Original Article - Prospective Study

# Assessment of Oral Health Status, Care Seeking Behaviours, and Oral Health-Related Quality of Life among Indian Adults Using the World Dental Federation's Digital Application


## Abstract

**Context:** A survey was conducted in line with the World Dental Federation's (FDI) vision for comprehensive, evidence-based oral healthcare by 2030. The study aims to collect standardised national data on the population's oral health needs, care-seeking behaviours, and oral health-related quality of life. **Materials and Methods:** This analytical cross-sectional survey included dentists from urban and rural India and the patients visiting their facilities. The data were collected using the digital application developed by the FDI as a part of the Oral Health Observatory (OHO) project between December 2018 and April 2020 among patients seeking care at private oral healthcare practices. Descriptive statistics, Chi-square tests, and Mann–Whitney U tests were performed to analyse the study data using SPSS software. **Results:** Data of 1049 patients (61.01% males, 38.98% females, mean age 38.6 ± 12.1 years) were collected using the OHO app on their oral health-seeking behaviour and habits. Over 80% of the patients had periodontal disease. About 51.5% visited a dentist in the past year, with common barriers being the belief that there was nothing wrong with their teeth and the time constraints. High rates of daily sugar consumption (67%) and tobacco use (35%) were noted. Most dentists focused on curative over preventive care. **Conclusions:** This survey provides essential data on India's oral health and forms an important first step in the quest of achieving universal health coverage for oral health by facilitating advocacy and aligning with FDI Vision 2030.


**Keywords:** *Oral health, practice-based research, practice patterns, surveillance*


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## Introduction

Oral diseases, including dental caries, periodontal disease, tooth loss, and oral cancers, are highly prevalent and burdensome, affecting 3.5 billion people globally, predominantly in middle-income countries. The Global Oral Health Status Report, 2022, of the World Health Organization acknowledges that global oral health is an area of significant concern and highlights the need for immediate attention.[1] In India, the annual dental expenditure per person was estimated to be less than 1$ which is among the least dental expenditures in the world despite the huge oral disease burden with an untreated caries prevalence of >40% and >30% in the deciduous and permanent dentition, respectively.[2] India's first epidemiological oral health survey conducted by the Dental Council of India in 2002-03,[3] and multicentric oral health survey by the Ministry of Health and Family Welfare in collaboration with AIIMS in 2005[4] provided valuable insights into the nation's oral health status. However, since then, there has been no national-level oral health surveillance. The existing surveillance system is fragmented and inadequate, characterised by sporadic and nonstandardized data collection, making it difficult to obtain an accurate picture of the nation's oral health status. Most available studies are either loco-regional or hospital-based, lacking comprehensive evidence on the epidemiology of dental diseases affecting the entire population.[5]

Collecting standardised data and establishing surveillance systems in oral health are crucial in the course of mustering evidence that warrants political action towards strengthening the oral healthcare delivery.[6] These systems provide vital insights into the prevalence, distribution,



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and trends of oral diseases and enable tailored interventions and efficient resource allocation, especially when the impact of poor oral health status on the general wellbeing and quality of life of the people is duly prioritised. Committed to ensuring universal oral healthcare, the World Dental Federation (FDI) aims for comprehensive, evidence-based oral healthcare by 2030, advocating for the development of national oral health indicators which could readily be integrated into the annual surveys.[7]

In 2014, the FDI launched the Oral Health Observatory (OHO) initiative to enhance global oral health data collection and analysis.[8] At the national level in India, the Indian Dental Association (IDA) collaborated with the FDI to strengthen oral health surveillance. With this background, the objective of this study was to collect standardised oral health data at the national level, using the FDI's OHO digital application, that facilitate global comparisons and to evaluate the dentition and periodontal status of the patients visiting private dental practitioners with adjunct emphasis on care seeking behaviours and oral health-related quality of life.

## Materials and Methods

This analytical cross-sectional survey adopted the FDI's OHO digital application to collect the data which warrants patient interview and clinical oral examination. The target respondents for this survey were private practice dentists from urban and rural areas in India, with the IDA membership list being the sampling frame. Nonprobability convenience sampling was used to recruit private practices into the survey, and each of the participating dentists were asked to include into the survey sample the first patient seen on Monday, the second on Tuesday, the third on Wednesday, and so on. Willing participants were then interviewed about their dental visits, lifestyle habits, and quality of life along with clinical oral examination. Both dentists and patients who were unwilling to participate were excluded from the study. The study has been approved by the Institutional Ethics Committee of Sibar Institute of Dental Sciences, Guntur (Ref No. 131/IEC-SIBAR/CIR/18).

The task team, including FDI Vision 2020 experts, developed a schedule in an iterative manner, involving 3 rounds of consensus building sessions, based on the FDI Oral health definition [Supplementary Figure 1]. The schedule was assessed in India by a group of experts for its content validity and cultural relevance after which the schedule was integrated into the OHO app. Access to the app was given to the participating dentists who underwent a training session to clearly delineate the survey objectives and to facilitate standardisation of data collection procedure across the country. Dentists were then trained to utilise the OHO app to record answers. Data were collected from 1049 patients over a period of seventeen months from December 2018 to April 2020. The questionnaire on the app had two components. The first component was Dental Practice Questionnaire, where dentists answered questions about oral health-seeking behaviour and services delivery, characteristics of services rendered at dental clinics and practice trends. The second component was the Patient Questionnaire, where dentists collected data from patients regarding their dental visit patterns, oral hygiene habits, and every day impacts. The questions on every day impacts were administered using a 5-point Likert scale (0-4) with 4 indicating the highest impact. Data on the clinical oral health status of the patients were followed up with a detailed clinical examination based on the WHO oral health assessment form, 2013. All the patients received a participant information sheet, and informed consent was obtained before data collection. The data collected by the dentists were stored on the FDI's server, accessible only to the Indian Dental Association. By consensus, the data were designated solely for research, not for commercial use. Descriptive statistics, Chi-square tests, and Mann–Whitney U tests were done to analyse the survey data using IBM SPSS version 20 software (IBM Corp., Armonk, NY, USA).

## Results

Of the 1,049 participants in this survey, 61.01% (n = 640) were males and 38.98% (n = 409) were females. The majority of the participants, 468 (44.6%), had completed postsecondary education, while nearly 231 (22%) had no formal education. Participants had a mean of 3.69 ± 1.92 missing teeth, 2.58 ± 1.46 decayed teeth, and 1.8 ± 1.01 filled teeth. Over 45% had periodontal disease, with gingivitis being the most common problem. About 51.5% of participants visited a dentist in the past 12 months, while 8.1% had never visited a dentist. Recent dental visits showed no significant association with age [Table 1] but had an inverse relation with education. Common reasons for not visiting were being busy and believing their teeth were fine [Supplementary Figure 2]. The travel time to a dentist for nearly 80% of the participants was less than an hour, and almost 90% could get an appointment within 24 hours.

About 94.9% reported brushing their teeth at least once daily, consistent across age groups. 67% consumed refined sugar daily or more frequently, with over 80% in the 18–24 age groups. Sugary food intake frequency was lower in the 35–54 age groups, but no age-related difference was found in the frequency of sugary drink consumption [Table 2].

Slightly over 35% of participants consumed tobacco, peaking in the 45–54 age group and gradually decreased from there [Table 3]. Most subjects reported starting tobacco use between the ages of 20 and 25. Chewing tobacco was common among the 18–24 and 25–34 age groups. Nearly all dentists reported offering direct advice on quitting tobacco, and 33% indicated they would refer patients to cessation centres.

In the past 12 months, 432 participants (41.2%) experienced mouth, teeth, or denture discomfort; 36% had difficulty eating, and 33.7% experienced pain [Supplementary

Figure 3]. Females reported significantly more pain than males, with no significant gender differences in other oral impact areas [Table 4]. Over 47% rated their oral health as very good or good, while 17.4% rated it as poor or very poor. Poor oral health ratings increased with age. Most dentists who participated in this survey project revealed that they spent over 50% of their time on curative care and less than 10% on preventive care. 51% used dental amalgam for restorations, while 59% were unaware of the guidelines on restricting amalgam usage as stated in the UN Minamata Convention on mercury.

## Discussion

The Oral Health Observatory project by the FDI was envisioned to collect standardised data on oral health across the globe.[8] The project aims to provide a comprehensive overview of oral health at local and global levels. The broader goal is to gather empirical evidence from various nations to advocate for prioritising oral health in the global healthcare agenda, especially in light of the negative influence poor oral health has on the general wellbeing. The Indian survey that was conducted in alignment with the FDI OHO project reaffirms the compromised oral health status and the poor care seeking behaviours in the country.[9] The fact that the survey was conducted among subjects seeking care at an oral healthcare facility underscores that the overall national profile could possibly be more inferior. The mean filled component being five times lesser than the combined decayed and missing components and the high prevalence of periodontal disease indicates the need for improving oral healthcare seeking behaviours. The literature suggests that dental caries and periodontal disease profoundly impact quality of life with symptoms like bleeding gums, tooth mobility, bad breath, and toothache, disrupting daily activities and well-being.[10] The impact poor oral health has on quality of life, and day to day living was clearly evident from the study findings with more than 40% of the participants reporting discomfort and a slightly lesser percentage reporting difficulty in eating because of oral health concerns. One of the fundamental benefits in integrating the questions on everyday impacts of oral health in the survey is that evidence generated from them readily aligns with the broader objective of advocating with policy makers that this is an area that poses significant burden on the quality of life of the nation's populace.

**Table 1: Association between age group and dental visiting patterns**

| Age group | Previous dental visit | | *P* |
|---|---|---|---|
| | Within the past 12 months *n* (%) | Not within the past 12 months *n* (%) | |
| 18-24 years | 60 (58.25) | 43 (41.75) | 0.067 |
| 25-34 years | 188 (48.96) | 196 (51.04) | |
| 35-44 years | 157 (54.9) | 129 (45.1) | |
| 45-54 years | 80 (51.95) | 74 (48.05) | |
| 55-64 years | 46 (48.42) | 49 (51.58) | |
| ≥65 years | 9 (33.33) | 18 (66.67) | |

*Chi-square test; $P \leq 0.05$ considered statistically significant

**Table 2: Association between age group and oral health behaviours**

| | Tooth brushing frequency | | |
|---|---|---|---|
| Age group | ≥ Once a day *n* (%) | < Once a day *n* (%) | *P* |
| 18-24 years | 93 (90.3) | 10 (9.7) | 0.161 |
| 25-34 years | 369 (96.09) | 15 (3.91) | |
| 35-44 years | 275 (96.15) | 11 (3.85) | |
| 45-54 years | 142 (92.2) | 12 (7.8) | |
| 55-64 years | 91 (95.79) | 4 (4.21) | |
| ≥65 years | 24 (88.89) | 3 (11.11) | |
| Sugary food consumption | | | |
| 18-24 years | 78 (75.73) | 25 (24.27) | 0.019† |
| 25-34 years | 269 (70.05) | 115 (29.95) | |
| 35-44 years | 172 (60.13) | 114 (39.87) | |
| 45-54 years | 89 (57.79) | 65 (42.21) | |
| 55-64 years | 63 (66.31) | 32 (33.69) | |
| ≥65 years | 19 (70.37) | 8 (29.63) | |
| Sugary drink consumption | | | |
| 18-24 years | 84 (81.55) | 19 (18.45) | 0.585 |
| 25-34 years | 307 (79.95) | 77 (20.05) | |
| 35-44 years | 215 (75.14) | 72 (24.86) | |
| 45-54 years | 120 (77.92) | 34 (22.08) | |
| 55-64 years | 72 (75.79) | 23 (24.21) | |
| ≥65 years | 22 (81.48) | 5 (18.52) | |

*Chi square test; $P \leq 0.05$ considered statistically significant; †denotes significance

The observations made from our study reflected that female participants experienced significantly higher levels of pain from poor periodontal conditions. A study in another developing country[11] revealed that social and cultural factors lead to different perceptions of pain and oral well-being between genders, with women more often experiencing chewing impairment. This highlights the need to probe into the influence that systemic hormonal factors might have on oral health. There is a direct correlation between dental attendance and better oral health.[12] In our study, over half of the participants visited the clinic within the past year. Specifically, 45% visited for regular check-ups, with younger participants more likely to do so than older ones. Similar trends[13] have been observed in different subsets of the population and are independent of the socioeconomic profile of the country.

India faces a significant challenge with the highest global rates of oral cancer, affecting 12% of men and 8% of women, mainly due to tobacco products like pan masala, gutka, and cigarettes.[14] In our study, over 35% of participants had tobacco habits, often starting between ages 20–25, aligning with NSS findings[15] of initiation between ages 15–24. Tobacco's detrimental effects extend beyond oral cancer, contributing to heart and lung diseases. Early

**Table 3: Association between age group and the habit of tobacco consumption**

| Age group | Habit of tobacco consumption | | *P* |
|---|---|---|---|
| | Yes *n* (%) | No *n* (%) | |
| 18-24 years | 23 (22.33) | 80 (77.67) | <0.001† |
| 25-34 years | 138 (35.94) | 246 (64.06) | |
| 35-44 years | 126 (44.06) | 160 (55.94) | |
| 45-54 years | 74 (48.05) | 80 (51.95) | |
| 55-64 years | 42 (44.21) | 53 (55.79) | |
| ≥65 years | 9 (33.33) | 18 (66.67) | |

*Chi square test; $P \leq 0.05$ considered statistically significant; †denotes significance

**Table 4: Differences in domain-wise mean oral impact scores in the past 12 months based on gender**

| Domain | Gender | Mean±SD | Mean rank | *P* |
|---|---|---|---|---|
| Discomfort | Male | 0.95±1.305 | 509.42 | 0.091 |
| | Female | 1.12±1.53 | 540.58 | |
| Pain | Male | 0.875±1.43 | 499.16 | <0.036† |
| | Female | 1.2±1.64 | 550.84 | |
| Spitting blood | Male | 0.687±1.24 | 528.87 | 0.92 |
| | Female | 0.677±1.27 | 521.13 | |
| Difficulty eating/ chewing | Male | 0.96±1.435 | 516.52 | 0.381 |
| | Female | 1.078±1.59 | 533.48 | |
| Embarrassed to smile/laugh | Male | 0.571±1.16 | 523.08 | 0.973 |
| | Female | 0.577±1.268 | 526.92 | |

*Mann Whitney *U* test; $P \leq 0.05$ considered statistically significant; †denotes significance

identification and treatment of precancerous and cancerous lesions in these groups are crucial. The rise in tobacco product consumption has led to an alarming increase in oral precancers and cancers among young people in India. The dental fraternity has significant potential in leading national tobacco cessation initiatives. Our survey found that all dentists provided quit advice to their tobacco-using patients, with 33% referring patients to cessation centres, underscoring the profession's role in tobacco cessation.

In India, dental practice has focused on a treatment-centric model, prioritising reactive measures over preventive care.[16] Our findings show most dentists spend over 50% of their time on curative care and less than 10% on prevention, despite recognizing its importance. A paradigm shift from curative to preventive should be given due emphasis. Reviewing the reasons for not visiting a dentist within the previous year, belief that there was nothing wrong with their teeth and being too busy were among the top reasons; this clearly demonstrates the parochial attitude towards the importance of oral health. It was also observed that there was an alarmingly high prevalence of sugary foods and sugary drinks among the survey participants. These findings highlight the need for more active interventions on the primary prevention front and the recent inclusion of oral health in the ambit of wellness as a part of Ayushman Bharat Initiative is a welcome sign.[17] With the WHO adopting the landmark global oral health strategy in its 75th assembly,[18] the focus on oral health on the global platform is more concrete now than it has ever been and is the right time for the dental fraternity as a group to leverage this focus for universal oral health coverage.

In 2019, the economic impact of treating and preventing oral diseases in India included a total expenditure of $64 million, a per capita expenditure of $0.05, and productivity losses of $7,249 million.[19] In 2015, the average Indian lost 117 INR (~$1.8) due to oral health issues, with productivity losses from tooth decay, gum disease, and severe tooth loss amounting to $1.8. Adjusted for purchasing power parity (PPP), the per capita cost rose to $0.52, and productivity losses to $6.69 (434.85 INR). This indicates limited access to adequate oral healthcare in India, with costs under PPP tripling and productivity losses increasing 13-fold for every INR (33.8) spent on oral healthcare.[20] Current public health policies have been inadequate, highlighting the need for robust, evidence-based oral health policies.

### Limitations

One of the main limitations of this survey was reliance on nonprobability convenience sample. Despite training sessions, language differences might have affected non-English participants. The COVID-19 pandemic disrupted the survey conducted between December 2018 and April 2020. Few modifications were suggested in the FDI OHO app after the completion of data analysis to avoid inconsistencies in the data obtained by internal validation of the tool. Self-reported data on dental visits, habits, and oral health may be biased by recall and social desirability. Despite these issues, this survey is a significant step towards universal oral health coverage in India, aligning with global requirements and collaborating with global partners.

## Conclusion

The outcomes of this study were deliberated and discussed at a workshop held by the IDA in collaboration with FDI and Haleon in 2023 which highlighted the need to adapt the questionnaire to the country context and disseminate it to a larger, more representative population. IDA envisions to address gaps identified in the current study and implement a sustainable project in the near future based on workshop insights [Supplementary Figure 4]. Through these efforts, we aim to create a detailed oral health surveillance system to inform policies and improve public health outcomes in India.

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### Conflicts of interest

There are no conflicts of interest.

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