

# Perceived effectiveness of text and pictorial health warnings for smokeless tobacco packages in Navi Mumbai, India, and Dhaka, Bangladesh: findings from an experimental study

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## ABSTRACT

**Objective** To examine the perceived effectiveness of text and pictorial smokeless tobacco health warnings in India and Bangladesh, including different types of message content.

**Methods** An experimental study was conducted in Navi Mumbai, India (n=1002), and Dhaka, Bangladesh (n=1081). Face-to-face interviews were conducted on tablets with adult (≥19 years) smokeless tobacco users and youth (16–18 years) users and non-users.

Respondents viewed warnings depicting five health effects, within one of the four randomly assigned warning label conditions (or message themes): (1) text-only, (2) symbolic pictorial, (3) graphic pictorial or (4) personal testimonial pictorial messages.

**Results** Text-only warnings were perceived as less effective than all of the pictorial styles (p<0.001 for all). Graphic warnings were given higher effectiveness ratings than symbolic or testimonial warnings (p<0.001). No differences were observed in levels of agreement with negative attitudes and beliefs across message themes, after respondents had viewed warnings.

**Conclusions** Pictorial warnings are more effective than text-only messages. Pictorial warnings depicting graphic health effects may have the greatest impact, consistent with research from high-income countries on cigarette warnings.

## INTRODUCTION

Smokeless tobacco use is disproportionately concentrated in low-and-middle income countries (LMICs), such as India and Bangladesh. Collectively, these two countries include about 200 million smokeless tobacco users<sup>1 2</sup>—more than those in the rest of the world combined. There are many varieties of smokeless tobacco available in India and Bangladesh. Popular packaged forms of smokeless tobacco include *pan masala*, *gutka* and *khaini*, all of which contain a mixture of ingredients such as slaked lime and spices, in addition to tobacco.

Prevalence estimates vary regionally, but overall, 33% of males and 18% of females use smokeless tobacco in India;<sup>2</sup> among female users, over 85% use smokeless tobacco exclusively.<sup>2</sup> In Bangladesh, smokeless tobacco use among females (28%) is comparable to males (26%).<sup>1</sup> The high prevalence of smokeless tobacco use reflects high levels of social acceptability within these countries.<sup>3 4</sup> The production and distribution of packaged forms of smokeless tobacco, including *gutka*, has recently

been banned in all Indian states.<sup>5</sup> However, it is unclear how well these bans are being enforced or whether they will curb consumption.<sup>6 7</sup>

Indian and Bangladeshi smokeless tobacco products contain markedly higher levels of carcinogenic agents compared to popular smokeless products in the USA and Sweden.<sup>8</sup> This difference may be due to the addition of other ingredients, such as areca nut, which is itself carcinogenic.<sup>9</sup> Indeed, India has one of the highest incidences of oral cancer in the world.<sup>10</sup> Smokeless tobacco use in this context has also been linked with cardiovascular disease and addiction.<sup>11–14</sup> Despite this evidence, knowledge of the health risks of smokeless tobacco remains so low that it continues to be used for medicinal purposes in many communities.<sup>3 4 15 16</sup>

Communicating the health risks of tobacco use remains a priority for tobacco control, particularly in LMICs, which are often characterised by limited access to health information, less exposure to mass media campaigns and lower literacy levels.<sup>17</sup> Health warnings on cigarette packages are one example of a cost-effective population-wide tobacco control strategy.<sup>18</sup> The WHO's Framework Convention on Tobacco Control (WHO FCTC) established international standards for packaging and health warnings: Article 11 mandates that warnings cover at least 30% of tobacco packages and recommends pictorial warnings that cover 50% or more of the pack.<sup>19</sup> India and Bangladesh are both signatory countries to the WHO FCTC.

In 2009, India became the first country in the world to require pictorial warnings for smokeless tobacco packages. Despite this precedent, the initial Indian warning depicting a symbolic image of a scorpion was considered 'diluted'.<sup>20 21</sup> After criticism from the public health community, the Indian Ministry of Health announced a subsequent set of warnings, this time with graphic images of oral cancer. Owing to industry interference, implementation was delayed and warnings did not appear on packages until May 2011.<sup>22 23</sup> In Bangladesh, health warnings are not required for smokeless tobacco packaging.

Pictorial health warnings have been shown to promote smoking cessation, and increase health knowledge and perceptions of risk, compared to text-only warnings;<sup>18</sup> however, this research is largely based in high-income countries (HICs). The limited studies conducted in LMICs, including Mauritius, China, Malaysia, Thailand and Mexico,<sup>24–28</sup> are

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## Research paper

consistent with evidence from HICs: pictorial health warnings are more effective in increasing health knowledge and motivation to quit than text-only warnings. Other studies conducted in LMICs, including two conducted in Mexico and one conducted in Brazil, Uruguay and Mexico, examined the impact of educational attainment on warning label effectiveness. Generally, the findings indicate that those with lower education gave higher perceived effectiveness ratings,<sup>29 30</sup> and individuals with higher education perceived warnings with testimonial-style content to be less effective than warnings with didactic information.<sup>31</sup> However, this evidence is entirely based on cigarette warnings.

To the best of our knowledge, only two published studies<sup>32 33</sup> have experimentally tested attributes of smokeless tobacco health warnings: one in the USA and one in Canada. The US study<sup>32</sup> examined design elements such as flavour descriptors and corporate branding, in addition to pictorial versus text health warnings. The findings demonstrated that pictorial warnings made respondents more likely to consider the health risks of smokeless tobacco use (vs text-only warnings). The Canadian study<sup>33</sup> demonstrated that pictorial warnings decreased product appeal and willingness to try the product (vs text-only or no health warning). Although these studies show promise for smokeless tobacco pictorial warnings, there remains a paucity of evidence specific to LMICs, which have a different context of use. The limited existing evidence includes six observational studies in India that demonstrate the ineffectiveness of the 2009 smokeless tobacco health warning (scorpion),<sup>20 21 23 34–36</sup> which has since been updated. Thus, there is little evidence to guide regulators on selecting content for smokeless tobacco health warnings in the two countries that bear the greatest burden of use. The current study is among the first to examine the perceived effectiveness of a set of novel health warning labels for smokeless tobacco packages among adults and youth in India and Bangladesh. Specifically, we sought to test the following hypotheses: (1) perceived effectiveness will be highest among graphic pictorial warnings and lowest for text-only warnings and (2) viewing health warnings will increase negative attitudes and beliefs about smokeless tobacco.

## METHODS

### Eligibility and consent

All respondents had to be at least 16 years of age. The adult sample ( $\geq 19$  years; no upper age limit) consisted only of smokeless tobacco users, whereas the youth sample (16–18 years) included both smokeless tobacco users and non-users, given the potential for future tobacco initiation. All respondents were given information about the study and asked to provide verbal consent. No personal identifiers were collected. Face-to-face interviews were conducted with tablets; interviewers read aloud questions to respondents and entered their responses. Interviews took 20–25 min to complete. In appreciation of their participation, Indian respondents received refreshments valued at about 100 Indian rupees (INR), approximately \$C2.00. Bangladeshi respondents were offered their choice of either a t-shirt or refreshment, valued at about 126 Bangladeshi taka (BDT), approximately \$C1.70.

Ethical clearance was received from the Office of Research Ethics (University of Waterloo), the Healis-Sekhsaria Institute for Public Health and the Bangladesh Medical Research Council.

### Protocol

Interviewers recruited respondents using an intercept technique,<sup>37</sup> whereby a physical landmark was selected and every

other person to pass it was approached in Navi Mumbai, India (10 April–6 August 2012). In Dhaka, Bangladesh (9 May–18 June 2012), every third person to pass the landmark was approached in busy locations, and 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 for Bangladeshi respondents.

In India, study sites included 15 areas around Navi Mumbai: 3 malls, 3 McDonald's locations, 4 market areas and 5 areas near schools/colleges. In Bangladesh, study sites included six locations around Dhaka City Corporation: two bus terminals, two areas near schools/colleges, and two public spaces near market and residential areas.

Respondents answered a series of demographic and smokeless tobacco use measures (adapted from International Tobacco Control Policy Evaluation Project surveys).<sup>38 39</sup> Respondents were then randomised (survey program software) into one of the four experimental conditions (or *message themes*): (1) text-only warning, (2) pictorial warning with symbolic imagery, (3) pictorial warning with a graphic health effect or (4) pictorial warning with a graphic health effect and personalised testimonial. Each respondent was shown a series of five health warnings within a particular condition, with each warning depicting one of the following five health effects: oral cancer, mouth disease, heart disease, addiction and death. Health warnings were shown as stand-alone warnings, not on smokeless tobacco packages. Presentation of health warnings was counterbalanced to minimise order effects (see online supplementary figure S1).

## Measures

### Sociodemographics

Sociodemographic variables included sex, age, education and income. For adults, education level was categorised 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 (Secondary school certificate)/HSC (Higher school certificate) (9–12 years)" to "University degree" in Bangladesh). For Indian youth, education was categorised 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 categorised 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 categorised as 'Low' (<10 000 INR; <5000 BDT), 'Moderate' (10 000 to <20 000 INR; 5000 to <10 000 BDT), 'High' (20 000 INR or more; 10 000 BDT or more), or 'Not stated'. For reference, one US dollar is equivalent to approximately 60 INR, and about 80 BDT.

### Smokeless tobacco use

*Daily smokeless* tobacco use was defined as using smokeless tobacco 'every day', and *non-daily smokeless* tobacco use as using 'at least once a week', or 'at least once in the last month'. Among youth *non-users*, susceptibility to smokeless tobacco use was 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 'definitely not' for all three measures were categorised

as *non-susceptible*, and all others were categorised as *susceptible*, as per previous research.<sup>40</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 categorised as 'Planning to quit' (first three response options) or 'Not planning to quit'.

### 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 and other. Response options in Bangladesh included: cigarettes (factory made and roll-your-own), bidis, hookah/shisha/narghile and other. Smokeless tobacco users who also selected any smoked tobacco product were classified as *mixed users*.

### Perceived effectiveness of health warnings

Respondents were asked to rate each warning individually using a numeric scale, where 1='not at all', 5='in the middle' and 10='extremely'. Four measures of perceived effectiveness were asked about, including whether the warning would: (1) "make people more concerned about the health risks of using smokeless tobacco"; (2) "help prevent young people from starting to use smokeless tobacco"; (3) "make smokeless tobacco users want to quit"; and (4) "overall, on a scale of 1–10, how effective is this health warning?". The four measures were highly correlated with one another (Cronbach's  $\alpha=0.97$ ); thus, only the measure of 'overall effectiveness' was used in the analysis. The 'overall effectiveness' measure was summed across the five warnings within each experimental condition and then divided by five (number of warnings in each condition), to yield a mean score between 1 and 10 for each condition.

### Attitudes and beliefs about smokeless tobacco

Attitudes and beliefs were assessed both before and after the presentation of health warnings.

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 females 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.

### ANALYSES

All analyses were conducted using SPSS V.22.0. Descriptive statistics, including frequencies,  $\chi^2$  tests (categorical variables), one-way analysis of variance and t tests (continuous variables), were conducted to examine differences between the Indian and Bangladeshi samples.

Generalised linear regression models were used to examine the effects of message theme, country and individual-level predictors on the perceived effectiveness of health warnings. In the model examining adults, message theme, country, age, sex, education, income, smokeless tobacco use (*daily users* and *nondaily users*), mixed use and quit intentions were entered as covariates.

In the model examining youth, message theme, country, age, sex, education and smokeless tobacco use (*daily users*, *nondaily users*, *susceptible nonusers* and *non-susceptible non-users*) were entered as covariates. Two-way interaction terms for message theme by socio-demographic and smokeless tobacco use variables were tested for each model.

McNemar  $\chi^2$  tests were conducted to test the difference between levels of agreement with the five attitudes and beliefs about smokeless tobacco before and after the presentation of health warnings. Logistic regression models were conducted to test the effect of message theme on each of the five attitudes and beliefs. Models were adjusted for attitudes and beliefs at baseline, age and country.

## RESULTS

### Sample characteristics

Table 1 presents the characteristics of the adult and youth samples, by country.

### Perceived effectiveness of health warnings: adults

Online supplementary table S2 presents the overall perceived effectiveness ratings (mean, (SD)) of warnings for each of the four experimental conditions. Among adults (n=1060), message theme ( $X^2_{(df=3)}=406.9$ ,  $p<0.001$ ), education ( $X^2_{(df=2)}=17.8$ ,  $p<0.001$ ), income ( $X^2_{(df=3)}=31.6$ ,  $p<0.001$ ) and quit intentions ( $X^2_{(df=1)}=99.6$ ,  $p<0.001$ ), were associated with ratings of perceived effectiveness.

Generalised linear regression models were conducted, with the measure of overall perceived effectiveness as the dependent variable. Text-only messages were rated as less effective than any of the pictorial warnings, including symbolic ( $b=-0.36$ ,  $p<0.01$ ), graphic ( $b=-2.22$ ,  $p<0.001$ ) and testimonial ( $b=-1.68$ ,  $p<0.001$ ). Among the pictorial themes, graphic health warnings were rated as more effective than symbolic ( $b=1.86$ ,  $p<0.001$ ) and testimonial warnings ( $b=0.54$ ,  $p<0.001$ ). Overall, illiterate respondents gave higher effectiveness ratings than their counterparts with low ( $b=0.56$ ,  $p<0.001$ ) and moderate/high ( $b=0.48$ ,  $p=0.01$ ) levels of education. Respondents with low ( $b=0.88$ ,  $p<0.001$ ), moderate ( $b=0.67$ ,  $p<0.001$ ) or high ( $b=0.82$ ,  $p<0.001$ ) income levels rated warnings as more effective compared to those who did not state their income. Those with no quit intentions rated warnings as less effective than those intending to quit ( $b=-0.43$ ,  $p=0.001$ ).

The message theme by country interaction ( $X^2_{(df=3)}=9.7$ ,  $p=0.02$ ) indicated that the effect of message theme (graphic warnings perceived as most effective, followed by testimonial warnings, symbolic warnings and text-only warnings) held for Bangladesh ( $p<0.01$  for all contrasts). In India, the same pattern was found, except text and symbolic warnings were not rated any differently than one another. Graphic health warnings were not rated differently between India and Bangladesh, nor were any differences observed in the ratings of text-only or testimonial warnings. However, respondents from Bangladesh perceived symbolic warnings to be more effective than their Indian counterparts did ( $b=0.51$ ,  $p=0.007$ ).

### Perceived effectiveness of health warnings: youth

Among youth (n=1001), message theme ( $X^2_{(df=3)}=665.3$ ,  $p<0.001$ ), country ( $X^2_{(df=1)}=32.4$ ,  $p<0.001$ ), education ( $X^2_{(df=2)}=11.4$ ,  $p=0.003$ ) and age ( $X^2_{(df=1)}=4.3$ ,  $p=0.04$ ) were significantly associated with perceived effectiveness. Similar to findings from the adult sample, text-only warnings were rated as less effective than all of the pictorial styles, including symbolic

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**Table 1** Sample characteristics for adults and youth in Navi Mumbai, India, and Dhaka, Bangladesh

	Adults (n=1071)			Youth (n=1012)		
	India (n=502)	Bangladesh (n=569)	Test statistics* (p value)	India (n=500)	Bangladesh (n=512)	Test statistics* (p value)
Age (mean; SD)†	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>
Sex (%)						
Female	49.8	45.9	$\chi^2=1.6$ (p=0.22)	50.0	49.6	$\chi^2=0.02$ (p=0.90)
Male	50.2	54.1		50.0	50.4	
Smokeless tobacco use (%)						
Daily user	93.6	94.4	$\chi^2=0.3$ (p=0.61)	29.0	14.5	<b><math>\chi^2=49.6</math> (p&lt;0.001)</b>
Non-daily user	6.4	5.6		5.8	11.8	
Non-user susceptible	–	–		21.2	15.4	
Non-user non-susceptible	–	–		44.0	58.4	
Mixed use (%) (smoked and smokeless)	16.9	24.8	<b><math>\chi^2=9.9</math> (p=0.002)</b>	18.4	21.6	$\chi^2=0.5$ (p=0.50)
Quit intentions‡ (%)						
Plans to quit	69.7	50.1	<b><math>\chi^2=42.5</math> (p&lt;0.001)</b>	81.6	49.6	<b><math>\chi^2=35.3</math> (p&lt;0.001)</b>
No plans to quit	30.3	49.9		18.4	50.4	
Income (%)						
Low	38.5	72.8	<b><math>\chi^2=131.0</math> (p&lt;0.001)</b>	–	–	
Moderate	34.9	18.0		–	–	
High	10.4	3.0		–	–	
Not stated	16.2	6.2		–	–	
Education (%)						
Low	3.8	31.5	<b><math>\chi^2=247.2</math> (p&lt;0.001)</b>	20.0	36.3	<b><math>\chi^2=277.5</math> (p&lt;0.001)</b>
Moderate	44.4	55.6		12.8	47.2	
High	51.8	12.9		67.1	16.5	

Bolded items represent statistical significance, where the p value is <0.05.

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

†Age range for Indian youth was 16–18 years; for Bangladeshi youth the age range was 16–18 years. For Indian adults the age range was 20–63 years; for Bangladeshi adults the age range was 19–80 years.

‡Among smokeless tobacco users.

( $b=-0.30$ ,  $p=0.01$ ), graphic ( $b=-2.59$ ,  $p<0.001$ ) and testimonial ( $b=-2.13$ ,  $p<0.001$ ). Among the pictorial themes, graphic health warnings were rated as most effective compared to symbolic ( $b=2.28$ ,  $p<0.001$ ) and testimonial health warnings ( $b=0.46$ ,  $p<0.001$ ). Indian youth gave higher effectiveness ratings than their Bangladeshi counterparts ( $b=0.62$ ,  $p<0.001$ ). Also, youth with moderate or high levels of education (vs illiterate/low), and those who were younger (vs older), gave higher effectiveness ratings ( $p<0.05$  for all contrasts).

Significant interactions included message theme by country ( $X^2_{(df=3)}=9.2$ ,  $p=0.03$ ) and message theme by education ( $X^2_{(df=6)}=13.6$ ,  $p=0.04$ ). Although the general pattern was consistent, the effect of message theme was not significant for every level in either country. Bangladeshi youth gave lower effectiveness ratings for text-only, symbolic and graphic warnings than Indian youth ( $p<0.05$  for all contrasts), but no country differences were observed in the ratings of testimonial warnings. The pattern observed for the main effect of education (described above) did not hold across any of the four message themes. Among youth who had viewed text-only warnings, those with high education gave lower ratings than those with illiterate/low or moderate levels of education ( $b=-0.50$ ,  $p=0.03$  and  $b=-0.26$ ,  $p=0.002$ ). Among those who viewed graphic warnings, those with moderate education gave higher ratings than those with either illiterate/low or high levels of education ( $b=0.50$ ,  $p=0.03$  and  $b=0.78$ ,  $p=0.002$ ). Among those who viewed testimonial warnings, those with moderate education (vs illiterate/low) gave higher ratings ( $b=0.64$ ,  $p=0.005$ ). Effectiveness ratings did not differ by level of education for respondents who viewed symbolic health warnings.

### Impact of health warnings on attitudes and beliefs about smokeless tobacco

Table 2 presents the change in levels of agreement with the five negative attitudes and beliefs about smokeless tobacco. Online supplementary table S4 presents the percentages of respondents who agreed with these attitudes and beliefs.

Logistic regression models were conducted to test the effect of message theme on each of the five attitudes and beliefs. No differences were found in levels of agreement with negative attitudes and beliefs across message themes.

### DISCUSSION

Pictorial warnings were perceived to have greater efficacy than text-only warnings, similar to previous research conducted in high-income countries for health warnings on cigarette packs.<sup>18</sup> Across all pictorial warnings, graphic warnings depicting gruesome health effects were perceived as most effective, even over warnings with personal testimonials. These findings are in line with marketing research, which suggests that negative emotions such as fear and disgust underlie the effectiveness of warnings.<sup>41–44</sup> Although some neurophysiological data suggest gruesome images may elicit ‘defensive avoidance’,<sup>45–46</sup> experimental and population-based studies have failed to detect any significant adverse outcomes from defensive reactions such as avoidance.<sup>47–49</sup> Further, a recent study<sup>50</sup> that examined the impact of cigarette warnings on quit attempts via mediational pathways found that avoidance behaviour actually increased the frequency of thinking about the harmful effects of smoking.

Unlike ratings of perceived effectiveness—no differences were observed in levels of negative attitudes and beliefs across

**Table 2** Per cent change in agreement with five attitudes and beliefs about smokeless tobacco, before and after presentation of health warnings, across message themes

	Text						Symbolic						Graphic						Testimonial					
	Adult		Youth		Youth		Adult		Youth		Youth		Adult		Youth		Adult		Youth		Adult		Youth	
	IN	BD	IN	BD	IN	BD	IN	BD	IN	BD	IN	BD	IN	BD	IN	BD	IN	BD	IN	BD	IN	BD		
Harmful to health	+10.4	+12.6***	+3.4	+9.5**	+7.9	+10.7**	+1.6	+5.2	+4.9	+14.7***	-4.9	+11.2***	+14.3*	+18.7***	-3.2	+10.1**								
Society disapproves	+13.6***	+14.0***	0.0	+10.0**	+9.4*	+5.0	+9.6**	+2.6	+8.8*	+11.2***	+8.9*	+10.4**	+10.3*	+22.9***	+2.4	+11.7***								
Bad example for children	+6.7	+7.0*	+3.9	+7.9*	+6.3	+10.0**	-8.9	+8.7**	+2.4	+10.4**	+5.2	+11.9**	+9.5	+18.8***	-6.4	+8.7								
Not acceptable for females	+14.8*	+5.6	+2.4	+7.7	+8.6	+2.8	+15.7**	-0.5	+10.6	+6.1	-3.5	+5.2	+4.7	+17.4***	+2.7	+4.2								
Addictive	+9.6	-2.1	+2.4	+1.6	-1.6	+4.3	+6.7	+0.9	+0.6	-0.8	+3.0	+0.8	+13.8**	-2.7	+2.4	+2.3								

Bolded items represent statistical significance, where the p value is <0.05.

Numbers in the table represent the difference in the percentages of respondents agreeing with the attitude/belief about smokeless tobacco before and after viewing health warnings. Positive numbers indicate an increase in negative attitudes and beliefs.

McNemar  $\chi^2$  tests were used to assess differences between percentages.

\*Significant difference (at \*p<0.05, \*\*p<0.01, \*\*\*p<0.001) between percentages agreeing before vs after viewing warnings.

BD, Bangladesh; IN, India.

message themes. Had the health warnings been presented on specific smokeless tobacco products (instead of as stand-alone warnings), and had the questions asked about these specific products (instead of smokeless tobacco in general), the results might have been more reflective of the differences between message themes (ie, text vs graphic), and shown a difference in attitudes and beliefs across themes.

At the outset, it was unknown whether personal testimonials—a narrative communication strategy suggested as promising for cancer prevention and control<sup>51</sup>—would prove more or less effective than graphic warnings without a personal narrative. Testimonials may be particularly impactful in countries with traditions of sharing knowledge through storytelling. In this study, testimonial health warnings had greater efficacy than both text and symbolic health warnings, however, no differences were observed across message themes for negative attitudes and beliefs. The reason for the lack of differences may be partly due to the medium of communication. Using print media (in this case, health warnings) with short quotes from unknown people is quite different from storytelling. Further, due to the experimental nature of this study, exposure to health warnings was immediate and testimonials may not have had the same initial impact as graphic warnings, however, they may have had greater longer term impacts. Additional research examining message content and its impact over time is needed.

Tailored health messages may promote greater acceptance and identification.<sup>52–53</sup> For example, India's first smokeless tobacco mass media campaign was tailored to a younger audience and included a testimonial from a 24-year-old man with advanced oral cancer.<sup>54</sup> The success of the radio ad led to the production of a television ad and billboards with the same testimonial message. An Australian study that examined testimonial health messages found that indigenous smokers rated a tailored antitobacco ad significantly higher on all measures of effectiveness, compared to their non-indigenous counterparts.<sup>55</sup> Additional research on the impacts of tailored messaging among different cultural groups is needed.

In the current study, those intending to quit rated warnings as more effective than those without any quit intentions. According to the Transtheoretical Model of Behavior Change,<sup>56</sup> respondents with no quit intentions, or 'pre-contemplators', may be attempting to rationalise their behaviour by discounting information that is in direct opposition to their lifestyle choices, and thus giving lower effectiveness scores.<sup>57</sup> As such, future research examining tobacco control strategies targeted to this group of perhaps more dependent users may be needed to help understand and overcome the possible dissonance observed in this study.

Findings were mixed with respect to education. Among adults, those who were illiterate tended to give higher effectiveness ratings than those with higher education levels, similar to previous studies.<sup>29–30</sup> This finding has particular importance given the lower literacy rates in India and Bangladesh (approximately 60%),<sup>58–59</sup> and reinforces the importance of pictorial warnings. Among youth, the opposite pattern was observed. Furthermore, the interaction effect indicated that this pattern did not hold across the different message themes. Future research should examine the impact of different design elements and message content across educational attainment, as well as smokeless tobacco use dependence, to ensure that warning messages reduce, rather than exacerbate, disparities in tobacco use.

Despite having different policy and cultural environments, respondents in India and Bangladesh consistently gave graphic warnings the highest perceived effectiveness ratings. This is particularly interesting in light of the longer history of tobacco control in India, and implies that Indian respondents had not

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become habituated to the existing health warnings. Presumably, the warnings would be more novel in Bangladesh.

Overall, these findings mirror patterns found in high-income countries, with respect to cigarette warnings. Furthermore, cross-country research in the domain of antitobacco television ads has found similar results. Wakefield *et al*<sup>60</sup> tested five Australian-based and US-based television ads with varying message content (graphic health effects, a personal testimonial and symbolic imagery) in 10 LMICs, including India and Bangladesh. Ads depicting graphic health effects were perceived as most effective across all countries, whereas the personal testimonial ad was given the lowest ratings across all measures of perceived effectiveness. Together, these findings suggest that the ways in which individuals respond to different types of message content may be similar across diverse cultural environments.

### Limitations

The current sample was not nationally representative, although study sites were selected to capture demographic diversity. Caution is advised when generalising the results from the present study to other regions. In particular, it is important to note the regional diversity of India. According to Global Adult Tobacco Survey data, prevalence of current smokeless tobacco use varies dramatically by state, ranging from approximately 5% in Goa to approximately 49% in Bihar.<sup>2</sup> The current study was conducted in the state of Maharashtra, where the prevalence of smokeless tobacco use was around 28%.<sup>2</sup> Also, given the experimental nature of the study, it was not possible to mimic the effects of 'real-world' exposure to health warnings, where users see the warnings multiple times over prolonged periods of time, rather than viewing them once.

Baseline percentages for Attitudes and Beliefs between experimental conditions suggest the randomisation may not have worked well for this measure. However, the main tests were conducted on the difference-change scores, which accounts for some of the differences observed at baseline.

The present study also has limitations common to survey research, including social desirability in self-reports. For example, Bangladeshi respondents reported higher baseline levels of negative attitudes and beliefs, possibly highlighting a heightened level of social desirability when compared to their Indian counterparts. In addition, the method of data collection may have contributed to an increase in socially desirable responses—interviewers entered responses into the tablet themselves.

### What this paper adds

- ▶ The current study is among the first to examine the perceived effectiveness of a set of novel health warning labels for smokeless tobacco packages among adults and youth in India and Bangladesh—two countries that bear the greatest burden of smokeless tobacco use worldwide.
- ▶ Pictorial warnings depicting graphic health effects may have the greatest efficacy, consistent with research from high-income countries on cigarette warnings.
- ▶ These findings suggest that the ways in which individuals respond to different types of message content may be similar across diverse cultural environments.

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**Contributors** DH, JLR and SM were involved in the conceptualisation, design and coordination of the study in India and Bangladesh. DH and SM designed the analysis, SM performed the analysis, JLR and DH consulted on the analysis, and all three authors interpreted the data. SM prepared the first draft of the manuscript and DH and JLR contributed. PCG, MSP and GD were involved in the design and coordination of the study in India. PCG, MSP and GD oversaw the data collection in India, and reviewed, edited and contributed to the manuscript. NN and KMGH were involved in the design and coordination of the study in Bangladesh, oversaw data collection and reviewed, edited and contributed to the manuscript. All the authors approved the final version.

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## **Perceived effectiveness of text and pictorial health warnings for smokeless tobacco packages in Navi Mumbai, India, and Dhaka, Bangladesh: findings from an experimental study**

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