

# A population-based study on tobacco consumption in urban slums: Its prevalence, pattern, and determinants

Amrita Sarkar<sup>1</sup>, Debjit Roy<sup>2</sup>, Arvind Nongpiur<sup>2</sup>

<sup>1</sup>Department of Community Medicine, Tomo Riba Institute of Health and Medical Sciences, Arunachal Pradesh,

<sup>2</sup>Department of Psychiatry, North Eastern Indira Gandhi Regional Institute Health and Medical Sciences, Shillong, Meghalaya, India

## ABSTRACT

**Background:** India suffers from a huge burden of substance abuse and associated morbidity and mortality. Among all substance use, tobacco consumption is the most common and yet the most widely accepted one. This study aimed to estimate the prevalence of tobacco consumption, to find out the type of tobacco products used and to assess the factors influencing tobacco consumption in the slums of Shillong city. **Materials and Methods:** A cross-sectional, community-based study was carried out in 330 respondents aged 15 and above. Chi-square test was used to compare proportions, and Student's *t*-test was used to compare groups for continuous variables. **Results:** The prevalence of current tobacco consumption was found to be 73.9%, and the rate of quitting was found to be 4.3%. The prevalence of tobacco consumption was observed to be higher in males (52.4%) compared to 21.5% in females. Highly significant statistical association was observed between tobacco consumption and age, gender, and occupation. The statistical association between tobacco consumption and religion and education was found to be statistically significant. Ever use of tobacco in any form as well as smokeless form peaked in 24–34 years, while smoking was more prevalent among 15–24 year olds. The prevalence of smokeless tobacco was higher (47.5%) as compared to the prevalence of smoking (28.2%), closely followed by dual use (24.3%). The most popular smoked and smokeless forms were found to be cigarettes and khaini, respectively. **Conclusions:** Tobacco consumption was found to be highly prevalent and was much higher than the national average hinting toward its association with higher incidence of various malignancies in the region and calling for immediate action toward propelling its prevention and control by all stakeholders.

**Keywords:** Addiction, cancer, epidemic, non-communicable diseases, substance abuse

## Introduction

Tobacco-related health issues are preventable but still tobacco use kills more than 7 million people annually. The widespread tobacco epidemic is a major public health threat leading to premature deaths, poverty, and healthcare burden to the family and the nation. More than 6 million of those deaths are the result of direct tobacco use, while around 9 million are the result of nonsmokers being exposed to second-hand smoke. Globally, smoking alone causes about 71% of lung cancer, 42% of chronic respiratory diseases, and

about 10% of cardiovascular disease<sup>[1]</sup> and the burden magnifies with concurrent use of other forms of tobacco use. Low- and middle-income countries, such as India, which are a home to 80% of the smokers, suffer from the heaviest burden of tobacco-related morbidity and mortality.<sup>[2]</sup> India is the second largest producer as well as consumer of tobacco after China. Tobacco use is very rampant varying across different geographical regions of the country in both forms: smoking and smokeless. The use of tobacco in dual form makes its control even more challenging; this situation is made worse by the fact that the presence of nitrosamines makes smokeless tobacco (SLI) use more addictive than smoking form. In the north-eastern state of Meghalaya, where this study was conducted, the prevalence of tobacco use in men is 72% and

**Address for correspondence:** Dr. Debjit Roy,  
Senior Resident, Department of Psychiatry,  
North Eastern Indira Gandhi Regional Institute Health and  
Medical Sciences, Shillong, Meghalaya, India.  
E-mail: debjitraj@gmail.com

### Access this article online

#### Quick Response Code:



**Website:**  
www.jfmipc.com

**DOI:**  
10.4103/jfmipc.jfmipc\_42\_19

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**For reprints contact:** reprints@medknow.com

**How to cite this article:** 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;8:892-8.

32% in women, which is much higher than the national average of 45% in men and 7% in women.<sup>[3]</sup> The consumption of *Kvui* (betel quid), which often coexists with tobacco co-addiction, is a cultural norm in this state. The prevalence of tobacco consumption has been observed to be high in poor people.<sup>[4]</sup> It has been observed in low- and middle-income countries that people from households in the poorest quintiles are twice more likely to smoke than the wealthier ones.<sup>[5]</sup> Several epidemiological studies conducted in India have elicited higher rates of tobacco usage within the urban slum population.<sup>[6-8]</sup> According to the last census, 377 million people reside in urban slums<sup>[9]</sup> and, by 2026 it is estimated to plunge to 535 million.<sup>[10]</sup> With this background, this study on tobacco consumption was planned in urban slums in Shillong, the capital city of Meghalaya.

This study aimed to do the following:

1. Estimate the prevalence of tobacco and find out the type of tobacco products used
2. Assess the factors influencing tobacco consumption.

## Materials and Methods

### Study design

The study was a cross-sectional, community-based design, and it was carried out for four months during September to December 2016.

Study setting and population: All those who were aged 15 and above and residing in the selected slums were eligible for the study, as this age group was used in the Global Adult Tobacco Survey (GATS).<sup>[11]</sup>

### Sample size

The sample size was calculated using the formula  $N = Z_{1-\alpha/2}^2 \frac{P(1-p)}{\epsilon^2}$ , where

$N$  = Sample size

$1-\alpha$  = confidence level

$Z_{1-\alpha/2}$  = Represent the number of standard errors from the mean ( $Z_{1-\alpha/2}$  is function of confidence level).

$P$  = Anticipated population proportion

$Q$  =  $100-P$

$\epsilon$  = Relative precision.

At 95% confidence interval, taking prevalence ( $P$ ) as 55%,<sup>[11]</sup> and  $\epsilon$  as 10% of  $P$ , a sample size of 314 was calculated. We took a nonresponse rate of 5% of  $N$  (i.e., 15.7 rounded to 16) and so the modified sample size was 330.

Sampling: A multistage sampling design was adopted in the study. At the first stage, three slums were selected by convenient

sampling: Demseiniong, Pynthormukhrah, and Jhalupara were selected by convenient sampling, followed by selection of the three subunits from each slum by simple random sampling where each street formed the subunit. Then, through systematic random sampling procedure with a sampling interval of 2, that is, every second house was selected for the study: 330 eligible participants were selected. If in a selected family there was no participant meeting the inclusion criteria, then the adjacent house was taken up. Moreover, if more than one eligible candidate was available, then one of them was selected by simple random sampling.

### Inclusion criteria

Residents of the selected slums who were aged 15 and above and present during the time of visit.

### Exclusion criteria

Eligible candidates not willing to participate.

### Operational definitions

*Residents of the slums* were defined as those staying there for at least 6 months.<sup>[12]</sup> The study subject was classified as consuming tobacco in smoked form if he/she smoked cigarette and bidi (tobacco hand-rolled in dried tendu leaves). Other forms of smoked tobacco use were classified as “other smoking.” Smokeless tobacco use consisted of chewing gutkha or paan masala (industrially manufactured tobacco product containing scented tobacco mixed with lime and areca nut, in powder form), *betel quid with tobacco*, and *kbaini/sadha* (processed or dried tobacco leaf combined with slaked lime paste to keep in the buccal cavity for some time). Other forms of SLT were classified as “*other SLT*” and consisted of chewing paan with zarda (mixture of lime, pieces of areca nut, tobacco and spices wrapped in betel leaf), *snuff*, and *lal dantmanjan* (red tooth powder).

Tobacco use was classified as “*ever user*” defined as having used tobacco even once in their lifetime, “*current user*” defined as having used tobacco at least once in the last 30 days preceding the visit, and “*never user*” was defined as having not used tobacco even once in their lifetime.<sup>[13,14]</sup> Ever users who were not currently consuming any form of tobacco were considered as “*quit tobacco*” or “*ex-users*.”<sup>[14]</sup>

### Data collection

Data were collected by personal interview during house-to-house visit using a predesigned, pretested, and semistructured questionnaire. The languages used were English, Hindi, and Khasi. The questionnaire consists of three sections: (1) Sociodemographic profile: information on age, gender, education, occupation, religion etc., (2) History of tobacco consumption: current use of tobacco, past use of tobacco, form of consumption (smoking/smokeless/dual use), type of tobacco product used, co-addictions, number of tobacco products consumed on daily basis, duration of consumption, age of initiation of consumption, time of first use in the day, factors influencing consumption in the first place, daily expenditure and

exposure to second-hand smoke. (3) Cessation: questions related to advice to quit smoking by healthcare providers, quit attempts, methods to quit smoking, and reasons for failure in attempt.

### Ethical issues

Informed consent was taken from the participants of the study after fully explaining the study in a language they well understood. No biological sample was taken. Confidentiality was maintained.

### Data analysis

Data were entered in Microsoft Excel 2007. Data analysis was done using OpenEpi Version 3. Frequencies were calculated accordingly, and the unemployment rate was calculated by the formula number of unemployed individuals/labor force (i.e. unemployed plus employed individuals). Pack years were calculated from the average number of cigarettes and/or bidis smoked per day; 1 pack year taken as smoking 20 cigarettes or 80 bidis for 1 year.<sup>[14]</sup> Chi-square test was used to compare proportions, and Student's *t*-test was used to compare groups for continuous variables. Statistical significance (*P*-value) was set at a level of 0.05.

## Results

A total of 330 slum dwellers were approached for the study, and all of them consented, making the response rate 100%. Among the total respondents interviewed, 207 (62.7%) were male. The age of the respondents interviewed ranged from 15 to 82 years, and the highest number of participants 94 (28.5%), 84 (25.5%), and 71 (21.5%) belonged to the younger age groups of 15–24 years, 25–34 years, and 35–44 years, respectively. The mean age ( $\pm$ SD) of the respondents was  $34.7 \pm 13.8$  years. Literacy rate in this study was observed to be 86.1%, and majority, that is, 92 (27.9%) of the study subjects were educated up to high school. The unemployment rate was estimated to be 26.3%. Majority, that is, 76 (23%) of the participants were businesspersons by occupation. The most widely practiced religion among the participants was Hinduism, and 200 (60.6%) were Hindus. It was observed that as high as 244 (73.9%) and 255 (77.3%) were current users and ever users of tobacco in any form, making the rate of quitting 4.3%. The mean age of the current tobacco users are  $36.3 \pm 13.3$  years [Table 1] and the age of the tobacco users, both ever and current, varied from 16 years to 82 years.

In this study, age-specific prevalence of current tobacco consumers was highest in age groups 45–54, 35–44, and 55–64 years in the order that were 88.6%, 81.7%, and 80.8%, respectively; whereas, the crude prevalence of current tobacco consumers was highest in 25–34 years, which was 20% followed by 17.6% in 35–44 years and 15.6% in 15–24 years. The prevalence of tobacco consumption was 52.4%, which was higher in males compared to 21.5% in females and, it was observed that 173 (83.6%) of the 207 male participants versus 71 (57.7%) of the 123 females studied consumed tobacco in any form. It was observed that 54 (69.2%) of 78 participants who were not working consumed tobacco, making the prevalence highest in this

**Table 1: Profile of the respondents (n=330)**

Variables	Number of respondents (%)	Mean $\pm$ SD* (in years)
Gender		
Male	207 (62.7%)	
Female	123 (37.3%)	
Age (in completed years)		
15-24	94 (28.5%)	
25-34	84 (25.5%)	
35-44	71 (21.5%)	
45-54	44 (13.3%)	
55-64	26 (7.9%)	
>64	11 (3.3%)	
Range		15-82 years
Mean age of respondents $\pm$ SD*		34.7 $\pm$ 13.8
Mean age of males $\pm$ SD*		34.6 $\pm$ 13.9
Mean age of females $\pm$ SD*		34.9 $\pm$ 13.7
Education		
Illiterate	46 (13.93%)	
Primary School	43 (13.30%)	
Middle School	81 (24.54%)	
High School	92 (27.87%)	
Higher Secondary and above	68 (20.6%)	
Occupation		
Not working	78 (23.6%)	
Business	76 (23%)	
Driver	27 (8.2%)	
Peon	8 (2.4%)	
Laborer	40 (12.1%)	
Student	48 (14%)	
Others	53 (16.1%)	
Religion		
Christian	122 (37%)	
Hindu	200 (60.6%)	
Others	8 (2.4%)	
Tobacco consumption		36.3 $\pm$ 13.3
Never users	75 (22.7%)	
Current users	244 (73.9%)	
Quit tobacco use	11 (3.4%)	
Mean age of current users $\pm$ SD*		

\*Standard deviation

group, that is, 16.4%. The statistical association between tobacco consumption and age, gender, and occupation was found to be highly significant ( $P < 0.001$ ). The religion-specific prevalence was highest in “others” consisting of Muslims and *Seng Khasis* 7 (87.5%) followed by Christians 99 (81.1%) and Hindus 138 (69%). It was observed that the trend of tobacco consumption was highest in illiterates and participants with low-educational status. However, the crude prevalence of tobacco consumption was highest in Hindus (41.8%). The statistical association between tobacco consumption and religion and education was found to be statistically significant ( $P < 0.05$ ) [Table 2]. No statistically significant difference of age was observed in male and female current tobacco consumers [Table 3].

We observed that ever use of tobacco in any form as well as smokeless form peaked in 24–34 years and smoking was more

**Table 2: Association of current tobacco consumption with sociodemographic characteristics (n=330)**

Variables	Consumers (%) n=244	Nonconsumers (%) n=86	Total (%) n=330	Test statistic
Age in completed years				
15-24	52 (55.3%)	42 (44.7%)	94 (28.5%)	$\chi^2=25.633$ , df=5, P<0.001"
25-34	66 (78.6%)	18 (21.4%)	84 (25.5%)	
35-44	58 (81.7%)	13 (18.3%)	71 (21.5%)	
45-54	39 (88.6%)	5 (11.4%)	44 (13.3%)	
55-64	21 (80.8%)	5 (19.2%)	26 (7.9%)	
>64	8 (72.7%)	3 (27.3%)	11 (3.3%)	
Gender				$\chi^2=26.76$ , df=1, P<0.001"
Male	173 (83.6%)	34 (16.4%)	207 (62.7%)	
Female	71 (57.7%)	52 (42.3%)	123 (37.3%)	
Occupation				$\chi^2=63.46$ , df=6, P<0.001"
Not working	54 (69.2%)	24 (30.8%)	78 (23.6%)	
Business	64 (84.2%)	12 (15.8%)	76 (23.1%)	
Driver	26 (96.3%)	1 (3.7%)	27 (8.2%)	
Peon	7 (87.5%)	1 (12.5%)	8 (2.4%)	
Laborer	35 (87.5%)	5 (12.5%)	40 (12.1%)	
Student	15 (31.2%)	33 (68.8%)	48 (14.5%)	
Others	43 (81.1%)	10 (18.9%)	53 (16.1%)	
Religion				$\chi^2=6.585$ , df=2 P=0.037†
Christian	99 (81.1%)	23 (18.9%)	122 (37%)	
Hindu	138 (69%)	62 (31%)	200 (60.6%)	
Others	7 (87.5%)	1 (12.5%)	8 (2.4%)	
Education Status				$\chi^2=9.668$ , df=4 P=0.046†
Illiterate	38 (82.60%)	8 (17.39%)	46 (13.93%)	
Primary	31 (72.09%)	12 (27.90%)	43 (13.30%)	
Middle School	67 (82.71%)	14 (17.28%)	81 (24.54%)	
High School	65 (70.65%)	27 (29.34%)	92 (27.87%)	
Higher Secondary School and above	43 (63.2%)	25 (36.2%)	68 (20.6%)	

\*P-value<0.001 (highly significant statistical association), †P-value<0.05 (significant statistical association)

**Table 3: Difference in age of male and female current tobacco consumers (n=244)**

Variables	Frequency	Mean	Standard deviation	t Test
Male tobacco consumers	173	35.1 years	13.3 years	F statistics=1.03077
Female tobacco consumers	71	39.3 years	13.1 years	df=172, 70 P=0.902

\*P-value>0.05 (no significant statistical association)

prevalent among 15–24 year olds [Figure 1]. The study revealed that among the ever users, the use of SLT was more common 121 (47.5%) as compared to smoking tobacco 72 (28.2%), closely followed by dual use 62 (24.3%). It was observed that smoking was more popular in 15–24 years while SLT was the preferred form of consumption in the older age groups. It was elicited that none of the females practiced only smoking and 72 (96%) of them used SLT. Highly significant statistical association was observed between form of tobacco consumption and age, gender, and occupation, and significant statistical association was observed between form of tobacco consumption and religion and education of the tobacco consumers [Table 4].

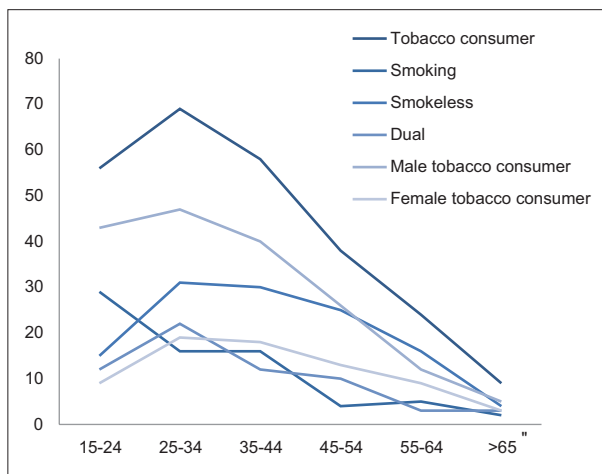
Cigarette 120 (47.1%) was found to be the most popular tobacco product used in the study population closely followed by khaini 108 (42.4%), betel quid with tobacco 72 (28.2%), paan masala or gutkha 48 (18.8%), and bidi 39 (15.3%). Although no other form of smoking was observed in this study, other SLTs such as paan chewing with tobacco and snuff were used by 10 (3.9%) [Figure 2].

## Discussion

In this cross-sectional study of 330 slum dwellers, a greater proportion (62.7%) of the sample was male. The mean age of the respondents was  $34.7 \pm 13.8$  years and was comparable to  $32.04 \pm 11.59$  years found in a study done in Delhi in 2014.<sup>[15]</sup> The prevalence of current tobacco consumption was found to be 73.9%. This was much higher than other studies done in India, Bangladesh, Nigeria, and Indonesia where the observed prevalence of current tobacco use was 34.6%, 33.4%, 5.5%, and 35.7%, respectively.<sup>[11,16-18]</sup> The prevalence of ever tobacco use (77.3%) was much higher in this study than the findings of a multicentric study done in Karachi, Delhi, and Chennai<sup>[19]</sup> but lower than another study done in slums of Bengaluru.<sup>[20]</sup> In our study, the rate of quitting was found to be 4.3%, which was comparable to other studies done in India.<sup>[11,20]</sup> However, in contrast to this finding, the rate of quitting is higher in the United States and other high-income countries.<sup>[21,22]</sup> We also observed that the mean age of the current tobacco users is

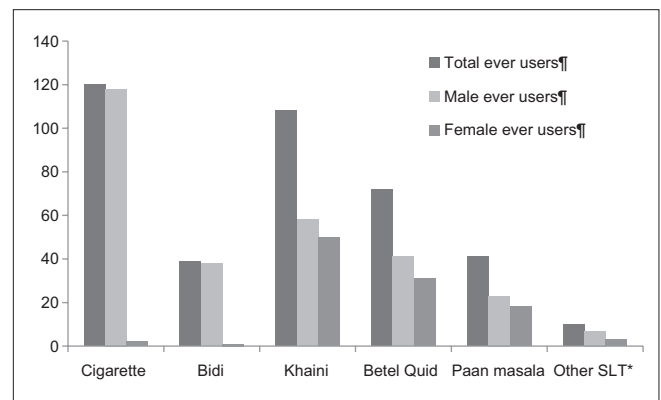
**Table 4: Association of form of tobacco consumption in ever users with sociodemographic characteristics (n=255)**

Variables	Smoking (%) n=72	Smokeless (%) n=121	Dual (%) n=62	Total (%) n=255	Test statistic
<b>Age</b>					
15-24	29 (51.8%)	15 (26.8%)	12 (21.4%)	56 (22%)	$\chi^2=30.03$ , df=10, P<0.001"
25-34	16 (23.2%)	31 (44.9%)	22 (31.9%)	69 (27.1%)	
35-44	16 (27.6%)	30 (51.7%)	12 (20.7%)	58 (22.8%)	
45-54	4 (10.5%)	25 (65.8%)	10 (25.6%)	39 (15.3%)	
55-64	5 (20.8%)	16 (66.7%)	3 (12.5%)	24 (9.4%)	
>64	2 (22.2%)	4 (44.5%)	3 (33.3%)	9 (3.5%)	
<b>Gender</b>					
Male	72 (40%)	49 (27.2%)	59 (32.8%)	180 (70.6%)	$\chi^2=100.8$ , df=2, P<0.001
Female	0 (0%)	72 (96%)	3 (4%)	75 (29.4%)	
<b>Occupation</b>					
Not working	0 (0%)	53 (92.9%)	4 (7.1%)	57 (22.4%)	$\chi^2=73.83$ , df=12, P<0.001"
Business	13 (41.9%)	10 (30.3%)	8 (25.8%)	31 (12.2%)	
Driver	13 (50%)	5 (19.2%)	8 (30.8%)	26 (10.2%)	
Peon	2 (28.6%)	3 (42.9%)	2 (28.5%)	7 (2.7%)	
Laborer	15 (42.9%)	8 (22.9%)	12 (34.2%)	35 (13.7%)	
Student	8 (47.1%)	5 (29.4%)	4 (23.5%)	17 (6.6%)	
Others	21 (25.6%)	37 (45.1%)	24 (29.3%)	82 (32.2%)	
<b>Religion</b>					
Christian	38 (37.6%)	34 (33.7%)	29 (28.7%)	101 (39.6%)	$\chi^2=15.95$ df=4 P=0.003†
Hindu	32 (21.8%)	85 (57.8%)	30 (20.4%)	147 (57.6%)	
Others	2 (28.6%)	2 (28.6%)	3 (42.8%)	7 (2.7%)	
<b>Education Status</b>					
Illiterate	8 (20%)	29 (72.5%)	3 (7.5%)	40 (15.7%)	$\chi^2=21.33$ df=8 P=0.006†
Primary School	8 (24.3%)	21 (63.6%)	4 (12.1%)	33 (12.9%)	
Middle School	20 (29.8%)	27 (40.4%)	20 (29.8%)	67 (26.3%)	
High School	24 (33.8%)	26 (36.6%)	21 (29.6%)	71 (27.8%)	
Higher Secondary School and above	12 (27.3%)	18 (40.9%)	14 (31.8%)	44 (17.3%)	

**Figure 1: Pattern of tobacco consumption in ever users (n = 255) ^ Age in completed years is plotted in the x-axis and frequency in the y-axis**

36.3 ± 13.3 years, and the age of the tobacco users varied from 16 years to 82 years.

In this study, age-specific prevalence of current tobacco consumers was highest in age groups 45–54 years (88.6%), 35–44 years (81.7%), and 55–64 years (80.8%). In contrast, the crude prevalence of current tobacco consumers was highest in 25–34 years (20%) followed by 17.6% in 35–44 years and 15.6%

**Figure 2: Pattern of use of various tobacco products (n = 255) \*SLT = smokeless tobacco, ^multiple response**

in 15–24 years. This trend was similar to World Health Survey carried out in 48 countries to determine the social determinants of smoking in low- and middle-income countries.<sup>[23]</sup> However, in the GATS study done in India, it was observed that the crude prevalence was higher in 45–65 years.<sup>[11]</sup> In this study, the prevalence of tobacco consumption was higher in males (52.4%) compared to 21.5% in females. The gender-specific prevalence, in our study, was as high as 83.6% in males and 57.7% in females. We observed no statistically significant difference of age in male and female current tobacco consumers. The

prevalence in both the groups was higher than the findings of two nationally representative studies, GATS and NFHS 4, in which the prevalence of current tobacco users was 47.9% in males and 20.3% in females and 44.5% in males and 6.8% in females, respectively.<sup>[11,24]</sup> However, male predominance was observed in most of the studies in India<sup>[11,19,24]</sup> suggesting that social norms against female tobacco use as an influencing factor. We also observed that the statistical association between tobacco consumption and age, gender, and occupation was highly significant. Hosseinpoor *et al.* also found that male gender was a social determinant of smoking in low- and middle-income countries.<sup>[23]</sup> Significant statistical observation between occupation and tobacco usage was observed in another Indian study.<sup>[25]</sup> The religion-specific prevalence was highest in “others” consisting of Muslims and *Seng Khasis* (87.5%) followed by Christians (81.1%) and Hindus (69%). However, the prevalence of tobacco consumption was highest in Hindus (41.8%). This might be due to the fact that most participants were Hindus. Religion was found to be significantly associated with smoking in a study done in Delhi.<sup>[25]</sup> It was observed that the trend of tobacco consumption was highest in illiterates and participants with low-educational status. The statistical association between tobacco consumption and religion and education was found to be statistically significant. Similarly, tobacco usage was found higher in illiterate men compared with higher secondary school-educated males in a study done by Narayan *et al.* in Delhi.<sup>[25]</sup>

We observed that ever use of tobacco in any form as well as smokeless form peaked in 24–34 years, smoking was more prevalent among 15–24 year olds. The prevalence of SLT was higher (47.5%) as compared to prevalence of smoking (28.2%), closely followed by dual use (24.3%). This may be due to the inexpensive pricing of SLT, lower perceived health hazards due to its use, as well its wide acceptance in the Indian society. It was observed that smoking was more popular in 15–24 years, while SLT was the preferred form of consumption in the older age groups. It was elicited that none 96% of the female tobacco consumers used only SLT. Highly significant statistical association was observed between form of tobacco consumption and age, gender, and occupation, and significant statistical association was observed between form of tobacco consumption and religion and education of the tobacco consumers.

In this study, respondents most commonly used cigarettes (47.1%) closely followed by khaini (42.4%), betel quid with tobacco (28.2%), paan masala or gutkha (18.8%), and bidi (15.3%). Higher use of cigarettes instead of the cheaper bidi points toward increased affordability in the population. In the study by Berg CJ *et al.* males in Chennai most commonly used cigarettes in Chennai (22.7%) and Karachi (20.8%) and bidis (15.5%) in Delhi while females used chewed tobacco in Chennai (3.1%) and Delhi (2.5%) and pan with zarda in Karachi (11.0%).<sup>[19]</sup> In the study done in the slums of Bengaluru, cigarettes and bidis were common smoking forms of tobacco, and betel quid with tobacco and paan masala (28.6%) were the most common smokeless forms.<sup>[20]</sup>

## Limitations

The findings in this study have the following limitations: first, these data apply only to residents of urban slums who were present at the time of visit, so the findings might not be generalized; second, the findings are based on self-reports and so may have suffered response bias. However, another study has been planned to include other urban areas of Shillong city for this reason. In addition, we had directly interviewed the tobacco consumers and so bias due to proxy reporting was eliminated.

## Conclusion

Tobacco consumption was found to be highly prevalent in the study areas and was much higher than the national average. Further studies may be done to find the association of higher incidence of cancers especially oropharyngeal cancers in this part of the country with tobacco consumption. The findings from our study show the need of targeted and customized interventions in various groups showing varied patterns of usage. Health professionals should focus on behavioral interventions for reducing the tobacco use along with the strict implementation of tobacco control measures by the government.

## Acknowledgement

The authors would like to thank all the respondents for their time and co-operation during the study.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## References

1. WHO Tobacco or Health. A Global Status Report. Geneva, World Health Organization; 1997.
2. World Health Organisation (WHO) Tobacco Fact Sheet. Available from: <http://www.who.int/mediacentre/factsheets/fs339/en/>. [Last accessed on 2017 Aug 02].
3. National Family Health Survey 4-, 2015-2016, Fact sheet Meghalaya. Ministry of Health & Family Welfare. Available from: [http://rchiips.org/NFHS/pdf/NFHS4/ML\\_FactSheet.pdf](http://rchiips.org/NFHS/pdf/NFHS4/ML_FactSheet.pdf).
4. World Health Organization: Tobacco: Deadly in Any Form or Disguise. Geneva: World Health Organization; 2006.
5. Efrogmson D, Ahmed S, Townsend J, Alam SM, Dey AR, Saha R, *et al.* Hungry for tobacco: An analysis of the economic impact of tobacco consumption on the poor in Bangladesh. *Tob Control* 2001;10:212-7.
6. Mukherjee K. Study on tobacco consumption patterns and its determinants in an urban slum in New Mumbai. *Int J Epidemiol Res* 2015;2:164-71.
7. Acharyya T, Kaur P, Murhekar MV. Prevalence of behavioral risk factors, overweight and hypertension in the urban slums of North 24 Parganas District, West Bengal, India, 2010. *Indian J Public Health* 2014;58:195-8.

8. Chockalingam K, Vedhachalam C, Rangasamy S, Sekar G, Adinarayanan S, Swaminathan S, *et al.* Prevalence of tobacco use in urban, semi urban and rural areas in and around Chennai City, India. *PLoS One* 2013;8:e76005.
9. Government of India. Census 2011 [cited on 2017 Jul 29]. Available from: [http://censusindia.gov.in/2011-prov-results/paper2/data\\_files/india/Rural\\_Urban\\_2011.pdf](http://censusindia.gov.in/2011-prov-results/paper2/data_files/india/Rural_Urban_2011.pdf).
10. Population projections for India and states 2001-2026: Report of the technical group on population projections constituted by the national commission on population. Office of the Registrar General and Census Commissioner, India. New Delhi [cited on 2017 Jul 29]. Available from: [http://gujhealth.gov.in/basicstatistics/pdf/Projection\\_Report.pdf](http://gujhealth.gov.in/basicstatistics/pdf/Projection_Report.pdf).
11. Global Adult Tobacco Survey (GATS): 2009-2010. Available from: [http://www.who.int/tobacco/surveillance/en\\_tfi\\_india\\_gats\\_fact\\_sheet.pdf](http://www.who.int/tobacco/surveillance/en_tfi_india_gats_fact_sheet.pdf). [Last accessed on 2017 Aug 20].
12. Khandker NN, Biswas T, Khan ANS, Hasib E, Rawal LB. Socio-demographic characteristics and tobacco use among the adults in urban slums of Dhaka, Bangladesh. *Tob Induc Dis* 2017;15:26.
13. Reynolds K, Liese AD, Anderson AM, Standiford D, Daniels SR, Waitzfelder B, *et al.* Prevalence of tobacco use and association between cardiometabolic risk factors and cigarette smoking in youth with type 1 or type 2 diabetes mellitus. *J Pediatr* 2011;158:594-601.e1.
14. Chhabra SK, Rajpal S, Gupta R. Patterns of smoking in Delhi and comparison of chronic respiratory morbidity among beedi and cigarette smokers. *Indian J Chest Dis Allied Sci* 2001;43:19-26.
15. Parashar M, Sharma N, Agarwalla R, Dwivedi S, Pathak R. Prevalence and correlates of tobacco chewing among construction site workers: A cross-sectional study in Delhi, *Indian J Med Spec* 2017;8:64-7.
16. Rahman K. Regional summary for the South-East Asia Region. In: Safey O, Dolwick S, Guindon GE, editors. *The 12<sup>th</sup> World Conference on Tobacco or Health. Tobacco Control Country Profile. (Monograph) 2<sup>nd</sup> ed.* Atlanta: American Cancer Society, WHO, International Union against Cancer; 2003. p. 38-40.
17. Global Adult Tobacco Survey. Nigeria Country Report. 2012. Available from: <http://nigerianstat.gov.ng/pages/download/157>. [Last accessed 2017 Aug 20].
18. Global Adult Tobacco Survey. Indonesia Report 2011. Available from: [http://www.who.int/tobacco/surveillance/survey/gats/indonesia\\_report.pdf](http://www.who.int/tobacco/surveillance/survey/gats/indonesia_report.pdf). [Last accessed 2017 Aug 20].
19. Berg CJ, Ajay VS, Ali MK, Kondal D, Khan HM, Shivashankar R, *et al.* A cross-sectional study of the prevalence and correlates of tobacco Use in Chennai, Delhi, and Karachi: Data from the CARRS study. *BMC Public Health* 2015;15:483.
20. Hussain CA, Saba HI, Gopi A, Subramanyam G. Tobacco prevalence and usage pattern among Bengaluru urban slum dwellers. *Int J Community Med Public Health* 2016;3:432-6.
21. Jha P, Ramasundarahettige C, Landsman V, Rostron B, Thun M, Anderson RN, *et al.* 21<sup>st</sup>-century hazards of smoking and benefits of cessation in the United States. *N Engl J Med* 2013;368:341-50.
22. Jha P, MacLennan M, Chaloupka FJ, Yurekli A, Ramasundarahettige C, Palipudi K. *et al.* Global hazards of tobacco and the benefits of smoking cessation and tobacco taxes in cancer. *Disease Control Priorities*. 3<sup>rd</sup> ed. 2015. p. 175-93.
23. Hosseinpoor AR, Parker LA, Tursan d'Espaignet E, Chatterji S. Social determinants of smoking in low- and middle-income countries: Results from the world health survey. *PLoS One* 2011;6:e20331.
24. National Family Health Survey 4-, 2015-2016, Fact sheet India. Ministry of Health & Family Welfare. Available from: <http://rchiips.org/NFHS/pdf/NFHS4/India.pdf>. [Last accessed on 2017 Aug 20].
25. 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;312:1576-9.