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Tobacco Use and Nicotine Dependence: Prevalence and Predictors Among Residents in Selected Slums of Kolkata

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ABSTRACT

Introduction: Tobacco use is one of the leading preventable causes of morbidity and mortality worldwide. In India, it accounts for nearly one million deaths annually, with both smoked and smokeless forms being widely consumed. Nicotine dependence is a critical barrier to successful cessation, yet evidence on its determinants remains limited.
Objective: To determine the prevalence of tobacco use, nicotine dependence and its predictor among tobacco users in selected slums of Kolkata.
Materials and Methods: A community-based descriptive cross-sectional study was conducted among 327 residents aged ≥15 years in the urban field practice area of a tertiary medical college, Kolkata, during April–May 2024. Participants were selected through simple random sampling. Data were collected using a pretested structured questionnaire including the Global Adult Tobacco Survey (GATS) and the Fagerström Test for Nicotine Dependence (FTND). Descriptive statistics were applied, and association was tested using chi-square, ANOVA, and binary logistic regression.
Results: The prevalence of tobacco use was 51%, of which 24% were smokers, 18% smokeless users, and 9% dual users. The mean (±SD) age of initiation was 18.7±4.3 years. High nicotine dependence was observed among 75.5% of smokers and 62.6% of smokeless users. Male gender (aOR: 2.35, 95% CI: 1.02–4.23), unmarried status (aOR: 1.8, 95% CI: 1.17–3.01), and higher socioeconomic class (aOR: 1.6, 95% CI: 1.0–2.5) were significantly associated with tobacco use. Age at initiation and duration of use were significantly associated with nicotine dependence.
Conclusion: Tobacco use and nicotine dependence were high in the study population. Focused interventions targeting adolescents, stricter enforcement of tobacco control laws, and provision of culturally sensitive cessation support are essential to reduce the burden.

Keywords: Tobacco use, Nicotine dependence, Global Adult Tobacco Survey (GATS), Fagerström test

INTRODUCTION

Tobacco use in both smoked and smokeless forms is recognized as the single most preventable cause of death and disability worldwide. The tobacco epidemic poses one of the greatest public health threats, claiming more than 8 million lives each year across the globe [1]. Nicotine, the primary addictive substance in tobacco, alters the mesolimbic pathway of the brain,

temporarily enhancing mood and physical sensations, which eventually leads to dependence [2]. Tobacco consumption is a well-established risk factor for multiple chronic illnesses such as stroke, cardiovascular diseases, respiratory disorders, and cancers, thereby contributing substantially to morbidity and mortality [3]. In India alone, tobacco use accounts for nearly one million deaths annually—far exceeding the combined mortality from malaria, tuberculosis, and HIV/AIDS. If current trends persist, tobacco will be responsible for nearly one billion deaths in the 21st century, with around 80% of these occurring in low- and middle-income countries such as India [1].

According to the Global Adult Tobacco Survey (2010), more than one-third (35%) of Indian adults consume tobacco—21% in smokeless form, 9% as smokers, and 5% in both forms. The overall prevalence was markedly higher among men (47.9%) compared to women (20.2%). The Global Youth Tobacco Survey (2009) further highlighted that 14.6% of school-going children aged 13–15 years reported using tobacco [1]. Regionally, the burden is also high: nearly four-fifths of the world's 1.1 billion smokers reside in low- and middle-income countries, with significant variation in prevalence across South-East Asia. For example, smoking among adult men ranges from 24.3% in India to 63.1% in Indonesia, while among women, rates vary from 0.4% in Sri Lanka to 15% in Myanmar and Nepal. Similarly, smokeless tobacco use among men ranges from 1.3% in Thailand to 31.8% in Myanmar, and among women from 4.6% in Nepal to 27.9% in Bangladesh [4].

Non-communicable diseases (NCDs) now account for about 55% of total deaths in the South-East Asia Region (SEAR), with premature mortality being a major concern. A substantial proportion of deaths—up to 60% in countries such as Timor-Leste and Bangladesh—occur before the age of 70 years [4]. Of the global tobacco-related deaths, more than 7 million are due to direct tobacco use, while around 1.3 million are attributed to exposure to second-hand smoke [5].

Given this rising burden, integrating tobacco control strategies into broader health system frameworks is essential for addressing the epidemic and reducing the impact of NCDs in SEAR countries [4,5]. While some studies in India have explored the prevalence of tobacco use, detailed data on nicotine dependence and its correlates remain limited. In this context, the present study was undertaken among adolescent tobacco users in selected slums of Kolkata to assess the prevalence of different levels of nicotine dependence and to identify the factors contributing to it.

MATERIALS & METHODS

This community-based, descriptive cross-sectional study was conducted among the residents of the slums in the urban field practice area of a medical college in Kolkata, during April-May 2024. Persons aged 15 years and above and residing in the area for at least 1 year were included in the study (as per the study population of GATS questionnaire),[6] whereas those who were seriously ill and refused to provide an informed consent to participate in the study were excluded.

Sample size and sampling technique:

Sample size was calculated using Cochran formula. Taking the prevalence of Tobacco use in an urban slum to be 73.9% as obtained in a study by Sarkar et al,[7] an absolute error of 5% and a non-response rate of 10%, a sample size of 327 was obtained. Households were selected by simple random sampling from the available list, maintained at Urban Health Training Centre (UHTC). One respondent was chosen per household who fulfilled the selection criteria. In case there were more than one eligible person, one of them was chosen by simple random sampling.

Study tools:

The study was conducted through face-to-face interviews using a pre-designed,

pretested, structured schedule which comprised of questions on sociodemographic profile of the study participants, Global Adult Tobacco Survey (GATS) questionnaire [6] to assess tobacco use and Fagerström Test for nicotine dependence [8]. The schedule was prepared in English and later translated into Bengali and Hindi with the guidance of language experts. Back translation into English was done by two other independent experts to check reliability. Pre-testing of the schedule was done among 20 adults residing in that area.

Data entry and Statistical Analysis

All responses were entered and analysed using MS Excel software and IBM SPSS software version 25.0.[9] Descriptive statistics were represented using frequency, percentages, mean and standard deviation. Fagerström Test for nicotine dependence was scored according to the available guidelines. A score of 0-2 was "very low", 3-4 was "low", 5 was "medium", 6-7 was "high" and 8-10 was considered as "very high" dependence. For the purpose of this study, very low and low categories were clubbed as "Low" whereas "high and very high were clubbed as "High". Chi-square test, Unpaired student t test, ANOVA. Binary Logistic regression analysis was performed to identify the factors associated with the tobacco use and nicotine dependence. A p value of <0.05 was considered statistically significant.

Ethical considerations:

Institutional ethics committee clearance and due written informed consent (assent wherever applicable) was obtained from each study participant. They were explained the nature of the study and assured about the confidentiality and anonymity of their information

Operational definitions:

Smokeless tobacco products: Those products that are not burned and smoked, but are sniffed through the nose, held in the mouth, chewed, or applied orally. [6]

Daily smokers/smokeless tobacco user: Those who smoke at least one smoked/smokeless tobacco product every day or nearly every day over a period of one month or more.[6]

Less than daily smoker/smokeless tobacco user: Those who use smoked/smokeless tobacco products but not every day.[6]

Stopped smoking/former smoker: Those respondents who have stopped smoking tobacco on a regular basis. Instances where the respondent might have smoked a tobacco product on a rare occasion or special occasion have been discounted.[6]

Dual users:-Those who use both smoked and smokeless tobacco products. [6

RESULT

The mean (±SD) age of the study participants was 40.77 (±17.21 years) and 31.19% were aged between 46-65 years. More than half (55%) of the study participants were female. The sociodemographic characteristics of the study participants are described in Table 1. Out of the 327 study participants, about 51% were found to be tobacco users of which 24% were smokers, 18% were smokeless tobacco users and 9% were dual users. (Fig 1) The mean± SD age of initiation of tobacco uses 21.7± 4.3 years with a range of 12-42 years. Bidi was the most frequently smoked tobacco product, smoked by over half (51.2%) of the tobacco users. On the other hand, khaini was the most used smokeless tobacco product, by 17.47% of the tobacco users. The other major smokeless tobacco product used were Gutka (14.45%), betel quid with tobacco (12.65%) and snuff (10.82). The age of initiation of 38.7% smokers and 37.5% smokeless tobacco users was 20-30 years. The frequency of use was daily for most of the smokers (71.7%) and smokeless tobacco (68.2) users. (Table 2). Among the smokers, 75.5% had low, 4.7% medium and 19.8% had high nicotine dependence, whereas, among the smokeless tobacco users, 62.6% had low, 7.9% moderate and 29.5% high nicotine dependence. (Fig 2). About 56% of

the smokers and 39% of the smokeless tobacco users attempted to quit tobacco use in the preceding 1 year and majority of them did so without any assistance. Almost half (41%) of the quit attempts lasted less than 24 hours. On binary logistic regression, significantly higher odds of tobacco use were reported among study participants who were male [aOR: 2.35, 95% C.I. 1.02-4.23], unmarried [aOR: 1.8, 95% C.I. 1.17-3.01] and those who belonged to upper socio-economic class [aOR: 1.6, 95% C.I. 1.0-2.5] (Table 3). Nicotine dependence was found to be significantly associated with age of initiation of and duration of tobacco use. (Table 4)

Table 1. Distribution of study participants according to sociodemographic characteristics (n=327)

Sociodemographic characteristics	n (%)
Age (in completed years)	
≤25	80 (24.46)
26-45	96 (29.36)
46-65	102 (31.19)
>65	49 (14.99)
Gender	
Male	147 (45)
Female	180 (55)
Religion	
Hinduism	294 (90.83)
Islam	30 (9.17)
Type of family	
Joint	118 (36.10)
Nuclear	209 (63.90)
Marital status (n=317)	
Married	217 (68.45)
Single	87 (27.40)
Other (widowed, divorced, separated)	13 (4.15)
Education	
Illiterate	31 (9.48)
Non-formal education	20 (6.12)
Primary level	49 (14.98)
Middle school	67 (20.49)
Secondary	59 (18.04)
Higher secondary	54 (16.51)
Graduate and above	47 (14.38)
Occupation	
Government employee	24 (7.34)
Non-government employee	48 (14.68)
Self-employed	103 (31.49)
Homemaker	47 (14.37)
Student	39 (11.92)
Unemployed	21 (6.42)
Retired	24 (7.34)
Elderly at home	21 (6.44)
Socio-economic class	
Upper class (I)	20 (6.11)
Upper middle class (II)	75 (22.93)
Middle class (III)	85 (25.99)
Lower middle class (IV)	104 (31.80)
Lower class (V)	43 (13.17)

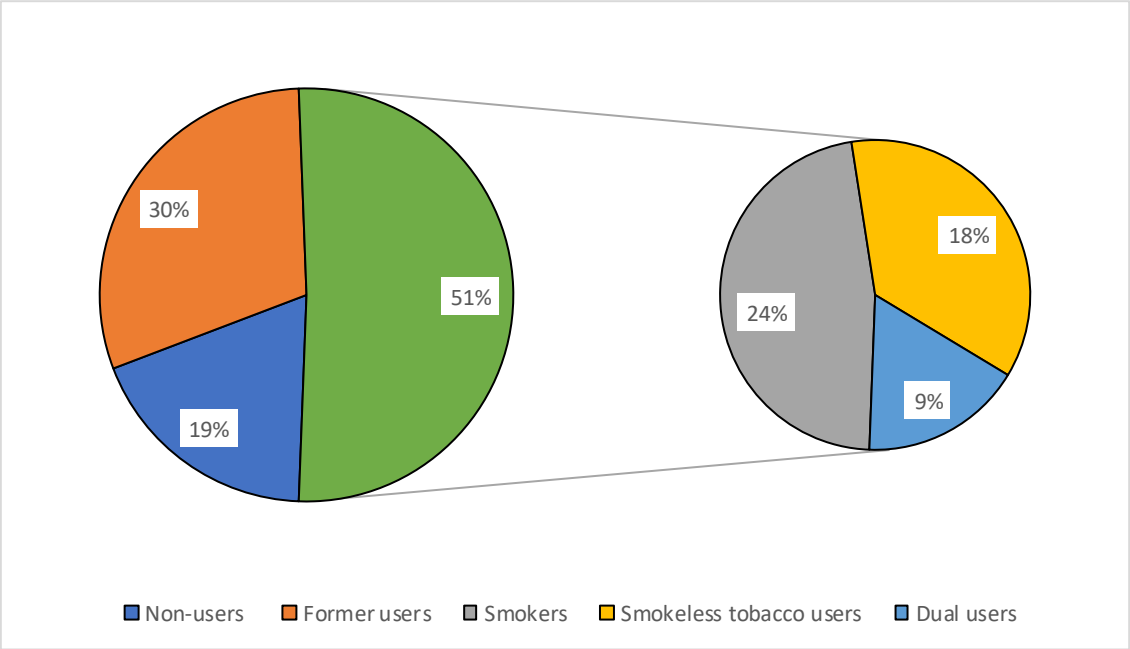

Fig 1. Distribution of study participants according to prevalence of tobacco use. (n=327)

Table 2. Distribution of tobacco users according to pattern of tobacco use (n=166*)

Pattern of tobacco use	Frequency (%)
Smoked tobacco	
• Cigarette	63 (37.8)
• Bidi	85 (51.2)
Smokeless tobacco	
• Khaini	29 (17.47)
• Gutka	24 (14.45)
• Gul	4 (3.4)
• Snuff by mouth	7 (4.20)
• Snuff by nose	11 (6.62)
• Betel quid with tobacco	21 (12.65)
• Pan masala with tobacco	4 (3.4)
* Multiple responses	

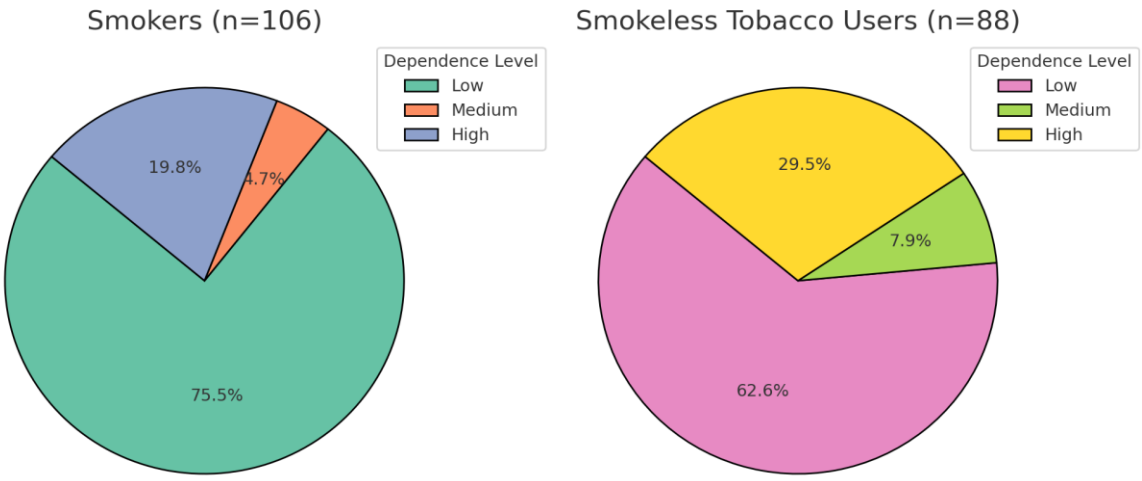

Fig. 2 Distribution of tobacco users according to nicotine dependence (n=166)

Table 3. Distribution of study participants according to factors associated with tobacco use (n=327)

Variables		Tobacco users n (%)	Non-users n (%)	aOR (95% C.I.)	p value
Age (in completed years)	< 40	93 (55.7)	85 (53.1)	1.88 (0.21-5.78)	0.64
	≥ 40	74 (44.3)	75 (46.9)	1	
Gender	Male	115 (68.9)	75 (46.9)	2.35 (1.02-4.23)	0.001
	Female	52 (31.1)	85 (53.1)	1	
Type of family	Joint	59 (35.3)	55 (34.4)	1.53 (0.11-2-95)	0.85
	Nuclear	108 (64.7)	105 (65.6)	1	
Marital status	Unmarried	67 (40.1)	42 (26.2)	1.88 (1.17-3.01)	0.007
	Married	100 (59.9)	118 (73.8)	1	
Education	Below secondary	85 (50.9)	74 (46.3)	2.77 (0.81-5.21)	0.40
	Secondary and above	82 (49.1)	86 (53.7)	1	
Occupation	Employed	110 (68.8)	97 (60.6)	1.25 (0.79-1.96)	0.32
	Unemployed	57 (31.2)	63 (39.4)	1	
Socioeconomic status	Upper class	75 (44.9)	54 (33.8)	1.6 (1.0-2.5)	0.04
	Lower class	92 (55.1)	106 (62.2)	1	

Table 4. Distribution of study participants according to factors associated with nicotine dependence (n=166)

Variables	Nicotine dependence			FTND score (mean ± SD)	p value (ANOVA)	p value (χ^2)
	Low	Medium	High			
Age of initiation (in years)						
<15	3 (7.5)	27 (28.4)	21 (67.8)	6.82±1.53	<0.001	<0.001
15-20	16 (40)	60 (63.2)	5 (16.1)	4.93±1.18		
>20	21 (52.5)	8 (8.4)	5 (16.1)	3.09±1.28		
Duration to tobacco use (in years)						
<10	11 (27.5)	18 (18.9)	3 (17.5)	4.54±1.83	0.001	0.002
10-20	24 (60)	59 (62.1)	18 (58.1)	5.07±1.66		
>20	5 (12.5)	18 (19)	10 (24.4)	6.18±2.25		
Frequency of use						
Daily	23 (57.5)	73 (76.8)	18 (58.1)	5.13±1.77	0.531	0.032
Less than daily	17 (42.5)	22 (23.2)	13 (41.9)	5.33±2.14		
Type of tobacco product						
Smoked	28 (70)	66 (69.5)	17 (41.5)	5.05±1.84	0.191	0.288
Smokeless	12 (30)	29 (30.5)	14 (58.5)	5.46±1.97		

DISCUSSION

This descriptive community-based study was conducted among 327 slum dwellers The study found the mean ±SD age of the study participants was 40.77 ±17.21 years and 31.19% were aged between 46-65 years which was comparable to 42.2 ± 16.2 years reported in a hospital-based study in West Bengal by Paul et al. [10]The present study found the Prevalence of tobacco use to be 51% wherein 24% and 18% of the study participants were found to be smokers and smokeless tobacco users respectively, and 9% were dual users. These findings were in line with those reported in a study by Paul et al,[10] where the overall prevalence of tobacco use was 51.5% and 11% used more than one form of tobacco simultaneously. On the other hand, a remarkably higher prevalence of tobacco use (73.9%) was reported in a study by Sarkar et al [7] conducted in slums of Shillong, and a lower prevalence only 20% was reported by Bhandari et al [11]. These differences may be attributed to the diverse study setting and population.

The mean (± SD) age of initiation of tobacco uses in this study 21.7± 4.3 years with a range of 12-42 years. Other studies have reported the age of initiation of tobacco use ranging from less than 11 to as high as 36.7 years. [7,11,12]. With respect to

the pattern of tobacco use, multiple responses were obtained in this study with bidi and khaini being the most used smoked and smokeless tobacco product respectively. This was in congruence with the study by Bhandari et al [11]. However, in a study by Hussain et al. [13], conducted among slum dwellers in Bengaluru, Cigarette and beetle quid with tobacco were the most frequently used product. The difference in pattern of use may be the consequence of difference in the population composition including differences in socio-economic backgrounds, personal preferences, and local customs. In this study, among smokers, 19.8% were found to have high nicotine dependence and among smokeless tobacco users 29.5% had high dependence. Contrary to these findings, a study by Kumar et al [14], reported 86% of the smokers and 69.6% of smokeless tobacco users had moderate to high levels of nicotine dependence. In a study by Saha et al [15] reported a lower prevalence of dependence at 57.7% and 41% of smoker and smokeless tobacco users respectively. These alarming figures of nicotine dependence is inevitably bound to impact the individuals with health as well as psychological and socio-economic consequences. High dependence also makes quitting particularly challenging as reflected in the findings of this study where about 56% of the smokers and 39% of the smokeless tobacco users attempted to quit tobacco in the preceding year. Most of them being unaware of the available interventions to aid quitting such as nicotine replacement therapy (NRT), tried quitting on their own, often resulting in unsuccessful quit attempts. This was validated in a study by Kumar et al [14] where inability to quit despite making attempts was found to be significantly associated with nicotine dependence. In a study by Saha et al. [15] nicotine dependence was found to be higher among those who had started using tobacco early (around 11-15 years of age).

One of the objectives of this study was to find the factors associated with tobacco use, and it was found that participants belonging to male gender, those who were unmarried and belonged to higher socio-economic class were more likely to use tobacco. Similarly, gender and marital status along with occupation, education and religion of the study participants were also reported to have a bearing upon tobacco use in multiple studies. [7,11, 16]

A study from Nepal reported that, nicotine dependency was found to be more with increase in duration of tobacco use and low socioeconomic status in case of smokeless and with smoking more than 10 cigarettes per day in case of smoking tobacco users.[17]The present study found that 56% of the smokers and 39% of the smokeless tobacco users attempted to quit tobacco use in the preceding 1 year and majority of them used no assistance; this finding was in agreement with the study by Divinakumar *et al*, where they found 52.9% had attempted quitting the habit more than once.[18] Another study conducted among university students in Delhi noted that 47% of the past smoker quit the habit by their own and had no effect of pictorial warning for quitting.[19]

CONCLUSION

Tobacco use was found to be highly prevalent among the study participant with an alarmingly low age of initiation. High nicotine dependence for both smoking and smokeless tobacco was also found among a considerable proportion of participants. To address this growing concern, targeted interventions are essential. Adolescents should be a primary focus of anti-tobacco campaigns. Health education programs must be implemented in schools through local health workers to raise awareness about the harmful effects of tobacco use. Level of nicotine dependence among them may help to determine the suitable plan of tobacco cessation including counselling and/or pharmacotherapy for an individual wishing to quit tobacco. Behaviour change communication strategies should be tailored to be age-appropriate and culturally sensitive, using peer educators and role models wherever possible. Enforcement of

existing tobacco control laws, such as prohibiting the sale of tobacco products to minors and near educational institutions, must be strengthened. A multi-sectoral approach involving health, education, law enforcement, and community organizations is key to reducing tobacco use.

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REFERENCES

1. World Health Organization. Tobacco [Internet]. Geneva: WHO; [cited 2024 Nov 28]. Available from: https://www.who.int/india/health-topics/tobacco
2. Kaur J, Sinha SK, Srivastava RK. Integration of tobacco cessation in general medical practice: Need of the hour. J Indian Med Assoc. 2011;109(12):925-8.
3. Raza H, John A, Nemmar A. Short-term effects of nose-only cigarette smoke exposure on glutathione redox homeostasis, cytochrome P450 1A1/2 and respiratory enzyme activities in mice tissues. Cell Physiol Biochem. 2013;31(4-5):683-92.
4. Thakur J, Narain J, Garg R, Menabde N. Tobacco use: A major risk factor for non-communicable diseases in South-East Asia region. Indian J Public Health. 2011;55(3):155-60.
5. Narain J, Sinha D. Tobacco epidemic in South-East Asia region: Challenges and progress in its control. Indian J Public Health. 2011;55(3):151-4.
6. International Institute for Population Sciences. Global Adult Tobacco Survey: India 2009–2010. New Delhi: Ministry of Health and Family Welfare, Government of India; 2010.
7. Sarkar A, Roy D, Nongpiur A. A population-based study on tobacco consumption in urban slums: Its prevalence, pattern, and determinants. J Family Med Prim Care. 2019;8(3):892-8.
8. Heatherton TF, Kozlowski LT, Frecker RC, Fagerström KO. The Fagerström test for nicotine dependence: A revision of the Fagerström Tolerance Questionnaire. Br J Addict. 1991;86(9):1119-27.
9. IBM Corp. IBM SPSS Statistics for Windows [Internet]. Armonk, NY: IBM Corp; 2024 [cited 2024 Nov 28]. Available from: https://www.ibm.com/spss
10. Paul R, Ghosh S, Bandyopadhyay D, Thakur I. Tobacco use behaviour in the urban population: A hospital-based study from Eastern India. J Indian Acad Clin Med. 2020;21(3-4):209-13.
11. Bhandari Y, Kishore J, Yadav A. Tobacco use and dependence among adults residing in an urbanized village, Delhi, India. J Family Med Prim Care. 2024;13(2):477-83.
12. Mukherjee K. Study on tobacco consumption patterns and its determinants in an urban slum in New Mumbai. Int J Epidemiol Res. 2018;5(2):58-63.
13. Hussain C, I H, Gopi A, Subramanyam G. Tobacco prevalence and usage pattern among Bengaluru urban slum dwellers. Int J Community Med Public Health. 2016;3(2):432-6.
14. Kumar R, Kant S, Chandra A, Krishnan A. Tobacco use and nicotine dependence among newly diagnosed pulmonary tuberculosis patients in Ballabgarh tuberculosis unit, Haryana. J Family Med Prim Care. 2020;9(6):2860-5.
15. Saha I, Islam K, Paul B, Som TK. Nicotine dependence and its correlates among the adult tobacco users in a slum of Burdwan district, West Bengal, India. J Family Med Prim Care. 2017;6(4):813-8.
16. Narayan KM, Chadha SL, Hanson RL, Tandon R, Shekhawat S, Fernandes RJ, et al. Prevalence and patterns of smoking in Delhi: Cross sectional study. BMJ. 1996;312(7046):1576-9.
17. Subedi K, Shrestha A, Bhagat T. Assessment of nicotine dependence among tobacco users visiting outreach programs in Dharan, Nepal: A cross-sectional study. BMC Public Health. 2021;21(1):1515.
18. Divinakumar KJ, Patra P, Prakash J, Daniel A. Prevalence and patterns of tobacco use and nicotine dependence among male industrial workers. Ind Psychiatry J. 2017;26(1):19-23.
19. Kamble BD, Acharya BP, Jethani S, Chellaiyan VG, Singh SK, Chaku S. Tobacco smoking habits and nicotine dependence among the college students of University of Delhi, India. J Family Med Prim Care. 2022;11(6):2965-70. doi: 10.4103/jfmpc.jfmpc_2172_21.

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