

# Patterns of Use and Perceptions of Harm of Smokeless Tobacco in Navi Mumbai, India and Dhaka, Bangladesh

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## ABSTRACT

**Background:** Globally, smokeless tobacco use is disproportionately concentrated in low-income and middle-income countries like India and Bangladesh. **Objectives:** The current study examined comparative patterns of use and perceptions of harm for different smokeless tobacco products among adults and youth in Navi Mumbai, India, and Dhaka, Bangladesh. **Methods:** Face-to-face interviews were conducted on tablets with adult (19 years and older) smokeless tobacco users and youth (16–18 years) users and non-users in Navi Mumbai ( $n = 1002$ ), and Dhaka ( $n = 1081$ ). **Results:** A majority (88.9%) of smokeless tobacco users reported daily use. Approximately one-fifth (20.4%) of the sample were mixed-users (used both smoked and smokeless tobacco), of which about half (54.4%) reported that they primarily used smokeless over smoked forms like cigarettes or bidis. The proportion of users planning to quit was higher in India than in Bangladesh (75.7% vs. 49.8%,  $p < 0.001$ ). *Gutkha* was the most commonly used smokeless product in India, and *pan masala* in Bangladesh. Among users in Bangladesh, the most commonly reported reason for using their usual product was the belief that it was “less harmful” than other types. Perceptions of harm also differed with respect to a respondent’s usual product. Bangladeshi respondents reported more negative attitudes toward smokeless tobacco compared to Indian respondents. **Conclusions:** The findings highlight the high daily use of smokeless tobacco, and the high prevalence of false beliefs about its harms. This set of findings reinforces the need to implement effective tobacco control strategies in low and middle-income countries like India and Bangladesh.

**Keywords:** Smokeless tobacco, India, Bangladesh, health knowledge, attitudes and practice, perceptions of harm.

## Key messages

False beliefs about the harmfulness of smokeless tobacco products were common in both India and Bangladesh, with more than half of users reporting that they chose

their usual product on the basis that it was “less harmful” than other types.

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Perceptions of harm differed with respect to a respondent's usual product. For example, while *gutkha* was rated as the most harmful smokeless tobacco product in India overall, respondents who used *gutkha* as their "usual product" perceived *zarda* as more harmful instead.

This set of findings reinforces the need to implement effective tobacco control strategies that include smokeless tobacco products in low and middle-income countries like India and Bangladesh.

## Introduction

India and Bangladesh have over 200 million smokeless tobacco users<sup>[1,2]</sup>—more than the rest of the world combined. Popular packaged forms of smokeless tobacco include *pan masala*, *gutkha*, *khaini*, *zarda*, *dokta*, *gudhaku*, and *gul*, all of which contain a mixture of ingredients like slaked lime and spices, in addition to tobacco. Another popular form of smokeless tobacco is *paan*, which is typically handmade using fresh, green betel leaf to wrap tobacco and other ingredients.

Indian and Bangladeshi smokeless tobacco products contain markedly higher levels of carcinogenic agents compared to smokeless products popular in the USA and Sweden.<sup>[3]</sup> This difference may be due to the addition of other ingredients used in the preparation of smokeless tobacco such as areca nut, which is itself carcinogenic.<sup>[4]</sup> Indeed, India has one of the highest incidences of oral cancer in the world.<sup>[5]</sup> Smokeless tobacco use in this context has also been linked with cardiovascular disease and addiction.<sup>[6-9]</sup> There is also a growing body of evidence supporting the link between smokeless tobacco use and negative reproductive health outcomes.<sup>[10-12]</sup> Despite evidence linking smokeless tobacco use with adverse health outcomes, knowledge of the health risks remains so low that it continues to be used for medicinal purposes in many communities.<sup>[13-16]</sup>

Prevalence estimates vary regionally, but overall, 33% of men and 18% of women use smokeless tobacco in India.<sup>[2]</sup> Among female users, over 85% use smokeless tobacco exclusively.<sup>[2]</sup> In Bangladesh, the prevalence of smokeless tobacco use among females actually exceeds that of males, at 28% and 26%, respectively.<sup>[1]</sup> The high prevalence of use reflects high levels of social acceptability within these countries.<sup>[13,16]</sup> The production and distribution of packaged forms of smokeless tobacco has recently been banned in all Indian states. However, it is unclear how well these bans are being enforced or whether they will prove effective in curbing consumption.<sup>[17,18]</sup>

Thus, communicating the health risks of tobacco use remains a priority for tobacco control, particularly in low and middle-income countries that are often characterized by limited access to health information, less exposure to

mass media campaigns, and lower literacy levels.<sup>[19]</sup> In order for a tobacco control strategy to be effective, it must first be informed by the local context. To date, numerous studies have examined patterns and predictors of smokeless tobacco use in India, and relatively few by comparison in Bangladesh.<sup>[14,20-26]</sup> The current study is among the first to examine comparative patterns of use and perceptions of harm of different smokeless tobacco products among adults and youth in India and Bangladesh.

## Materials and Methods

Face-to-face recruitment and interviews took place at 15 sites around Navi Mumbai, India (April 10 to August 6, 2012), and six sites around Dhaka, Bangladesh (May 9 to June 18, 2012). Sites were busy public areas, selected for geographic and demographic diversity. Interviewers recruited respondents using a standard intercept technique,<sup>[27]</sup> whereby a physical landmark was selected and every other person to pass it was approached in Navi Mumbai; in Dhaka, every third person to pass the landmark was approached in busy locations, which was increased to every person in locations with less pedestrian traffic. Interviews were conducted in the respondents' preferred language in India (English, Hindi, or Marathi), and in Bengali in Bangladesh. Interviewers read aloud questions to respondents and entered their responses into the tablets. Interviewers from local partner organizations were trained by the same team members to increase consistency between sites, and supervised by local research staff who monitored randomly in the field, to ensure study protocols were followed.

The adult (19 years and older) sample consisted of only smokeless tobacco users, whereas the youth (16–18 years) sample included both smokeless tobacco users and non-users, given the potential for future tobacco initiation among youth. Prior to beginning the interview, all respondents were provided with information about the study and asked to provide verbal consent. No personal information identifiers were collected. The study was reviewed by the Office of Research Ethics (University of Waterloo), the Healix-Sekharia Institute for Public Health and the Bangladesh Medical Research Council and received ethical clearance. Respondents were asked a series of socio demographic and psychosocial measures adapted from national International Tobacco Control Policy Evaluation Study surveys.<sup>[28,29]</sup>

## Measures

### Demographics

Demographic variables included *sex*, *age*, *education*, and *income*. For adults, education level was categorized as: 'Low' ("Illiterate"), 'Moderate' ("Middle school or less" in India; "Secondary school or less" in Bangladesh), or 'High' ("Secondary school" to "Graduate with degree/

diploma or more" in India; "SSC/HSC (9–12 years)" to "University degree" in Bangladesh).

For Indian youth, education was categorized as 'Low' ("Did not attend school", and "Primary school" to "Middle School (up to class VII)"), 'Moderate' ("Secondary school"), or 'High' ("Class XI (Higher Secondary)" or "Graduate (degree, diploma) or more"). For Bangladeshi youth, education was categorized as 'Low' ("Illiterate", "Literate (no formal education)", and "Primary (1–5 years)"), 'Moderate' ("Secondary school (6–8 years)"), or 'High' ("SSC"/"HSC" (9–12 years) or more).

Household income level was categorized as 'Low' (< 10,000 Indian rupee or INR (India); < 5000 Bangladeshi taka (Bangladesh)), 'Moderate' (10,000 to < 20,000 INR; 5000 to < 10,000 taka), 'High' (20,000 INR or more; 10,000 taka or more), or 'Not stated'. For reference, one US dollar is equivalent to approximately 60 INR, and about 80 taka.

### Smokeless tobacco use

Daily smokeless tobacco use was defined as using smokeless tobacco "every day". Non-daily smokeless tobacco use was defined as using smokeless tobacco "at least once a week", or "at least once in the last month". Among youth non-users, susceptibility to smokeless tobacco use was determined based on responses to three questions: 1) "Do you think in the future you might try using smokeless tobacco?", 2) "If one of your best friends were to offer you smokeless tobacco, would you use it?", and 3) "At any time during the next year, do you think you will use smokeless tobacco?". Respondents who reported a firm commitment not to use smokeless tobacco (i.e. "definitely not" for all three measures) were categorized as non-susceptible, and all others were categorized as susceptible, as per previous research on smoking susceptibility.<sup>[30]</sup>

### Quit intentions

Smokeless tobacco users were asked "Are you planning to quit... 1) Within the next month, 2) Within the next 6 months, 3) Sometime in the future, beyond 6 months, or 4) Not planning to quit". Quit intentions were categorized as 'Planning to quit' (first three response options) and 'Not planning to quit'.

### Usual smokeless tobacco product

Respondents were asked "Do you currently use any smokeless tobacco products at least once a month?" In India, response options included: *mishri*, *paan*, plain chewing tobacco, *gutkha*, *khaini*, *zarda*, tobacco toothpaste, nasal/oral snuff, *lal dantmanjan*, *dokta*, *gudhaku*, *gul*, or other. Response options in Bangladesh included: *zarda*, *paan*, *gul*, *sadapata*, *pan masala*, *nasshi*, or other. Respondents were asked the follow-up "Which of these products do you use most frequently?", and their responses comprised a Usual product variable.

### Reasons for use

Smokeless tobacco users were asked "In choosing this type of smokeless tobacco [referring to their Usual product], was part of your decision based on any of the following...1) The price, 2) This type is of high quality, or 3) This type is less harmful to my health", with the following response options for each reason: "Yes", "No", "Refused", and "Don't know".

### Mixed-use (Smokeless and smoked tobacco)

Respondents were asked "In the past month, have you used any of the following smoked tobacco products?" In India, response options included: cigarettes (factory made and roll-your-own), *bidis*, *hookah/shisha/narghile*/water pipe, cigars/small cigars/cigarillos, pipe, *chutta*, *hooklis*, or other. Response options in Bangladesh included: cigarettes (factory made and roll-your-own), *bidis*, *hookah/shisha/narghile*, or other. Respondents who reported using both smoked and smokeless tobacco products were then asked which they used most often: "Smoked tobacco", "Smokeless tobacco", or "Smoked and smokeless tobacco about the same"? Smokeless tobacco users who also selected any smoked tobacco product were classified as *mixed users*.

### Perceptions of harm about smokeless tobacco products

Respondents were asked to rank six popular smokeless tobacco products available in their country, from most harmful to least harmful (where 1 was 'most harmful' and 6 was 'least harmful'). The six products were selected based on previous research and local consultation (Table 3). The order was reverse-coded, and mean ranks for each product were computed, whereby higher numbers corresponded with greater perceptions of harm.

### Attitudes and beliefs about smokeless tobacco

Respondents were asked whether they "agree", "disagree", or "neither agree nor disagree" with each of the following statements. 1) "Indian [Bangladeshi] society disapproves of using smokeless tobacco", 2) "Smokeless tobacco is highly addictive", 3) "It is acceptable for women to use smokeless tobacco", 4) "Using smokeless tobacco sets a bad example for children", and 5) "Smokeless tobacco use is harmful to health". Item 3 was reverse-coded so that positive and negative responses were consistent with the direction of the other attitudes and beliefs. An *Attitudes and Beliefs Scale* was created by summing the number of 'agree' responses across the five items, to yield a score of 0–5, where lower scores indicated more positive attitudes and beliefs towards smokeless tobacco.

### Analysis

All analyses were conducted using SPSS version 22.0. Descriptive statistics including frequencies, chi-square

tests (for categorical variables), one-way ANOVA and *t* tests (for continuous variables), were conducted to examine differences between the Indian and Bangladeshi samples. Multiple linear regression models were used to examine the associations between country and individual-level predictors on attitudes and beliefs about smokeless tobacco (using the *Attitudes and Beliefs Scale* as the outcome measure).

In the model examining only adult users, *country*, *age*, ( $p < 0.001$ ) *sex*, *education*, *income*, *smokeless tobacco use* (daily user, non-daily user), *mixed-use*, and *quit intentions* were entered as covariates. In the model examining youth (users and non-users), *country*, *age*, *sex*, *education*, and *smokeless tobacco use* (daily user, non-daily user, susceptible non-user, non-susceptible non-user) were entered as covariates.

## Results

### Sample characteristics

In India, interviews were conducted in English ( $n = 33$ ), Hindi ( $n = 456$ ), and Marathi ( $n = 513$ ). In Bangladesh, all interviews were conducted in Bengali ( $n = 1081$ ). Fifty respondents had missing information, and were

not included in the analysis. Table 1 represents the characteristics of the adult and youth samples, by country.

Differences between the Indian and Bangladeshi samples were found for *age*, *quit intentions*, and *education*, for both adults and youth ( $p < 0.001$  for all comparisons). In addition, among adults, between-country differences were found in *income* level, ( $p < 0.001$ ) and *mixed-use* was significantly higher in Bangladesh in the adult sample ( $p = 0.002$ ). Among youth, between-country differences were found for *smokeless tobacco use* ( $p < 0.001$ ).

### Usual product and reasons for use

Table 2 represents the usual products reported by adults and youth in Navi Mumbai and Dhaka. In India, more than half (51.7%) of youth, and one-quarter (26.3%) of adults reported *gutkha* as their usual product. *Mishri*, *paan*, and *plain chewing tobacco* were also among the most popular 'usual products' for adults, whereas youth reported *mishri*, *plain chewing tobacco*, and *khaini* as their second, third, and fourth most popular 'usual products'. In Bangladesh, more than half of adult and youth users reported using *paan masala* as their 'usual product' (54.6% and 66.1%, respectively). *Zarda*, *gul*, and *paan* were also

**Table 1: Sample Characteristics for Adults and Youth in Navi Mumbai, India and Dhaka, Bangladesh (N = 2,083)**

	ADULTS (n = 1,071)			YOUTH (n = 1,012)		
	India % (n) (n = 502)	Bangladesh % (n) (n = 569)	Test statistic (p-value)	India % (n) (n = 500)	Bangladesh % (n) (n = 512)	Test statistic (p-value)
<b>Age (mean; SD)</b>	36.0 (9.2)	38.6 (12.5)	<b>t = 3.8 (p &lt; 0.001)</b>	17.5 (0.7)	17.1 (0.8)	<b>t = -7.4 (p &lt; 0.001)</b>
<b>Sex</b>						
Female	49.8 (250)	45.9 (261)	$X^2 = 1.6 (p = 0.22)$	50.0 (250)	49.6 (254)	$X^2 = 0.015 (p = 0.90)$
Male	50.2 (252)	54.1 (308)		50.0 (250)	50.4 (258)	
<b>Smokeless tobacco use</b>						
Daily user	93.6 (470)	94.4 (537)	$X^2 = 0.3 (p = 0.61)$	29.0 (145)	14.5 (74)	<b><math>X^2 = 49.6 (p &lt; 0.001)</math></b>
Non-daily user	6.4 (32)	5.6 (32)		5.8 (29)	11.8 (60)	
Non-user susceptible	–	–		21.2 (106)	15.4 (79)	
Non-user non-susceptible	–	–		44.0 (220)	58.4 (299)	
<b>Mixed-use</b>	16.9 (85)	24.8 (141)	<b><math>X^2 = 9.9 (p = 0.002)</math></b>	18.4 (32)	21.6 (29)	$X^2 = 0.504 (p = 0.50)$
<b>Quit intentions</b>						
Plans to quit	69.7 (350)	50.1 (284)	<b><math>X^2 = 42.5 (p &lt; 0.001)</math></b>	81.6 (142)	49.6 (66)	<b><math>X^2 = 35.3 (p &lt; 0.001)</math></b>
Not plans to quit	30.3 (152)	49.9 (283)		18.4 (32)	50.4 (67)	
<b>Income</b>						
Low	38.5 (193)	72.8 (412)	<b><math>X^2 = 131.0 (p &lt; 0.001)</math></b>	–	–	
Moderate	34.9 (175)	18.0 (102)		–	–	
High	10.4 (52)	3.0 (17)		–	–	
Not stated	16.2 (81)	6.2 (35)		–	–	
<b>Education</b>						
Low	3.8 (19)	31.5 (179)	<b><math>X^2 = 247.2 (p &lt; 0.001)</math></b>	20.0 (100)	36.3 (185)	<b><math>X^2 = 277.5 (p &lt; 0.001)</math></b>
Moderate	44.4 (223)	55.6 (316)		12.8 (64)	47.2 (240)	
High	51.8 (260)	12.9 (73)		67.1 (335)	16.5 (84)	

\*Test statistic denotes between-country differences (India vs. Bangladesh), within adult or youth sample. Significant differences bolded.



**Table 2: Percentage of smokeless tobacco users reporting their 'usual product', by country and age group (n = 1,339)**

INDIA	%	%
	Adults n = 494	Youth n = 174
Gutkha	26.3	51.7
Mishri	21.1	10.9
Paan	16.4	5.2
Plain chewing tobacco	13.6	10.3
Zarda	7.9	4.6
Nasal/oral snuff	6.5	4.6
Khaini	3.0	6.9
Tobacco toothpaste	2.4	1.1
Gul	1.2	0.0
Dokta	0.6	0.6
Lal dantmanjan	0.4	1.7
Gudhaku	0.2	2.3
BANGLADESH	Adults n = 556	Youth n = 115
Paan masala	54.6	66.1
Zarda	22.3	3.5
Gul	11.7	7.0
Paan	9.7	21.7
Sadapata	0.9	0.0
Nasshi	0.7	0.9

rated among the most popular 'usual products' for both adults and youth.

Figure 1 represents the percentages of smokeless tobacco users reporting various reasons for use of their usual product.

Among Indian youth, no differences were found in the proportions of smokeless tobacco users reporting that they chose their usual product based on the 'price', the 'quality', and the belief that it was 'less harmful' than other types (46.6%, 46.6%, and 47.7%, respectively).

Among Indian adults, significantly lower proportions reported that they selected their usual product because it was of higher quality (35.5%) compared to those who reported they selected their usual product because of the price (46.9%,  $X^2_{(df=1)} = 25.0, p < 0.001$ ), or the belief that it was less harmful (49.1%,  $X^2_{(df=1)} = 32.5, p < 0.001$ , respectively).

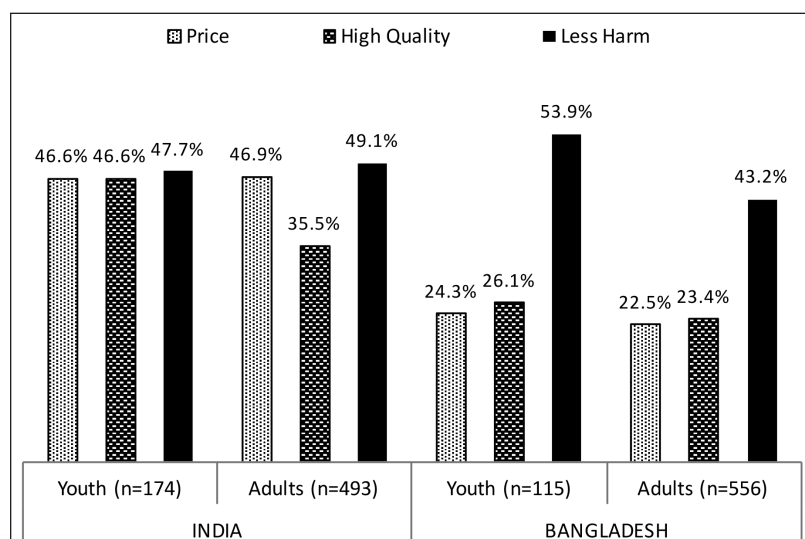
Bangladeshi youth reported 'less harm' (53.9%) as the primary reason for selecting their usual product, compared to beliefs about the products 'high quality' (26.1%) and 'price' (24.3%) ( $X^2_{(df=1)} = 28.4, p < 0.001$ ;  $X^2_{(df=1)} = 28.9, p < 0.001$ ). Similarly, 'less harm', was the primary reason that Bangladeshi adults reported for selecting their usual product (43.2%), compared to beliefs about 'high quality' (23.4%), and 'price' (22.5%) ( $X^2_{(df=1)} = 73.8, p < 0.001$ ;  $X^2_{(df=1)} = 66.5, p < 0.001$ ).

### Perceptions of harm of popular local smokeless tobacco products

Table 3 represents the mean rank scores of perceived harm for six local smokeless tobacco products available in each country, from most to least harmful.

Among Indian youth (users and non-users), *gutkha* was ranked as most harmful compared to other products. Among adults, *gutkha* and *zarda* were rated the most harmful. Bangladeshi adults and youth both ranked *gul* as most harmful. Overall, adults and youth ranked perceived harm similarly, with few exceptions.

Differences were found in perceptions of harm based on the type of product used by the respondent. In India, among usual users of *gutkha* (the most commonly used product), both adults and youth perceived *zarda* as most



**Figure 1:** Percentage of smokeless tobacco users reporting reasons for using their 'usual product', by country and age group (n = 1,338)

**Table 3: Mean rank score\* (SD) for perceived harm rankings of six local smokeless tobacco products, by country and age group (n = 1,835)**

INDIA						
	Gutkha	Zarda	Paan	Snuff	Mishri	Gudhaku
<b>Adults</b> n = 437	4.2 (1.6) <sup>a</sup>	4.2 (1.4) <sup>a</sup>	3.9 (1.5) <sup>b</sup>	3.4 (1.4) <sup>c</sup>	3.2 (1.8) <sup>c</sup>	2.1 (1.5) <sup>d</sup>
<b>Youth</b> n = 337	4.5 (1.5) <sup>a</sup>	4.1 (1.3) <sup>b</sup>	4.1 (1.4) <sup>b</sup>	3.6 (1.8) <sup>c</sup>	2.8 (1.3) <sup>d</sup>	1.9 (1.3) <sup>e</sup>
BANGLADESH						
	Gul	Zarda	Paan	Sadapata	Paan masala	Nasshi
<b>Adults</b> n = 568	5.0 (1.2) <sup>a</sup>	4.2 (1.4) <sup>b</sup>	3.7 (1.5) <sup>c</sup>	3.7 (1.3) <sup>c</sup>	2.2 (0.9) <sup>d</sup>	2.2 (1.7) <sup>d</sup>
<b>Youth</b> n = 493	4.9 (1.3) <sup>a</sup>	4.2 (1.3) <sup>b</sup>	4.0 (1.4) <sup>b</sup>	3.7 (1.5) <sup>c</sup>	2.2 (0.9) <sup>d</sup>	2.0 (1.6) <sup>e</sup>

\*Higher mean rank scores correspond with greater perceptions of harm. Different letters denote significant differences between mean rank scores, where  $p < 0.05$ .

harmful [mean rank = 4.4 (SD = 1.2) for adults; mean rank = 4.3 (SD = 1.2) for youth]. In Bangladesh, among usual users of *pan masala* (the most commonly used product), adults perceived *gul* to be most harmful [mean rank = 4.9 (SD = 1.3), whereas youth perceived *sadapata* to be most harmful [mean rank = 4.6 (SD = 1.3)].

#### Attitudes and beliefs towards smokeless tobacco: adults

Multiple linear regression models were conducted, with the *Attitudes and Beliefs Scale* as the dependent variable. Among adults, country ( $X^2_{(df=1)} = 42.4, p < 0.001$ ), income ( $X^2_{(df=3)} = 43.8, p < 0.001$ ), and quit intentions ( $X^2_{(df=1)} = 23.0, p < 0.001$ ) were significantly associated with the *Attitudes and Beliefs* scale. Respondents from Bangladesh ( $\beta = 0.69$ ; vs. India), those who were planning to quit ( $\beta = 0.43$ ; vs. not planning to quit), and those with low ( $\beta = 0.92$ ), moderate ( $\beta = 0.96$ ) or [high-income ( $\beta = 1.10$ ) levels vs. not stating income] reported more negative attitudes and beliefs about smokeless tobacco ( $p < 0.001$  for all contrasts).

#### Attitudes and beliefs towards smokeless tobacco: youth

In a model conducted among youth smokeless tobacco users and non-users, age ( $X^2_{(df=1)} = 5.8, p = 0.02$ ), sex ( $X^2_{(df=1)} = 4.1, p = 0.04$ ), country ( $X^2_{(df=1)} = 16.2, p < 0.001$ ), education ( $X^2_{(df=2)} = 19.6, p < 0.001$ ), and smokeless tobacco use ( $X^2_{(df=3)} = 100.7, p < 0.001$ ) were associated with the *Attitudes and Beliefs* scale. Older youth ( $\beta = 0.13, p = 0.02$ ), men ( $\beta = 0.17, p = 0.04$ ), and respondents in Bangladesh ( $\beta = 0.39; p < 0.001$ ) reported more negative attitudes and beliefs. Respondents with low levels of education reported more positive attitudes and beliefs than those with moderate ( $\beta = 0.34, p = 0.002$ ) or high ( $\beta = 0.49, p < 0.001$ ) levels of education. Daily smokeless tobacco users also reported more positive attitudes and beliefs than did non-daily users ( $\beta = 0.75, p < 0.001$ ), susceptible

non-users ( $\beta = 1.18, p < 0.001$ ) and non-susceptible non-users ( $\beta = 1.02, p < 0.001$ ). Lastly, non-daily smokeless tobacco users reported more positive attitudes and beliefs than susceptible non-users ( $\beta = 0.44, p < 0.001$ ).

## Discussion

Overall, the patterns of use observed in the present study are similar to findings from the Global Adult Tobacco Survey (GATS), a nationally representative household survey of adult smokeless tobacco users (15 years and older) in India and Bangladesh.<sup>[1,2]</sup> It is important to note that the adult sample in the current study was made up of entirely smokeless tobacco users, so prevalence of smokeless tobacco use cannot be estimated. However, it is possible to compare prevalence of use in the study's youth sample against national estimates, as it is made up of both smokeless tobacco users and non-users between the ages of 16 and 18 years. According to GATS data from India (which defines "adult" as those 15 years of age and above), the overall prevalence of smokeless tobacco use was 8.2% among women aged 15–24 years and 23.1% among men. The sample in the current study followed a similar pattern, with 13.0% of women and 21.8% of men aged 16–18 years reporting smokeless tobacco use. In Bangladesh, GATS data estimates the overall prevalence of smokeless tobacco use at 4.0% among women aged 15–24 years, and 9.3% among men. Smokeless tobacco in the current study sample was 6.2% of women and 19.9% of men aged 16–18 years. Although the general patterns are consistent with nationally representative data, estimates from the current study were higher, which could be due to a variety of factors, the most likely of which was the sampling method.

Among youth, daily smokeless tobacco users reported more positive attitudes and beliefs than non-daily users, and susceptible and non-susceptible non-users. In addition,

false beliefs about the harmfulness of smokeless tobacco products were common in both India and Bangladesh, with more than half of users reporting that they chose their usual product on the basis that it was “less harmful” than other types. Perceptions of harm also differed with respect to a respondent’s usual product. For example, while *gutkha* was rated as the most harmful smokeless tobacco product in India overall, respondents who used *gutkha* as their “usual product” perceived *zarda* to be most harmful instead.

This set of findings may be explained through Cognitive Dissonance theory.<sup>[31]</sup> In the context of tobacco use, this theory suggests that those with a greater dependence on tobacco may attempt to rationalize their behaviour to help overcome the dissonance they experience when faced with information that runs counter to their lifestyle choice. Further, these findings might also indicate an optimistic bias among smokeless tobacco users, particularly those with a “usual product”, in which they perceive their own product as “less harmful” than other products.<sup>[32,33]</sup> Thus, there is a need to communicate the health effects of smokeless tobacco use within these populations to try to address the false beliefs found in this and other studies.<sup>[13,14,16,34]</sup>

Aside from the burden of smokeless tobacco, Navi Mumbai in India and Dhaka in Bangladesh are substantially different with respect to culture and tobacco control policy environments. Thus, it was not surprising that country differences were observed. For example, with respect to youth, Indian respondents were more likely to be daily smokeless tobacco users, and non-users were more likely to be susceptible to smokeless tobacco use, compared to their Bangladeshi counterparts. These findings may highlight the influential role of the marketing environment in India, the ease of access, and permissive cultural and social norms with regards to the social acceptability of smokeless tobacco.<sup>[35]</sup>

Despite the tendency for Indian respondents to be either daily users, or susceptible non-users, the findings also demonstrate greater intentions to quit compared to their Bangladeshi counterparts. The longer history of tobacco control in India may help explain this difference. In 2006, India became the first country in the world to implement pictorial health warnings on smokeless tobacco packages. Further, in 2009 the first mass media campaign highlighting the harmful effects of smokeless tobacco from real-life users was aired on radio and television in India.<sup>[36]</sup> In recent years, Bangladesh has made progress with respect to some tobacco control policies; however, these policy changes may not have had enough time to penetrate the public’s understanding of smokeless tobacco issues the same way it has in India.

Overall, this set of findings reinforces the urgent need to implement effective tobacco control strategies that include smokeless tobacco products in low and middle-income countries like India and Bangladesh.

### Limitations

The current sample was not a probability-based or nationally representative sample, although study sites were selected to capture demographic diversity within the sampling areas. Therefore, caution is advised when generalizing the results from the present study to other regions. In particular, it is important to note the regional diversity of India. According to GATS data, the prevalence of current smokeless tobacco use varies markedly by state, ranging from 5% in Goato 49% in Bihar.<sup>[2,15]</sup> The current study was conducted in the state of Maharashtra, where the prevalence of smokeless tobacco use was around 28%.<sup>[2]</sup> The present study also has limitations common to survey research, including social desirability in self-reports. For example, Bangladeshi respondents agreed with more statements about negative attitudes and beliefs, a pattern that persisted across different levels of income, mixed-use, age, and quit intentions, possibly highlighting an increased level of social desirability in responding when compared to their Indian counterparts.

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### Conflicts of interest

There are no conflicts of interest.

### Disclaimer

The authors alone are responsible for the views expressed in this article and they do not necessarily represent the views, decisions or policies of the institutions with which they are affiliated.

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