

## Assessment of oral health status and tobacco-related habits among the employees of North-West Karnataka Road Transport Corporation (NWKRTC), Belagavi City, India - A Cross-Sectional Study

Choudhury AR<sup>1</sup>, Ankola AV<sup>1</sup>, Roopali S<sup>1</sup>, Siddibhavi M<sup>1</sup>, Vallakunja D<sup>1</sup>, Khot AP<sup>1</sup>, Deshpande A<sup>1</sup>

<sup>1</sup>Department of Public Health Dentistry, KLE VK Institute of Dental Sciences, Belagavi, Karnataka, India

### ABSTRACT

**Introduction:** Transport workers have a very haphazard and incongruent schedule which makes it difficult for them to follow proper oral hygiene practices. The prevalence of tobacco habits is also found to be high due to their long periods of work and constant stress. This study aimed to assess the oral health status and tobacco habits of the government bus drivers and conductors of NWKRTC, Belagavi City, Karnataka.

**Methods:** A descriptive cross-sectional study was conducted on 451 Government Bus drivers and other employees of NWKRTC who gave consent for the study. WHO Oral Health Assessment Form 2013 was used to record the oral health status and a self-designed, validated questionnaire was employed for recording the oral hygiene practices and tobacco-related habits. Descriptive statistics and Chi-Square was used for statistical analysis.

**Results:** The mean age of the employees of NWKRTC is 43.55 years and there are 414 males as compared to only 37 females. The mean DMFT score was  $5.55 \pm 3.08$ . 228 of them had some kind of tobacco habit with guthka (25.9 percent) being the most prevalent one. 57 employees had manifestations of leukoplakia and OSMF. There was an association between tobacco habits and oral mucosal lesions as well as the DMFT score.

**Conclusion:** The Oral Health Status of the Government employees of NWKRTC is poor. It is further compounded by the high prevalence of tobacco habits and associated lesions and it is a problem that needs to be addressed immediately.

**Key words:** Belagavi, NWKRTC, oral health, tobacco.

### INTRODUCTION

Health is an asset, not only for an individual but for the community as a whole, and it is an essential aspect by which a nation progresses rapidly.<sup>1</sup> Unfortunately, health is highly undervalued, and its importance is not appreciated unless it is lost.<sup>2</sup>

**DOI:** <https://doi.org/10.3126/ijosh.v12i4.43885>

Conflicts of interest: None  
Supporting agencies: None

Date of submission: 17.03.2022  
Date of acceptance: 14.07.2022  
Date of publication: 01.10.2022

#### Corresponding Author

Dr. Abhra Roy Choudhury  
Department no.2, Dept. of Public Health Dentistry,  
KLE VK Institute of Dental Sciences, JNMC Campus,  
Nehru Nagar, Belagavi- 590010, Karnataka, India  
Contact Number: 8105414360  
Email: [abhra.rkmv@gmail.com](mailto:abhra.rkmv@gmail.com)  
ORCID ID: <https://orcid.org/0000-0001-5945-550X>

Oral health is an important entity that contributes significantly to the well-being of a person. There can be many factors contributing to oral disease, and it can affect humans of all ages, races, gender, ethnicity, etc. So, people with poor oral health should be advised to change their personal habits to decrease their risk of developing oral disease.<sup>3</sup>

Occupation has been one of the most relevant factors that cause a lot of social disparity related to oral health and transport workers to fall into that category.<sup>4</sup> It can be attributed to their erratic lifestyle, haphazard schedules, and odd timings at work, interspersed with delays and frequent breakdowns and continuous adaptation to the changing shifts while being on the wheel for most of the time.<sup>5,6</sup> Moreover, due to the constant stress at work and to keep themselves functional, despite long



This journal is licensed under a Creative Commons Attribution-Non Commercial 4.0 International License.

working hours, they tend to resort to habits like tobacco consumption, either in a smoking or a smokeless form.<sup>7</sup> They also tend to come under several individuals and social influences that further increase the habit.<sup>8</sup> Nicotine, the principal constituent of tobacco, has been known to keep people awake for a long due to the constant release of a chemical neurotransmitter.<sup>9</sup> Most people engaging in odd jobs, including bus drivers, get addicted to it as they feel more alert and energetic.

More than 2000 bus drivers, conductors, and mechanics work in the Belgaum Bus depot, a small city located in the upper part of North Karnataka. The status of oral health of the employees of NWKRTC needs to be assessed in detail as it has never been done before. Similar studies have been done on the bus drivers in Chandigarh and Chennai, and the findings were found to be significant.<sup>4,5</sup> Studies have been done on seafarers, coal mine workers, and labourers, who belong to a similar socioeconomic status, and the results have been similar as well.<sup>10, 11, 12</sup> The aim of the study is to assess the oral health status and the tobacco-related habits of the employees of NWKRTC, Belagavi City. The objective is to find the association of oral health status with tobacco-related habits so that premature identification of risks can be done.

## METHODS

A descriptive cross-sectional study was conducted in the month of April 2021 on the employees of NWKRTC belonging to the age group of 24-60 years working in Central Bus Depot no.1 and City Bus Stand Depot no.2. The examination site was fixed at a building within premises of the office of the Central Bus Stand and City Bus Stand. All necessary arrangements were done at the site of examination. The Ethical clearance was obtained from the Institutional Ethical Committee. Permission to examine the employees of NWKRTC, Belagavi City was obtained from the Labour Welfare Officer. Written informed consent was obtained prior to examination of each subject. A pilot study was done on 50 employees of NWKRTC to check for internal consistency, test-retest reliability, and inter-rater reliability of the self-designed questionnaire. Data collection was done using a self-designed questionnaire and WHO Oral Health Assessment Form 2013. Due to the ongoing global pandemic of COVID-19 in Karnataka, NWKRTC was not functioning at full strength and most of the employees were on leave or working on a rotation basis. Therefore, the

employees who reported for work on the days of the study were included. Universal sampling technique was applied and 451 subjects were included in the study. The data collection and clinical examination of all the subjects were done by a single examiner who was trained before conducting the study, under the guidance of a subject expert to limit the intra-examiner variability. The intra-examiner variability was checked by performing repeated examination on randomly selected subjects and the intra-examiner Kappa coefficient was calculated to be 0.82. The schedule for examination of the employees of NWKRTC was prepared and submitted to the Labour Welfare Officer. A maximum of 40 subjects were examined each day. One intern from the college was trained to record the "WHO Oral Assessment Form 2013" as well as the self-designed questionnaire and assisted the examiner during the study as a recording clerk. The study was conducted during the dire times of the pandemic and it necessitated the strict following of infection protocol as laid down by the "Centre for Disease Control" (CDC) and "World Health Organization" (WHO). Personal Protective Equipment (PPE) kits were used by the investigator as well as the recording clerk. The kits were of the sterilizable and reusable type and were autoclaved thoroughly every day after conducting the examination. The kit consisted of a fully-covered surgical gown, head cap, eye protector, N95 mouth mask, respirator, and disposable gloves. The gloves were changed before the examination of every subject and intermittent sterilization of the hand using sanitizer was also done. Data collection was done using the self-designed questionnaire and WHO Oral Health Assessment Form 2013. Data Analysis was done using SPSS version 21.0. Descriptive Statistics, Chi-Square tests, and Regression Analysis were done.

## RESULTS

The study was conducted to assess the Oral Health Status and Tobacco-related Habits among the 451 employees of NWKRTC, Belagavi City, Karnataka. The age groups ranged from 21 to 60 years with the mean age being  $43.55 \pm 8.46$ . In terms of gender distribution, 414 (91.80%) of them were males while only 37 (8.20%) of the employees of NWKRTC were females. The distribution of the occupation of the employees of NWKRTC showed that 328 (72.73%) of them were bus drivers while 123 (27.27%) belonged to other occupations like Bus Conductors, Mechanics, Sweepers, and Security Guards [Table 1].

Among the total subjects, 445 (98.88%) of them had some form of caries experience reflected in terms of the DMFT score. In terms of gender, 408 (98.55%) males had some caries experience while 100% (37 out of 37) of the females also expressed the same. A significant result was also obtained in terms of occupation with 324 among 328 (98.78%) bus drivers showing some form of manifestation of dental caries. Only 2 out of 123 (1.63%) participants belonging to other occupations like Bus conductor, Mechanic, Sweepers, and Security Guards did not have any caries experience [Table 2].

The comparison of age groups and DMFT score as well as individual components like Decayed Teeth (DT), Missing Teeth (MT) and Filled Teeth (FT) showed statistically significant result [Figure 1].

The maximum prevalence of tobacco consumption habit was found in the age group of 41-50 years with 55.61% of the participants having some form of tobacco habits. The association between age group and tobacco habits was found to be statistically significant. These tobacco-

related habits were commonly seen among males and it stood at 52.9%. Additionally, the percentage was found to be significantly higher among bus drivers at 54.27%. The association between occupation and tobacco habits was found to be statistically significant [Table 3].

A statistically significant association was found between different types of tobacco and the demographic profile of the employees [Table 4].

The distribution of different oral mucosal lesions is represented [Figure 2].

The occurrence of oral mucosal lesions (OML) was found to be 15.29%. Among the OML, Leukoplakia and Oral Submucous Fibrosis (OSMF) were commonly found at 44.92% and 37.68% respectively. An association was found between the age groups and the presence of OML which was statistically significant. Buccal mucosa was inadvertently found to be the most common site of the OML at 72.46% when compared to all other sites.

**Table 1:** Distribution of the demographic profile of employees of NWKRTC

Demographic Profile	No. of employees n (%)
<b>Age groups</b>	
21-30yrs	33 (7.32%)
31-40yrs	119 (26.39%)
41-50yrs	187 (41.46%)
51-60yrs	112 (24.83%)
<b>Total</b>	<b>451 (100.00%)</b>
Mean $\pm$ SD of age = 43.55 $\pm$ 8.46 years.	
<b>Gender</b>	
Male	414 (91.80%)
Female	37 (8.20%)
<b>Total</b>	<b>451 (100.00%)</b>
<b>Occupation</b>	
Driver	328 (72.73%)
Others (Mechanics, Conductors, Sweepers, Security Guards)	123 (27.27%)
<b>Total</b>	<b>451 (100.00%)</b>

**Table 2:** Association between prevalence of dental caries and demographic profile of employees of NWKRTC using Chi-Square Test

Demographic Profile	Without caries n (%)	With caries n (%)	Total n (%)	Chi-square	p-value
<b>Age groups</b>					
21-30 yrs	2 (6.06%)	31 (93.94%)	33 (7.32%)		
31-40 yrs	1 (0.84%)	118 (99.16%)	119 (26.39%)		
41-50 yrs	0 (0.00%)	187 (100.00%)	187 (41.46%)	9.9150	0.0190*
51-60 yrs	3 (2.68%)	109 (97.32%)	112 (24.83%)		
<b>Total</b>	<b>6 (1.33%)</b>	<b>445 (98.67%)</b>	<b>451 (100.00%)</b>		
<b>Gender</b>					
Male	6 (1.47%)	408 (98.53%)	414 (91.80%)		
Female	0 (00.00%)	37 (100.00%)	37 (8.20%)	0.5430	0.4610
<b>Total</b>	<b>6 (1.33%)</b>	<b>445 (98.67%)</b>	<b>451 (100.00%)</b>		
<b>Occupation</b>					
Driver	4 (1.21%)	324 (98.78%)	328 (72.73%)		
Others	2 (1.62%)	121 (98.37%)	123 (27.27%)	0.1130	0.7370
<b>Total</b>	<b>6 (1.33%)</b>	<b>445 (98.67%)</b>	<b>451 (100.00%)</b>		

\*p&lt;0.05= statistically significant

**Table For Figure 1:** Comparison of age groups with mean DMFT and its components (DT, MT, FT) by one way ANOVA

Age groups	DMFT		DT		MT		FT	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
21-30yrs	3.79	2.34	2.73	1.75	0.64	1.32	0.42	0.97
31-40yrs	5.55	3.26	3.83	2.48	0.82	1.48	0.91	1.97
41-50yrs	5.44	2.69	3.11	2.08	1.66	1.93	0.68	1.62
51-60yrs	6.24	3.48	3.27	2.17	2.04	2.63	0.93	2.43
Total	5.55	3.08	3.31	2.21	1.46	2.05	0.78	1.91
F-value	5.7195		3.5630		9.7708		0.9409	
P-value	0.0008*		0.0143*		0.0001*		0.4207	
Pair wise comparisons by Scheffe's posthoc								
21-30yrs vs 31-40yrs	p=0.0341*		p=0.0897		p=0.9729		p=0.6468	
21-30yrs vs 41-50yrs	p=0.0417*		p=0.8401		p=0.0621		p=0.9140	
21-30yrs vs 51-60yrs	p=0.0010*		p=0.6721		p=0.0056*		p=0.6196	
31-40yrs vs 41-50yrs	p=0.9911		p=0.0488*		p=0.0056*		p=0.8028	
31-40yrs vs 51-60yrs	p=0.4008		p=0.2844		p=0.0001*		p=0.9998	
41-50yrs vs 51-60yrs	p=0.1816		p=0.9451		p=0.4505		p=0.7661	

\*p&lt;0.05= statistically significant

**Table 3:** Association between presence of tobacco habits and demographic profile of employees of NWKRTC using Chi-Square Test

Demographic profile	Tobacco habit present n (%)	Tobacco habit absent n (%)	Total n (%)	Chi-square	p-value
<b>Age groups</b>					
21-30yrs	17 (51.52%)	16 (48.48%)	33 (7.32%)		
31-40yrs	54 (45.38%)	65 (54.62%)	119 (26.39%)		
41-50yrs	83 (44.39%)	104 (55.61%)	187 (41.46%)	13.7070	0.0030*
51-60yrs	73 (65.18%)	39 (34.82%)	112 (24.83%)		
<b>Total</b>	<b>227 (50.33%)</b>	<b>224 (49.67%)</b>	<b>451 (100.00%)</b>		
<b>Gender</b>					
Male	195 (47.10%)	219 (52.90%)	414 (91.80%)		
Female	32 (86.49%)	5 (13.51%)	37 (8.20%)	21.0750	0.0001*
<b>Total</b>	<b>227 (50.33%)</b>	<b>224 (49.67%)</b>	<b>451 (100.00%)</b>		
<b>Occupation</b>					
Driver	150 (45.73%)	178 (54.27%)	328 (72.73%)		
Others	77 (62.60%)	46 (37.40%)	123 (27.27%)	10.1840	0.0010*
<b>Total</b>	<b>227 (50.33%)</b>	<b>224 (49.67%)</b>	<b>451 (100.00%)</b>		

\*p&lt;0.05= statistically significant

**Table 4:** Association between different types of tobacco intake with demographic profile of employees of NWKRTC using Chi-Square Test

Profile	Cigarette n (%)	Beedi n (%)	Pan with slaked lime n (%)	Guthka n (%)	Total n (%)	Chi-square	p-value
<b>Age groups</b>							
21-30yrs	0 (0.00%)	3 (18.75%)	4 (25.00%)	9 (56.25%)	16 (7.04%)		0.0010*
31-40yrs	3 (4.54%)	3 (4.54%)	24 (36.66%)	36 (54.54%)	66 (29.07%)		
41-50yrs	2 (1.88%)	3 (2.83%)	38 (35.84%)	63 (59.43%)	106 (46.69%)	33.96	
51-60yrs	1 (2.56%)	4 (10.25%)	24 (61.53%)	10 (25.64%)	39 (17.18%)		
<b>Total</b>	<b>6 (2.64%)</b>	<b>13 (5.72%)</b>	<b>90 (39.64%)</b>	<b>118 (51.98%)</b>	<b>227 (100.00%)</b>		
<b>Gender</b>							
Male	6 (2.71%)	13 (5.88%)	85 (38.46%)	117 (52.94%)	221 (97.35%)		0.0001*
Female	0 (0.00%)	0 (0.00%)	5 (83.33%)	1 (16.67%)	6 (2.64%)	20.46	
<b>Total</b>	<b>6 (2.64%)</b>	<b>13 (5.72%)</b>	<b>90 (39.64%)</b>	<b>118 (51.98%)</b>	<b>227 (100.00%)</b>		
<b>Occupation</b>							
Driver	4 (2.23%)	8 (4.46%)	74 (41.34%)	93 (51.95%)	179 (78.85%)		0.0210*
Others	2 (4.16%)	5 (10.41%)	16 (33.33%)	25 (52.08%)	48 (21.15%)	11.58	
<b>Total</b>	<b>6 (2.64%)</b>	<b>13 (5.72%)</b>	<b>90 (39.64%)</b>	<b>118 (51.98%)</b>	<b>227 (100.00%)</b>		

\*p&lt;0.05= statistically significant

**Table For Figure 2:** Prevalence of different oral mucosal lesions

ORAL MUCOSAL LESIONS	NO. OF EMPLOYEES n (%)
1. Oral Cancer	2 (2.89%)
2. Leukoplakia	31 (44.92%)
3. Oral Submucous Fibrosis (OSMF)	26 (37.68%)
4. Ulcerations	10 (14.49%)
<b>Total</b>	<b>69 (15.29%)</b>

## DISCUSSION

The present study was conducted to find out about the oral health status of North-West Karnataka Road Transport Corporation (NWKRTC) employees in Belagavi City in a systematic manner. It describes the prevalence and the patterns related to tobacco-related habits among them so that this pressing issue can be addressed at the earliest, using appropriate measures. The age group of the employees of NWKRTC in Belagavi ranged from 25-60 years, and most of them fell in the bracket of 41-50 years. The minimum requirement for recruitment under NWKRTC is to clear Higher Secondary Examination and be of at least 24 years of age. The State Government has recently increased the retirement age to 60 years from 56 years, which justifies the age range. The majority of the employees working in NWKRTC were males. Only 8.20% of them were females, and all of them worked as bus conductors. This clearly states that there is a huge gender disparity in the employment ratio, which can be because females do not prefer to work long and odd hours due to safety matters. The occupation of the employees of NWKRTC was broadly classified into two sections: bus drivers and others. Other employees included the bus conductors, mechanics, sweepers, and the security guards who worked in the different Bus Depots.

The dental caries experience of the employees of NWKRTC was evaluated using the caries index included in WHO Oral Assessment Form 2013. The caries experience was very high at 98.88%, with the mean DMFT score for the total population being  $5.55 \pm 3.08$ . This result was similar to the study done by Ramandeep S. Gambhir et al. on the transport workers of Chandigarh Transport Undertaking (CTU), where the DMFT was 5.02.<sup>11</sup> These results could be related to the fact that the transport workers consumed tea and coffee more often when compared to normal individuals, which resulted in an increase in the 'sweet score'. According to the studies done by Akrad et al. and Masalin et al., a positive correlation was present between the 'sweet score' and the DMFT score.<sup>13,14</sup> The employees were under constant stress at work, mainly due to long working hours, and the frequent consumption could be a form of relaxation and de-stressing. Peer pressure and influence from colleagues can also be significant contributing factors for the same.<sup>6</sup>

The high number of missing teeth due to caries implies that the transport workers did not visit the

dentists at the initial stage of the problem related to tooth decay, which destroyed the tooth structure and sometimes went to the stage of irreplaceable damage and extraction. These results were in accordance with the studies done by Clarke et al., Hamesha et al. and Kawamura et al., who pointed to a similar pattern in their findings.<sup>15,16,17</sup>

An association revealed that maximum dental caries experience was noticed in middle-aged employees, that is, among 41-50 years old. This can be related to the fact that young people tend to be more aware of the importance of oral health and maintenance of oral hygiene. In terms of gender, males were more prone to dental caries than females due to the apparent reason of males being engaged in the stressful work of bus driving. This was further reiterated by the fact that the bus drivers had maximum caries experience compared to other employees of NWKRTC. The prevalence of oral mucosal findings was 15.29% which was in contrast to the study by Gambhir et al. where it was found to be 1.9%, and Reddy et al., where the manifestation was seen to be 3.1%.<sup>11,18</sup> The most common reason that could be attributed to this particular scenario was tobacco consumption coupled with stress. Among the oral mucosal lesions, leukoplakia, in the form of whitish patches or plaque, was most commonly found, and it was associated with long-term exposure to different types of tobacco. Another important finding was the presence of Oral Submucous Fibrosis associated with areca nut and betel nut chewing seen more commonly in the subjects who had the habit of consuming Pan with slaked lime.

Almost half the examined population reported some tobacco habit with the prevalence being at 50.13%, which can be considered to be pretty high. It is also higher than the prevalence of tobacco habits in India, at 42%.<sup>19</sup> This result was similar to the study done by Parashari et al. where the prevalence of tobacco consumption among the long-distance bus drivers in Ghaziabad, Uttar Pradesh, was 50.1%, and a study by G Ayappa et al. where the prevalence among the bus drivers in Pune was 55.8%.<sup>8,4</sup> Tobacco is one of the leading causes of oral cancer in India and globally. More than 5 million people succumb to cancer caused by tobacco every year, and the number is expected to rise over the years. Many deaths are mainly reported in the countries belonging to low or medium-income strata.<sup>20</sup> The primary reasons for the frequent tobacco consumption among transport workers were

the stress at work due to long working hours and the fact that they stay away from home most of the time and are surrounded by their peers, which makes the environment conducive for tobacco consumption. Another essential factor of consideration is that the nicotine present in tobacco makes a person feel alert and awake for more extended periods. Since the bus drivers are on the wheel for long hours, they 'need' the tobacco to sustain themselves.<sup>21</sup> Some people even cited the reason that tobacco consumption made them feel 'mature' and respected in front of their friends and colleagues, which is consistent with other studies in this regard.<sup>22</sup>

One limitation that the study might have is the limited sample size. However, the study was conducted in the middle of a global pandemic of COVID-19 which was the main reason behind this limitation. The sample size was set at 600 after appropriate calculations. However, only 451 employees of NWKRTC could be included in the study. Even though lockdown was lifted in April, many people were still apprehensive of contracting the disease, primarily because of its high infectivity and moderate mortality rate. Therefore, only a few

employees worked in the Bus Depots on a rotation basis which led to a further compromise in the sample size. More studies can be done in the future, taking a larger sample size from all the districts of Belagavi city and allocating more time for data collection, so that a complete result can be obtained from them.

## CONCLUSION

The study revealed that the dental caries experience of the employees of NWKRTC was very high. There was a high prevalence of tobacco consumption, especially among the bus drivers, who used it to deal with the stress at work, stay alert and awake for long hours and under peer pressure. Quite a few of them also consumed alcohol with it. The prevalence of oral mucosal lesions was very high when compared to other studies done on the same population groups in other parts of India. Among the oral mucosal lesions, leukoplakia, a whitish plaque or patch on the buccal mucosa, was most commonly seen, followed closely by Oral Submucous Fibrosis. More indigenous research should be encouraged, especially among this population group so that there is an overall improvement in their oral health.

## REFERENCES

1. Sharda AJ, Shetty S. Relationship of periodontal status and dental caries status with oral health knowledge, attitude and behavior among professional students in India. *Int J Oral Sci* 2009;1:196-206. Available from: <https://doi.org/10.4248/IJOS09061>
2. Park K. Park's textbook of Preventive and Social medicine. 25th ed. New Delhi: Banarsidas Bhanot Publishers; 2019
3. Tirth A, Yadav V, Tangade PS, Ravishankar T, Chaudhary S, Mathur A. Assessment of Dental caries status, Periodontal health and oral hygiene practices among two Populations of Moradabad city, India. *International Journal of Occupational Safety and Health*, 3(2), 8–11. Available from: <https://doi.org/10.3126/ijosh.v3i2.6312>
4. Ayyappa G, Kunte R, Yadav AK, Basannar DR. Is occupation the "driving force" for tobacco consumption? A cross-sectional study to assess prevalence, patterns, and attitude towards tobacco use among long-distance bus drivers and conductors in Western Maharashtra. *Ind Psychiatry J*. 2019;28(2):237-41. Available from: [https://doi.org/10.4103/ipj.ipj\\_72\\_20](https://doi.org/10.4103/ipj.ipj_72_20)
5. Chandigarh Transport Undertaking [monograph on the internet]. Chandigarh: 2009. Department of Information Technology and National Informatics Centre, Chandigarh. Available from: <http://www.chandigarh.gov.in>
6. Aparna, S & Kumar, Pd. (2019). Assessment of oral health status and treatment needs of professional bus drivers in Chennai.2018; 6(2) 45-50. Available from: [https://doi.org/10.4103/ijcd.ijcd\\_8\\_18](https://doi.org/10.4103/ijcd.ijcd_8_18)
7. Bhatt B, Seema MS. Occupational health hazards: A study of bus drivers. *J Health Manage*. 2012;14:201–6. Available from: <https://doi.org/10.1177%2F097206341201400209>
8. Parashari A, Ahmad S, Asthana S, Saxena S. Tobacco use among drivers and conductors in Western Uttar Pradesh, India. *Indian J Community Health*. 2017;29:301–7. Available from: <https://doi.org/10.47203/IJCH.2017.v29i03.016>
9. Jiang X, Wu J, Wang J, Huang R. Tobacco and oral squamous cell carcinoma: A review of carcinogenic pathways. *Tob Induc Dis*. 2019;17:29. Published 2019 Apr 12. Available from: <https://doi.org/10.18332/tid/105844>
10. Abbas I, Mohammad SA, Peddireddy PR, Mocherla M, Koppula YR, Avidapu R. Oral Health Status of Underground Coal Mine Workers of Ramakrishnapur, Adilabad District, Telangana, India - A Cross-Sectional Study. *J Clin Diagn Res*. 2016;10(1):ZC28-

- ZC31. Available from: <https://doi.org/0.7860/JCDR/2016/15777.7059>
11. Gambhir RS, Sogi GM, Veerasha KL, Sohi RK, Randhawa A, Kakar H. Dental health status and treatment needs of transport workers of a northern Indian city: A cross-sectional study. *J Nat Sci Biol Med.* 2013;4(2):451-6. Available from: <https://doi.org/10.4103/0976-9668.117010>
  12. Rao BV, Suresh Babu AM, Kamalsha SK, Rao MS, Karthik K. Oral Health Status and Treatment Needs of Gunj Marketing Yard Laborers of Raichur City, Karnataka. *J Pharm Bioallied Sci.* 2017 Jul-Sep;9(3):195-200. Available from: [https://doi.org/10.4103/jpbs.JPBS\\_32\\_17](https://doi.org/10.4103/jpbs.JPBS_32_17). PMID: 28979074; PMCID: PMC5621182.
  13. Akrad ZT, Beitollahi JM, Khajetorab AA. DMFT (Decayed, Missing, Filled, Teeth) Oral health index in sweets and cable industry workers. *Iran J Public Health* 2006;35:64-8.
  14. Masalin K, Murtomaa H. Work-related behavioral and dental risk factors among confectionery workers. *Scand J Work Environ Health.* 1992;18(6):388-92. Available from: <https://doi.org/10.5271/sjweh.1558>
  15. Srikandi TW, Clarke NG. Periodontal status in a South Australian industrial population. *Community Dent Oral Epidemiol.* 1982;10(5):272-5. Available from: <https://doi.org/10.1111/j.1600-0528.1982.tb00393.x>
  16. Hamasha AA, Sasa I, Al-Qudah M. Risk indicators associated with tooth loss in Jordanian adults. *Community Dent Oral Epidemiol.* 2000;28(1):67-72. Available from: <https://doi.org/10.1034/j.1600-0528.2000.280109.x>
  17. Kawamura M, Iwamoto Y. Present state of dental health knowledge, attitudes/behaviour and perceived oral health of Japanese employees. *Int Dent J.* 1999;49(3):173-81. Available from: <https://doi.org/10.1002/j.1875-595x.1999.tb00903.x>
  18. Reddy S, Reddy C. Oral Health Status and Treatment Needs of Karnataka State Road Transport Corporation Drivers and Employees in Mysore Division. *J Indian Assoc Public Health Dent.* 2010;8:221-7. Available from: [https://doi.org/10.4103/ijcd.ijcd\\_8\\_18](https://doi.org/10.4103/ijcd.ijcd_8_18)
  19. Global Adult Tobacco Survey. Global Adult Tobacco Survey: Fact Sheet, Maharashtra 2016-17 Global Adult Tobacco Survey. 2017. Available from: [http://www.who.int/tobacco/surveillance/survey/gats/GATS\\_Maharashtra\\_2016-17\\_FactSheetpdf](http://www.who.int/tobacco/surveillance/survey/gats/GATS_Maharashtra_2016-17_FactSheetpdf)
  20. Mpower: A policy package to reverse the tobacco epidemic. World Health Organization, 2022 [cited 23 March 2022]. Available from: [https://apps.who.int/iris/bitstream/handle/10665/43888/9789241596633\\_eng.pdf](https://apps.who.int/iris/bitstream/handle/10665/43888/9789241596633_eng.pdf)
  21. Subba SH, Binu VS, Menezes RG, Ninan J, Rana MS. Tobacco chewing and associated factors among youth of western Nepal: A cross-sectional study. *Indian J Community Med.* 2011;36(2):128-32. Available from: <https://doi.org/10.4103/0970-0218.84132>
  22. Lalithambigai G, Rao A, Rajesh G, Ramya S, Pai BM. Predictors of cigarette smoking among young adults in Mangalore, India. *Asian Pac J Cancer Prev.* 2016;17:45-50. Available from: <https://doi.org/10.7314/APJCP.2016.17.1.45>