Heckman model is identified when the same independent variables in the selection equation appear in the outcome equation. However, this does not provide precise estimates in the outcome equation because of high multicollinearity; it was suggested to have at least one independent variable that appears in the selection equation and not in the outcome equation. A p-value of less than 0.05 was considered statistically significant (37).

Results

The sample distribution of the study population is shown in Table 1. And it was found that nearly fifteen percent of older adults smoke, 21.6% chewing tobacco, and 7.6% consumed the alcohol. Further, around 10% and 21% of older adults were suffering from diabetes and hypertension respectively. The majority of older adults belonged to 60–69 years age group and 52.6% were women. Half of the older adults were illiterate and more than half of older adults were not working. Nearly, half of the older adult's economic independence was on dependent pension, and in the case of living arrangements, 70.4% of older adults were living with their children. A higher proportion of older adults were Non-SC/ST (74%) and mostly belonged to rural areas (74%).

Table 1
Sample distribution of study population, India

Background characteristics	N	%
Smoking tobacco		
No	8,085	84.7
Yes	1,456	15.3
Chewing tobacco		
No	7,481	78.4
Yes	2,060	21.6
Alcohol consumption		
No	8,814	92.4
Yes	727	7.6
Diabetes		
No	8,570	89.8
Yes	971	10.2
Hypertension		
No	7,520	78.8
Yes	2,021	21.2
Age (years)		
60-69	5,891	61.8
70-79	2,613	27.4
80+	1,036	10.9
Gender		
Men	4,526	47.4
Women	5,015	52.6
Marital Status		
Not in Union	3,758	39.4
Currently in Union	5,783	60.6
Education		
None	4,870	51.1

Below 5 years	1,955	20.5
6-10 years	2,137	22.4
11+ years	578	6.1
Working status		
No	6,421	67.3
Yes	2,310	24.2
Retired	810	8.5
Economic Independence		
Independent	2,178	22.8
Pension	2,772	29.1
Dependent Pension	4,591	48.1
Living arrangement		
Alone	561	5.9
With spouse	1523	16.0
With children	6717	70.4
Others	740	7.8
Wealth Status		
Poor	4,367	45.8
Middle	1,969	20.6
Rich	3,204	33.6
Religion		
Hindu	7,572	79.4
Muslim	671	7.0
Sikh	898	9.4
Others	400	4.2
Caste		
SC/ST	2,510	26.3
Non-SC/ST	7,031	73.7
Residence		

Rural	7,044	73.8
Urban	2,497	26.2
State		
Himachal Pradesh	1,470	15.4
Punjab	1,354	14.2
West Bengal	1,127	11.8
Orissa	1,453	15.2
Maharashtra	1,379	14.5
Kerala	1,356	14.2
Tamil Nadu	1,403	14.7

Note: N: Sample; %: Percentage; SC/ST: Scheduled caste/scheduled tribe

Table 2

Bivariate association between background characteristics and dental problems along with aid seeking behaviour among older adults in India.

Background characteristics	Teeth disability (%)	Teeth Aid (%)
	(N=9541)	(N=2584)
Smoking tobacco		
No	27.5	-
Yes	31.4	-
Chewing tobacco		
No	27.6	-
Yes	29.9	-
Alcohol consumption		
No	28.0	-
Yes	29.2	-
Diabetes		
No	28.0	-
Yes	28.2	-
Hypertension		
No	26.2	-
Yes	34.9	-
Age (years)		
60-69	19.9	13.1
70-79	36.9	11.4
80+	51.9	8.1
Gender		
Men	26.8	10.1
Women	29.2	12.6
Marital Status		
Not in Union	32.5	10.6
Currently in Union	25.2	12.2

Education		
None	33.4	7.9
Below 5 years	27.1	11.7
6-10 years	19.8	22.3
11+ years	16.8	22.7
Working status		
No	31.7	10.6
Yes	20.8	11.2
Retired	19.6	23.9
Economic Independence		
Independent	20.2	11.7
Pension	36.4	11.7
Dependent Pension	26.8	11.2
Living arrangement		
Alone	24.1	10.9
With spouse	22.2	10.0
With children	29.2	11.8
Others	32.4	10.8
Wealth Status		
Poor	29.3	2.9
Middle	28.1	11.2
Rich	26.3	24.7
Religion		
Hindu	27.2	10.2
Muslim	21.1	10.0
Sikh	44.0	15.7
Others	20.3	24.7
Caste		
SC/ST	29.9	6.5

Non-SC/ST	27.4	13.4
Residence		
Rural	30.7	10.4
Urban	20.6	16.0
State		
Himachal Pradesh	32.7	22.1
Punjab	43.8	18.1
West Bengal	38.7	4.7
Orissa	41.6	0.4
Maharashtra	12.2	7.7
Kerala	18.5	18.9
Tamil Nadu	10.2	7.1
Total	28.1	11.5

?: Percentage; SC/ST: Scheduled caste/scheduled tribe

Association of teeth problem and their treatment-seeking behavior by background characteristics are shown in *Table 2*. Older adults those who smoke (31.4%), chewing tobacco (29.9%) and consumed alcohol (29.2%) had a higher prevalence of dental problem than those were not. Increasing the age within the elderly population has a positive association with dental problem. Older adults in the age groups of 70–79 years (36.9%) and 80+ years (51.9%) reported higher dental problems compared to 60–69 years (19.9%) age group. However, older adults with the age group of 60–69 years used more dental aids (13.1%) than other age groups. Interestingly, women reported more dental problems (29.2%) and also used dental aids (12.6%) compared to men. Education and wealth of older adults have a negative relationship with dental problems. Moreover, this relationship was reversed for dental aids of dental problems. For instance, older adults with no education (33.4%) and belonged to poor categories (29.3%) reported a higher prevalence of dental problems compared to their counterparts. On the other hand, more educated (22.7%) and rich older adults (24.7%) used more dental aids for dental problems. The prevalence of dental problems was higher among not working (31.7%) older adults compared to working or retired older adults, though, the use of dental aid was more among retired older adults (23.9%). Dental problem was more prevalent among SC/ST and rural older adults. While Non-SC/ST and urban older adults used more dental aids than SC/ST and rural counterparts. In addition, dental problem was higher in Punjab followed by Orissa and West Bengal. However, the use of dental aids was more in Himachal Pradesh (22.1%) followed by Kerala (18.9%).

The results from the Heckprobit model for reporting of dental problem and sequential decision making to use of dental aids are presented in Table 3. Older adults those who smoke were 0.31 times more likely to suffer from dental problem compared to those who did not smoke. In addition, older adults suffering from diabetes and hypertension were 0.14 times and 0.21 times more likely to face dental problems respectively, compared to their counterparts.

Table 3
Heckprobit model for dental problem and the use of dental aids among older adults in India

Background characteristics	Outcome equation (dental problem)	Selection equation (Dental aid)
Smoking tobacco		
No	Ref.	
Yes	0.31*(0.22,0.41)	
Chewing tobacco		
No	Ref.	
Yes	0.04(-0.04,0.11)	
Alcohol consumption		
No	Ref.	
Yes	0.07(-0.06,0.19)	
Diabetes		
No	Ref.	
Yes	0.14*(0.04,0.23)	
Hypertension		
No	Ref.	
Yes	0.21*(0.13,0.28)	
Age (years)		
60–69	Ref.	Ref.
70–79	0.41*(0.34,0.48)	-0.15(-0.36,0.05)
80+	0.8*(0.7,0.9)	-0.4*(-0.71,-0.09)
Gender		
Men	Ref.	Ref.
Women	0(-0.08,0.08)	0.28*(0.1,0.45)
Marital Status		
Not in Union	Ref.	Ref.

Note: Ref: Reference; *if $p < 0.05$; SC/ST: Scheduled caste/scheduled tribe

Background characteristics	Outcome equation (dental problem)	Selection equation (Dental aid)
Currently in Union	-0.08*(-0.16,-0.01)	0.09(-0.07,0.26)
Education		
None	Ref.	Ref.
Below 5 years	-0.07(-0.15,0.02)	0.27*(0.08,0.47)
6–10 years	-0.14*(-0.23,-0.05)	0.42*(0.23,0.62)
11 + years	-0.23*(-0.37,-0.09)	0.35*(0.06,0.65)
Working status		
No	Ref.	Ref.
Yes	-0.18*(-0.28,-0.08)	0.15(-0.11,0.4)
Retired	-0.22*(-0.34,-0.09)	0.34*(0.08,0.6)
Economic Independence		
Independent	Ref.	Ref.
Pension	0.18*(0.07,0.28)	-0.12(-0.37,0.12)
Dependent Pension	0.05(-0.06,0.16)	-0.02(-0.26,0.23)
Living arrangement		
Alone	Ref.	Ref.
With spouse	-0.18*(-0.34,-0.03)	0.14(-0.23,0.52)
With children	-0.1(-0.23,0.04)	-0.06(-0.38,0.27)
Others	-0.06(-0.22,0.1)	-0.11(-0.48,0.27)
Wealth Status		
Poor	Ref.	Ref.
Middle	-0.02(-0.11,0.07)	0.41*(0.17,0.66)
Rich	-0.07(-0.16,0.02)	0.77*(0.5,1.03)
Religion		
Hindu	Ref.	Ref.
Muslim	-0.03(-0.16,0.1)	-0.09(-0.41,0.23)

Note: Ref: Reference; *if $p < 0.05$; SC/ST: Scheduled caste/scheduled tribe

Background characteristics	Outcome equation (dental problem)	Selection equation (Dental aid)
Sikh	-0.03(-0.16,0.11)	-0.17(-0.4,0.07)
Others	0.11(-0.05,0.27)	0.08(-0.27,0.44)
Caste		
SC/ST	Ref.	Ref.
Non-SC/ST	0.11*(0.04,0.18)	0.07(-0.12,0.26)
Residence		
Rural	Ref.	Ref.
Urban	-0.1*(-0.16,-0.03)	0.14(-0.01,0.28)
State		
Himachal Pradesh	Ref.	Ref.
Punjab	0.3*(0.18,0.43)	-0.28*(-0.5,-0.06)
West Bengal	0.17*(0.06,0.28)	-0.9*(-1.16,-0.64)
Orissa	0.26*(0.15,0.37)	-1.55*(-1.94,-1.15)
Maharashtra	-0.69*(-0.81,-0.57)	-0.27(-0.76,0.22)
Kerala	-0.61*(-0.74,-0.49)	-0.31(-0.7,0.08)
Tamil Nadu	-0.73*(-0.86,-0.61)	-0.36(-0.91,0.19)
/athrho	-0.50*(-1.1,-0.23)	
rho	-0.46*(-0.8,0.09)	
Wald chi2	339.4*	
Censored observation	6,957	
Uncensored Observation	2,584	
Note: Ref: Reference; *if p < 0.05; SC/ST: Scheduled caste/scheduled tribe		

Older adults in the age group 70–79 and 80 + years were 0.15 times and 0.40 times less likely to use dental aids respectively, compared to 60–69 years older adults. Moreover, women were 0.28 times more likely to use dental aids than men. In reference to the illiterate category, older adults with below 5 years of education, 6–10 years, and 11 + years of education were 0.27 times, 0.42 times, and 0.35 times more likely to use dental aids respectively. In addition, older adults belonged to middle and rich categories were 0.41 times and 0.77 times more likely to use dental aids compared to poor counterparts. In comparison to

Himachal Pradesh, Punjab (0.28 times), West Bengal (0.90 times), Orissa (1.55 times), Maharashtra (0.27 times), Kerala (0.31 times) and Tamil Nadu (0.36 times) were less likely to use dental aids.

Discussion

Our research aimed to investigate the dental health problems of older adults and their associated treatment-seeking behavior. The bivariate associations revealed that 28.1% of older adults in India are having a dental disability and 11.5% sought help in that context. The Heckprobit model illustrated the determinants of the use of dental aids among older adults in India. The results indicated that more women than men used dental aids. Also, with an increase in educational level and wealth index, the use of dental aids increased.

Among the three types of substance use, smoking tobacco is found to be a positive significant determinant of dental disability. The results were similar to a study by Rohini, Sherlin & Jayaraj, (38). The authors by conducting a descriptive pro-forma-based study on elderly patients in the age group 55–90 years in Chennai, Tamil Nadu, found out that the prevalence of oral habits related lesions was more among patients exposed to tobacco-related products. The study results indicated that any kind of substance use like chewing or smoking tobacco and consumption of alcohol by the elderly to have a detrimental effect on dental health. Though not restricted to the age group of 60 years and above, a study on 16 to 75 years individuals found that consumption of smoking and smokeless tobacco was a risk factor for increased dental cavity and it was higher in smokers as compared to smokeless tobacco chewers (39).

Elderly suffering from morbidities like diabetes and hypertension were found to be having more dental problems compared to those not reporting the disease. Studies exploring the association of diabetes with dental care emphasized oral health assessment (26, 40). A study by Kudpi et al., (44) on 211 elderly patients revealed that most of the patients with tooth loss were diabetic and hypertensive. However, there was no statistically significant difference between tooth loss and the presence of diabetes or hypertension or both. In this case, our study made a significant contribution to the literature by providing a significant difference between the groups.

Determinants of use of teeth aids among the elderly were gender, age, education, and wealth index. Though we did not find any studies dealing with the socio-economic and demographic predictors of use of teeth aid among elderly in particular, a study by Mack et al., (28) exploring the same association in the age group 55 to 79 years showed old age, low education level, low income, smoking, and alcohol abuse significantly associated with the use of a complete denture. However, our results contradict this and indicate that with a rise in educational level and wealth index, the use of dentures as an aid increase. The probable reasons why individuals with low education and income are less likely to use dentures as an aid range from focusing on basic issues of food, shelter, and cloth to keeping oral health as a less priority issue (41).

According to the data from the National Oral Health Survey of India (2002-03), the prevalence of periodontal diseases is 57.0%, 67.7%, 89.6% and 79.9% in the age groups 12, 15, 35–44 and 65–74 years, respectively (42). Further, in the age range of 65–74 years, 19% in India are toothless (35). With an ever-increasing 60 plus population in India, this data further necessitates the study on the dental health of the elderly to be taken up in a systematic manner. Although the National Oral Health Program of the Ministry of Health and Family Welfare, Government of India is designed for an affordable, accessible and equitable oral health care to bring about “optimal oral health” for all by 2020, one should not forget that most of the elderly are economically dependent either on pension or on somebody else. This dependence hinders one to be hesitant to take proper dental care. Therefore, we strongly support that the dental policies target the elderly population in general and dependent elderly population in specific.

Generally, oral or dental health is not given the attention it needs. A common practice among people, irrespective of age group is to go for a dental checkup only if there is a toothache. However, the elderly are more vulnerable to tooth loss or oral disease because changes occur with aging (43), hence making it a major concern. For instance, oral and dental health is positively linked to chronic and infectious diseases (4). In a country like India where the elderly population is increasing, lack of adequate data on oral and dental health and hygiene practices is a barrier to achieve good oral and dental health. Infact, one of the study limitations is the non-availability of questions on dental hygiene habits, eating habits, and self-perceived oral health. But, the strength of our study lies in the exploration of the socio-economic and demographic characteristics of older adults with chewing problems and with no teeth aid.

Conclusion

The three major themes of our analysis are, first, smoking is injurious to one’s dental health. Second, morbidities like diabetes and hypertension are key risk factors of teeth disability. Third, adverse socio-economic conditions prevent the elderly to access tooth aid in the form of using dentures. From the above pieces of evidence, it is clear that awareness of smoking-related health problems should be promoted vigorously. A holistic approach is needed to prevent oral disease to occur because of other morbidities. For that, integration of the oral health program with other programs dealing with morbidities can act as a solution to the existing problem. Though under the National Oral Health Program (45), free dentures are given to elders above 65 years, still a large number of economically dependent elderly are without any aid.

Declarations

Ethics approval and consent to participate:

The data is freely available in public domain and survey agencies that conducted the field survey for the data collection have collected prior consent from the respondent. The local ethics committee of the Institute for Social and Economic Change (ISEC), Bengaluru, ruled that no formal ethics approval was required to carry out research from this data source.

Consent for publication:

Not applicable

Availability of data and materials:

The study utilizes a secondary source of data that is freely available in the public domain. And, it can be available by a request through <http://www.isec.ac.in/prc.html#>

Competing Interests:

The authors declare that they have no competing interests.

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Author's Contribution:

The concept was drafted by SS; SS, PK contributed to the analysis design; SS, PK, PSM, and DS advised on the paper and assisted in paper conceptualization; PSM, PK, DS, and SS contributed in the comprehensive writing of the article. All authors read and approved the final manuscript.

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Not applicable

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