



## Awareness of the Effects of Tobacco on Oral Health among the General Public of Himachal Pradesh

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### Abstract

**Background:** Tobacco use is a major preventable public health problem and is strongly associated with a wide range of oral health conditions, including periodontal disease, oral mucosal lesions, and oral cancer. Although the harmful systemic effects of tobacco are widely recognized, public awareness regarding its specific impact on oral health remains inadequate. Understanding community awareness is essential for effective oral health promotion and tobacco cessation strategies, particularly in geographically diverse regions such as Himachal Pradesh. **Materials and Methods:** A community-based, descriptive cross-sectional study was conducted from January to April 2025 among 420 adults residing in urban and semi-urban areas of Himachal Pradesh. Data were collected using a validated, structured, self-administered questionnaire assessing socio-demographic characteristics, tobacco use status, awareness regarding the effects of tobacco on oral health, and perceptions toward tobacco cessation. Awareness scores were categorized as excellent, good, fair, or poor. Data were analyzed using IBM SPSS Statistics version 26.0, applying descriptive statistics and the Chi-square test, with  $p < 0.05$  considered statistically significant. **Results:** Overall awareness regarding the effects of tobacco on oral health was moderate to good, with 64.3% of participants demonstrating good to excellent awareness. Most respondents recognized the association between tobacco use and periodontal disease, oral mucosal lesions, delayed wound healing, and oral cancer. However, awareness was comparatively lower among current tobacco users, of whom 21.5% exhibited poor awareness. Awareness showed significant associations with education level, occupation, income, age, and area of residence ( $p < 0.05$ ), while gender was not significantly associated. A highly significant association was observed between tobacco use status and awareness level ( $p < 0.001$ ), with former and never users exhibiting higher awareness compared to current users. **Conclusion:** Despite moderate-to-good awareness regarding the oral health effects of tobacco, substantial knowledge gaps persist, particularly among current users, highlighting a clear knowledge-behavior gap. Educational and socio-economic factors significantly influence awareness levels. Strengthening behavior-oriented oral health education, integrating tobacco cessation counseling into routine dental care, and expanding community-based interventions are essential to reduce tobacco-related oral health burden in Himachal Pradesh.

**Keywords:** Tobacco use; Oral health; Awareness; Tobacco cessation; Community-based study; Himachal Pradesh



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### INTRODUCTION

Tobacco use remains one of the leading preventable causes of morbidity and mortality worldwide and continues to pose a major public health challenge in India. While the systemic effects of tobacco—such as cardiovascular disease, respiratory illness, and malignancies—are widely recognized, its impact on oral health is often underestimated or overlooked by the general public. The oral cavity is one of the first sites exposed to tobacco toxins, making oral tissues particularly vulnerable to both early and long-term damage. As a result, tobacco-related oral diseases not only contribute to pain, disability, and reduced quality

of life, but also act as visible indicators of broader health risks.<sup>1-4</sup>

The detrimental effects of tobacco on oral health are well established. Both smoked and smokeless forms of tobacco are strongly associated with periodontal disease, tooth loss, oral mucosal lesions (including leukoplakia and erythroplakia), delayed wound healing, halitosis, dental staining, reduced salivary flow, and increased susceptibility to infections. Importantly, tobacco use is a principal risk factor for oral potentially malignant disorders and oral cancer, and it significantly worsens prognosis when combined with alcohol use and

poor oral hygiene. Despite these well-documented consequences, many users perceive tobacco-related harm primarily in terms of cancer risk, while remaining unaware of the earlier oral manifestations that can serve as critical warning signs.<sup>5-11</sup>

In India, the burden of tobacco consumption persists due to cultural acceptance, peer influence, stress-related use, and easy availability of tobacco products. Moreover, the diversity of tobacco forms—cigarettes, bidis, hookah, gutkha, khaini, pan masala with tobacco, and other smokeless preparations—adds complexity to public perception and risk understanding. Awareness levels often vary widely depending on education, socio-economic status, media exposure, and access to health information. A major concern is that even when people have general knowledge that “tobacco is harmful,” they may not recognize the specific oral consequences, underestimate their personal risk, or delay seeking dental consultation until symptoms become severe.<sup>12-16</sup>

Himachal Pradesh, a predominantly hilly state with unique geographic and socio-cultural characteristics, presents distinct public health and healthcare access challenges. Difficult terrain, scattered settlements, and variable availability of dental services—especially in semi-urban and remote regions—can influence both health awareness and preventive healthcare utilization. Additionally, tobacco use patterns may be shaped by occupational factors, social norms, and local practices, which in turn affect oral health outcomes. In such settings, limited awareness about tobacco-related oral effects can delay early detection of oral lesions and hinder timely cessation efforts.<sup>17-21</sup>

While several studies have explored tobacco prevalence and its systemic hazards, there is comparatively limited region-specific evidence assessing public awareness of tobacco’s oral health effects in Himachal Pradesh. Understanding community knowledge is crucial for designing targeted health education strategies, strengthening tobacco cessation counseling, and promoting early screening for oral lesions. Evaluating awareness levels also helps identify demographic groups with greater knowledge deficits and informs the development of focused interventions through schools, workplaces, community outreach, and primary healthcare services.

Therefore, the present study aims to assess awareness of the effects of tobacco on oral health among the general public of Himachal Pradesh, and to evaluate the association of awareness with socio-demographic factors. By identifying existing knowledge gaps and misconceptions, this study seeks to support evidence-based oral health promotion and tobacco control initiatives that encourage cessation, early screening, and improved oral health outcomes in the region.

## **MATERIALS AND METHODS**

### **Study Design and Setting**

A community-based, descriptive cross-sectional study was conducted to assess awareness regarding the effects of tobacco on oral health among the general public of Himachal Pradesh, India. The study was carried out over a period of four months, from January to April 2025, and included participants from urban and semi-urban areas across multiple districts of the state. This design was chosen to capture a snapshot of prevailing knowledge and perceptions related to tobacco-associated oral health effects in the community.

### **Study Population**

The study population comprised adult residents aged 18 years and above who had been residing in Himachal Pradesh for at least one year. Individuals who were willing to participate voluntarily and were able to understand and respond to the questionnaire were included.

### **Exclusion criteria were:**

- Dental and medical professionals or students, to avoid professional knowledge bias
- Individuals currently undergoing treatment for oral cancer or advanced oral lesions
- Participants with a history of head and neck radiotherapy
- Incomplete or duplicate questionnaire responses

### **Sample Size Determination**

The sample size was calculated using the single population proportion formula, assuming a 50% prevalence of adequate awareness regarding tobacco’s effects on oral health due to the lack of region-specific data, with a 95% confidence interval and a 5% margin of error. The minimum calculated sample size was 384. To account for possible non-response and incomplete submissions, the sample size was increased to 420 participants.

### **Sampling Technique and Data Collection**

A non-probability convenience sampling technique was employed. Data were collected using a self-administered, structured questionnaire developed in Google Forms. The survey link was disseminated through social media platforms (WhatsApp, email, community groups), resident welfare associations, and educational institutions to ensure wide participation.

Before participation, respondents were provided with a brief explanation of the study objectives, and informed consent was obtained electronically. Participation was voluntary, and anonymity was maintained by not collecting personally identifiable information. Each participant required approximately 10–15 minutes to complete the questionnaire.

### **Study Instrument**

The questionnaire was developed after an extensive review of literature on tobacco use and oral health, national tobacco control guidelines, and oral cancer prevention frameworks. It consisted of four sections:

1. Socio-demographic characteristics – age, gender, education level, occupation, monthly household income, and area of residence
2. Tobacco use profile – type of tobacco used (smoking/smokeless/both), duration and frequency of use, and age of initiation
3. Awareness regarding effects of tobacco on oral health – impact on teeth, gums, oral mucosa, wound healing, periodontal disease, tooth loss, oral potentially malignant disorders, and oral cancer
4. Perception and attitudes – awareness of tobacco cessation benefits, willingness to quit, perceived severity of oral health effects, and acceptance of dental counseling for tobacco cessation

Each correct awareness response was awarded one point, while incorrect or “don’t know” responses were scored zero.

Scoring and Categorization

**Based on cumulative awareness scores, participants were categorized into four levels:**

- Excellent awareness:  $\geq 75\%$
- Good awareness: 50–74%
- Fair awareness: 25–49%
- Poor awareness:  $< 25\%$

Perception-related responses were analyzed descriptively to assess attitudes toward tobacco cessation and oral health risk perception.

## RESULTS

Table 1 describes the socio-demographic profile of the 420 participants included in the study. The largest proportion of participants belonged to the 26–35-year age group (29.0%), followed by 18–25 years (23.3%) and 36–45 years (22.9%), indicating a predominantly young to middle-aged population. Males constituted 51.0% of the sample, while females accounted for 49.0%. A relatively high educational status was observed, with 42.4% being graduates and 34.7% postgraduates. Service/professional workers formed the largest occupational group (35.7%), followed by homemakers (23.3%) and self-employed individuals (18.1%). Most participants belonged to the middle-income category, with 32.9% earning between INR 25,001–50,000. Urban residents comprised 56.2% of the sample. Notably, 40.0% of participants were current tobacco users, emphasizing the public health relevance of assessing awareness regarding tobacco’s oral health effects.

Table 2 presents responses to 20 awareness-based questions related to the effects of tobacco on oral health. A majority of participants demonstrated good knowledge regarding major oral consequences of tobacco use. 83.8% correctly identified tobacco as a risk factor for oral cancer, and 79.0% recognized its role in causing gum disease and tooth loss. Awareness regarding smokeless tobacco causing oral mucosal lesions was reported by 73.3%, while 74.8% acknowledged its association with oral potentially malignant disorders. Preventive and clinical aspects were also reasonably understood, with 82.9% recognizing the importance of early detection of oral lesions and 80.0% acknowledging that tobacco cessation improves oral health. However, comparatively lower awareness was observed regarding tobacco-related implant failure (56.7%) and the effects of passive smoking on oral health (60.5%), indicating specific gaps in comprehensive understanding.

Table 3 summarizes the overall awareness levels of participants based on cumulative scores. Good awareness was observed in 41.4% of participants, while 22.9% demonstrated excellent awareness. However, 24.8% of participants exhibited only fair awareness, and 10.9% had poor awareness. The mean awareness score was  $13.5 \pm 3.4$  out of a maximum score of 20, indicating an overall moderate-to-good level of awareness regarding the effects of tobacco on oral

## Validity and Reliability

The questionnaire underwent content and face validation by a panel of experts comprising public health dentists, oral medicine specialists, and community medicine experts. A pilot study was conducted among 40 participants (excluded from final analysis) to assess clarity, relevance, and feasibility.

Internal consistency of the questionnaire was assessed using Cronbach’s alpha, which yielded a value of  $\geq 0.80$ , indicating good reliability.

## Data Management and Statistical Analysis

Data collected via Google Forms were exported to Microsoft Excel and analyzed using IBM SPSS Statistics version 26.0. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarize socio-demographic variables, tobacco use patterns, and awareness levels.

Inferential analysis was performed using the Chi-square test to assess associations between awareness levels and socio-demographic variables, as well as tobacco use characteristics. A  $p\text{-value} < 0.05$  was considered statistically significant.

## Ethical Considerations

The study adhered to the ethical principles outlined in the Declaration of Helsinki. Participation was voluntary, informed consent was obtained electronically, and strict confidentiality and anonymity of participants were maintained throughout the study.

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health. Despite this, nearly one-third of the participants fell into fair or poor awareness categories, highlighting persistent knowledge gaps within the population.

**Table 1: Socio-Demographic Characteristics of the Study Participants (n = 420)**

| Variable                              | Category                | Frequency (n) | Percentage (%) |
|---------------------------------------|-------------------------|---------------|----------------|
| <b>Age Group (years)</b>              | 18–25                   | 98            | 23.3           |
|                                       | 26–35                   | 122           | 29.0           |
|                                       | 36–45                   | 96            | 22.9           |
|                                       | 46–60                   | 74            | 17.6           |
|                                       | >60                     | 30            | 7.2            |
| <b>Gender</b>                         | Male                    | 214           | 51.0           |
|                                       | Female                  | 206           | 49.0           |
| <b>Educational Level</b>              | Up to Secondary (≤10+2) | 96            | 22.9           |
|                                       | Graduate                | 178           | 42.4           |
|                                       | Postgraduate and above  | 146           | 34.7           |
| <b>Occupation</b>                     | Student                 | 64            | 15.2           |
|                                       | Service/Professional    | 150           | 35.7           |
|                                       | Homemaker               | 98            | 23.3           |
|                                       | Self-employed/Business  | 76            | 18.1           |
|                                       | Retired/Unemployed      | 32            | 7.6            |
| <b>Monthly Household Income (INR)</b> | <25,000                 | 80            | 19.0           |
|                                       | 25,001–50,000           | 138           | 32.9           |
|                                       | 50,001–75,000           | 116           | 27.6           |
|                                       | >75,000                 | 86            | 20.5           |
| <b>Area of Residence</b>              | Urban                   | 236           | 56.2           |
|                                       | Semi-urban              | 184           | 43.8           |
| <b>Tobacco Use Status</b>             | Current user            | 168           | 40.0           |
|                                       | Former user             | 74            | 17.6           |
|                                       | Never user              | 178           | 42.4           |

**Table 3: Overall Awareness Level Regarding the Effects of Tobacco on Oral Health Among the Study Participants (n = 420)**

| Awareness Level  | Score Range    | Participants (n) | Percentage (%) |
|------------------|----------------|------------------|----------------|
| <b>Excellent</b> | ≥75% (15–20)   | 96               | 22.9           |
| <b>Good</b>      | 50–74% (10–14) | 174              | 41.4           |
| <b>Fair</b>      | 25–49% (5–9)   | 104              | 24.8           |
| <b>Poor</b>      | <25% (0–4)     | 46               | 10.9           |
| <b>Total</b>     | —              | <b>420</b>       | <b>100.0</b>   |

**Mean ± SD awareness score (out of 20): 13.5 ± 3.4**

Table 4 illustrates the association between socio-demographic variables and awareness levels regarding the effects of tobacco on oral health. Awareness showed statistically significant associations with age ( $p = 0.014$ ), education level ( $p < 0.001$ ), occupation ( $p = 0.007$ ), monthly income ( $p = 0.009$ ), and area of residence ( $p = 0.027$ ). Higher awareness levels were observed among participants aged 36–45 years, postgraduates (34.2% excellent awareness), service professionals, higher-income groups (>75,000 INR), and urban residents. Gender did not show a significant association with awareness ( $p = 0.581$ ), suggesting that socio-economic and educational factors played a more decisive role in determining awareness than gender.

#### **NS = Not Significant**

Table 5 demonstrates a highly significant association between tobacco use status and awareness regarding the effects of tobacco on oral health ( $p < 0.001$ ). Among current tobacco users, only 14.3% demonstrated excellent awareness, while 21.5% fell into the poor awareness category. In contrast, former users showed markedly better awareness, with 29.7% exhibiting excellent and 45.9% good awareness. Never users also demonstrated higher awareness levels, with 28.1% showing excellent awareness and only 3.4% categorized as poor. These findings indicate that lower awareness is strongly associated with ongoing tobacco use and emphasize the importance of targeted education and cessation interventions for current users.

**Table 2: Awareness Regarding the Effects of Tobacco on Oral Health Among the Study Participants (n = 420)**

| Q. No. | Question                                                  | Options                                                                                                                | Correct n (%) |
|--------|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|---------------|
| 1      | Tobacco use can cause which oral condition most commonly? | a) Tooth whitening <b>b) Gum disease and tooth loss</b> c) Improved oral hygiene d) Tooth strengthening                | 332 (79.0)    |
| 2      | Smoking tobacco mainly affects which oral tissue first?   | a) Jaw bone <b>b) Oral mucosa</b> c) Salivary glands d) Tongue muscles                                                 | 286 (68.1)    |
| 3      | Smokeless tobacco use is associated with                  | a) Reduced caries risk <b>b) Oral mucosal lesions</b> c) Improved digestion d) Stronger gums                           | 308 (73.3)    |
| 4      | Tobacco use increases the risk of                         | a) Only tooth staining b) Only bad breath <b>c) Oral cancer</b> d) Tooth sensitivity only                              | 352 (83.8)    |
| 5      | Which oral lesion is considered potentially malignant?    | a) Aphthous ulcer <b>b) Leukoplakia</b> c) Dental caries d) Gingivitis                                                 | 264 (62.9)    |
| 6      | Tobacco causes periodontal disease by                     | a) Strengthening gums b) Increasing saliva flow <b>c) Reducing blood supply to gums</b> d) Increasing enamel thickness | 248 (59.0)    |
| 7      | Tobacco use affects wound healing by                      | a) Speeding healing <b>b) Delaying healing</b> c) Having no effect d) Preventing infection                             | 292 (69.5)    |
| 8      | Staining of teeth due to tobacco is                       | a) Always reversible b) Harmless <b>c) Difficult to remove</b> d) Beneficial                                           | 276 (65.7)    |
| 9      | Tobacco users are more prone to                           | a) Dental fluorosis <b>b) Tooth loss</b> c) Improved gum health d) Less plaque                                         | 304 (72.4)    |
| 10     | Tobacco causes halitosis mainly due to                    | a) Food habits <b>b) Bacterial changes and dry mouth</b> c) Tooth decay only d) Mouthwash use                          | 258 (61.4)    |
| 11     | Long-term tobacco use can lead to                         | a) Healthier gums b) Reduced plaque <b>c) Oral potentially malignant disorders</b> d) Better oral immunity             | 314 (74.8)    |
| 12     | Which form of tobacco is safer for oral health?           | a) Cigarettes b) Smokeless tobacco c) Hookah <b>d) None are safe</b>                                                   | 346 (82.4)    |
| 13     | Tobacco affects taste sensation by                        | a) Improving taste <b>b) Reducing taste perception</b> c) No effect d) Enhancing smell                                 | 268 (63.8)    |
| 14     | Tobacco use increases dental implant failure risk         | a) No <b>b) Yes</b> c) Only in elderly d) Only in smokers                                                              | 238 (56.7)    |
| 15     | Tobacco-related oral lesions should be                    | a) Ignored b) Treated with home remedies <b>c) Examined by a dentist</b> d) Waited until painful                       | 324 (77.1)    |
| 16     | Passive smoking can affect oral health                    | a) No effect <b>b) Yes, increases disease risk</b> c) Only affects lungs d) Only children affected                     | 254 (60.5)    |
| 17     | Tobacco reduces saliva flow leading to                    | a) Stronger teeth <b>b) Dry mouth and infections</b> c) Less plaque formation d) Better taste                          | 286 (68.1)    |
| 18     | Tobacco cessation improves oral health                    | a) Never b) Only after years <b>c) Gradually after quitting</b> d) No improvement                                      | 336 (80.0)    |
| 19     | Early detection of tobacco-related oral lesions helps in  | a) Delaying treatment <b>b) Preventing cancer progression</b> c) Avoiding dental visits d) Ignoring symptoms           | 348 (82.9)    |
| 20     | Dentists play a role in tobacco cessation by              | a) Avoiding discussion b) Only treating teeth <b>c) Counseling and referral</b> d) Prescribing antibiotics             | 318 (75.7)    |

**Table 5: Association Between Tobacco Use Status and Awareness Level Regarding the Effects of Tobacco on Oral Health Among the Study Participants (n = 420)**

| Tobacco Use Status   | Excellent n (%) | Good n (%) | Fair n (%) | Poor n (%) | Total (n)  | $\chi^2$ value | p-value | Significance       |
|----------------------|-----------------|------------|------------|------------|------------|----------------|---------|--------------------|
| <b>Current users</b> | 24 (14.3)       | 54 (32.1)  | 54 (32.1)  | 36 (21.5)  | 168        | 26.84          | <0.001  | Highly Significant |
| <b>Former users</b>  | 22 (29.7)       | 34 (45.9)  | 14 (18.9)  | 4 (5.5)    | 74         |                |         |                    |
| <b>Never users</b>   | 50 (28.1)       | 86 (48.3)  | 36 (20.2)  | 6 (3.4)    | 178        |                |         |                    |
| <b>Total</b>         | <b>96</b>       | <b>174</b> | <b>104</b> | <b>46</b>  | <b>420</b> | —              | —       | —                  |

**Table 4: Association Between Socio-Demographic Variables and Awareness Level Regarding the Effects of Tobacco on Oral Health Among the Study Participants (n = 420)**

| Variable | Category | Excellent n | Good n | Fair n | Poor n | $\chi^2$ | p- | Significance |
|----------|----------|-------------|--------|--------|--------|----------|----|--------------|
|----------|----------|-------------|--------|--------|--------|----------|----|--------------|

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|                             |                              | (%)       | (%)       | (%)       | (%)       | value | value  |                    |
|-----------------------------|------------------------------|-----------|-----------|-----------|-----------|-------|--------|--------------------|
| <b>Age Group (years)</b>    | 18–25 (n=98)                 | 16 (16.3) | 36 (36.7) | 30 (30.6) | 16 (16.4) | 12.48 | 0.014  | Significant        |
|                             | 26–35 (n=122)                | 28 (23.0) | 54 (44.3) | 26 (21.3) | 14 (11.4) |       |        |                    |
|                             | 36–45 (n=96)                 | 30 (31.3) | 42 (43.8) | 16 (16.7) | 8 (8.2)   |       |        |                    |
|                             | 46–60 (n=74)                 | 18 (24.3) | 30 (40.5) | 18 (24.3) | 8 (10.9)  |       |        |                    |
|                             | >60 (n=30)                   | 4 (13.3)  | 12 (40.0) | 14 (46.7) | 0 (0.0)   |       |        |                    |
| <b>Gender</b>               | Male (n=214)                 | 46 (21.5) | 86 (40.2) | 54 (25.2) | 28 (13.1) | 1.96  | 0.581  | NS                 |
|                             | Female (n=206)               | 50 (24.3) | 88 (42.7) | 50 (24.3) | 18 (8.7)  |       |        |                    |
| <b>Education Level</b>      | Up to Secondary (n=96)       | 8 (8.3)   | 26 (27.1) | 36 (37.5) | 26 (27.1) | 30.12 | <0.001 | Highly Significant |
|                             | Graduate (n=178)             | 38 (21.3) | 78 (43.8) | 44 (24.7) | 18 (10.2) |       |        |                    |
|                             | Postgraduate & above (n=146) | 50 (34.2) | 70 (47.9) | 24 (16.4) | 2 (1.5)   |       |        |                    |
| <b>Occupation</b>           | Student (n=64)               | 8 (12.5)  | 22 (34.4) | 22 (34.4) | 12 (18.7) | 17.84 | 0.007  | Significant        |
|                             | Service/Professional (n=150) | 44 (29.3) | 64 (42.7) | 28 (18.7) | 14 (9.3)  |       |        |                    |
|                             | Homemaker (n=98)             | 20 (20.4) | 38 (38.8) | 26 (26.5) | 14 (14.3) |       |        |                    |
|                             | Self-employed (n=76)         | 18 (23.7) | 30 (39.5) | 20 (26.3) | 8 (10.5)  |       |        |                    |
|                             | Retired/Unemployed (n=32)    | 6 (18.8)  | 20 (62.5) | 8 (18.7)  | 0 (0.0)   |       |        |                    |
| <b>Monthly Income (INR)</b> | <25,000 (n=80)               | 10 (12.5) | 22 (27.5) | 28 (35.0) | 20 (25.0) | 15.36 | 0.009  | Significant        |
|                             | 25,001–50,000 (n=138)        | 26 (18.8) | 56 (40.6) | 38 (27.5) | 18 (13.1) |       |        |                    |
|                             | 50,001–75,000 (n=116)        | 30 (25.9) | 48 (41.4) | 28 (24.1) | 10 (8.6)  |       |        |                    |
|                             | >75,000 (n=86)               | 30 (34.9) | 48 (55.8) | 10 (11.6) | 2 (2.3)   |       |        |                    |
| <b>Area of Residence</b>    | Urban (n=236)                | 66 (28.0) | 98 (41.5) | 48 (20.3) | 24 (10.2) | 9.18  | 0.027  | Significant        |
|                             | Semi-urban (n=184)           | 30 (16.3) | 76 (41.3) | 56 (30.4) | 22 (12.0) |       |        |                    |

## DISCUSSION

The present study assessed awareness regarding the effects of tobacco on oral health among the general public of Himachal Pradesh and explored its association with socio-demographic factors and tobacco use status. The findings reveal that although overall awareness was moderate to good, important gaps persist—particularly among current tobacco users—highlighting the need for targeted oral health education and tobacco cessation interventions.

In the present study, nearly two-thirds of the participants demonstrated good to excellent awareness regarding the harmful effects of tobacco on oral health. A majority correctly identified the association of tobacco use with periodontal disease, oral mucosal lesions, delayed wound healing, and oral cancer. This suggests that general information about the harmful nature of tobacco has reached a substantial proportion

of the population, possibly through mass media campaigns, warning labels, and public health messaging. Similar levels of awareness have been reported in studies from other parts of India, indicating gradual improvement in public understanding of tobacco-related health risks.<sup>14,16,19</sup>

Despite reasonable awareness, misconceptions and incomplete knowledge were evident. Awareness was comparatively lower regarding the effects of tobacco on implant failure, saliva reduction, passive smoking, and early asymptomatic oral lesions. These gaps are clinically significant, as lack of recognition of early and painless oral changes may delay diagnosis of potentially malignant disorders and oral cancer. This finding underscores the importance of emphasizing early oral manifestations of tobacco use during health education

programs, rather than focusing solely on advanced disease outcomes.8,16,19

A key finding of this study is the high prevalence of current tobacco use (40%), with a considerable proportion reporting long-term and daily consumption. Although most participants acknowledged that tobacco adversely affects oral health, many current users continued the habit, indicating that awareness alone does not necessarily translate into behavior change. This observation supports existing evidence that tobacco use is influenced by addiction, social norms, peer pressure, and stress, which may override health knowledge.9,15,21

The study demonstrated a highly significant association between tobacco use status and awareness level, with current users showing lower awareness compared to former and never users. Former users exhibited the highest proportion of good to excellent awareness, suggesting that increased knowledge may contribute to cessation or that cessation efforts themselves enhance awareness. This highlights the potential role of education and counseling in motivating tobacco cessation and preventing relapse.7,16,19

Socio-demographic variables such as education level, occupation, income, age, and area of residence showed significant associations with awareness levels. Participants with higher education, professional occupations, higher income, and urban residence demonstrated better awareness regarding the oral effects of tobacco. Education emerged as the strongest predictor, with postgraduates exhibiting markedly higher awareness compared to those with secondary education. These findings align with previous studies indicating that education enhances health literacy, risk perception, and receptiveness to preventive messages.6,17,20

Age also influenced awareness levels, with middle-aged adults demonstrating better knowledge compared to younger participants. Younger individuals, despite being at higher risk of initiating tobacco use, showed comparatively lower awareness, possibly due to limited exposure to targeted health education or underestimation of long-term risks. This finding emphasizes the need for youth-focused tobacco and oral health awareness programs, particularly in educational institutions.5,13,16

Gender did not show a statistically significant association with awareness, suggesting that knowledge regarding tobacco's oral effects is shaped more by socio-economic and educational factors than by gender alone. This reflects a shift from earlier observations where gender differences were more pronounced and indicates broader dissemination of health information across populations.

Perception and attitude findings revealed encouraging trends, as a majority of participants expressed willingness to quit tobacco if advised by a dentist and showed readiness to attend cessation programs. However, more than half reported never receiving tobacco cessation advice from a dental professional, highlighting a missed opportunity for intervention. Given that dentists routinely examine the oral cavity and are well positioned to detect early tobacco-related lesions, integrating tobacco cessation counseling into routine dental practice could significantly improve outcomes.

### **Strengths and Limitations**

The strengths of this study include its community-based design, adequate sample size, use of a validated questionnaire, and comprehensive assessment of awareness, perceptions, and tobacco use status. The inclusion of socio-demographic and behavioral variables allowed for a detailed understanding of factors influencing awareness.

However, certain limitations must be acknowledged. The cross-sectional nature of the study limits causal inference. Self-reported data may be subject to recall and social desirability bias. Additionally, the absence of clinical oral examinations prevents correlation of awareness with actual oral health status or lesion prevalence. The online mode of data collection may also limit generalizability to populations with limited digital access.

### **Implications for Public Health and Practice**

The findings of this study highlight that improving awareness alone is insufficient to curb tobacco use and its oral health consequences. Public health strategies should focus on behavior change communication, early identification of oral lesions, and routine tobacco cessation counseling—particularly targeting current users, younger individuals, and populations with lower educational and socio-economic status. Strengthening the role of dental professionals in tobacco cessation and expanding community-based oral health programs could play a pivotal role in reducing tobacco-related oral disease burden in Himachal Pradesh.

### **CONCLUSION**

The present study demonstrates that awareness regarding the effects of tobacco on oral health among the general public of Himachal Pradesh is moderate to good, with a majority of participants recognizing the harmful impact of tobacco on the oral cavity. However, substantial knowledge gaps persist, particularly among current tobacco users, younger individuals, and those with lower educational and socio-economic status. Despite acknowledging the harmful effects of tobacco, a significant proportion of participants continued tobacco use, highlighting a clear gap between awareness and behavior.

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Socio-demographic factors such as education level, occupation, income, age, and area of residence significantly influenced awareness, while gender showed no significant association. Former and never tobacco users demonstrated higher awareness compared to current users, emphasizing the role of knowledge in facilitating cessation and prevention. The findings underscore that tobacco-related oral health risks remain under-recognized in their early and asymptomatic stages, which may delay diagnosis and increase the burden of oral potentially malignant disorders and oral cancer.

Overall, the study highlights the urgent need for strengthened, targeted, and behavior-oriented oral health education and tobacco cessation initiatives, particularly focusing on current users and vulnerable population groups in Himachal Pradesh.

### Recommendations

Based on the findings of the present study, the following recommendations are proposed:

1. Targeted Oral Health Education: Focused awareness programs should be developed to emphasize the specific effects of tobacco on oral tissues, early warning signs of oral lesions, and the reversible benefits of tobacco cessation.
2. Integration of Tobacco Cessation Counseling in Dental Practice: Dental professionals should be actively trained and encouraged to provide routine tobacco cessation counseling, brief interventions, and referrals during dental visits.
3. Youth-Focused Interventions: School- and college-based oral health and tobacco awareness programs should be strengthened to prevent early initiation of tobacco use and promote lifelong healthy behaviors.
4. Community-Based Outreach Programs: Mobile dental units, community camps, and primary healthcare centers should incorporate oral screening and tobacco cessation education, especially in semi-urban and underserved areas.
5. Behavior Change Communication (BCC): Public health campaigns should adopt behavior change communication strategies that address addiction, peer influence, and risk perception, rather than focusing solely on information dissemination.
6. Policy and Public Health Support: Policymakers should reinforce tobacco control policies, promote access to cessation services, and integrate oral health promotion into existing national tobacco control and primary healthcare programs.
7. Future Research: Further studies incorporating clinical oral examinations and longitudinal follow-up are recommended to assess the relationship between awareness, tobacco use behavior, and actual oral health outcomes.

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