

## RESEARCH COMMUNICATION

# Knowledge of Health Effects and Intentions to Quit among Smokeless Tobacco Users in India: Findings from the International Tobacco Control Policy Evaluation (ITC) India Pilot Survey

Lalit J Raute<sup>1\*</sup>, Genevieve Sansone<sup>2</sup>, Mangesh S Pednekar<sup>1</sup>, Geoffrey T Fong<sup>2,3</sup>, Prakash C Gupta<sup>1</sup>, Anne CK Quah<sup>2</sup>, Maansi Bansal-Travers<sup>4</sup>, Dharendra N Sinha<sup>5</sup>

### Abstract

**Introduction and background:** The prevalence of smokeless tobacco use in India is the highest in the world, with 26% of adults reporting being users of smokeless tobacco only. But to date, there are few studies of beliefs, knowledge, and other psychosocial measures relating to smokeless tobacco use in India. The aim of the present study was to use data from the ITC India Pilot Study conducted in 2006 to examine beliefs about the harms of smokeless tobacco use, knowledge of health effects, and intentions to quit among current smokeless tobacco users in two states, Maharashtra and Bihar. **Methods:** Data from the ITC India Pilot Study, a face-to-face cross-sectional survey of 248 adults reporting exclusive current use of smokeless tobacco in Maharashtra and Bihar, were analyzed with respect to the knowledge of health effects, beliefs about harmfulness, and intentions to quit smokeless tobacco use. **Results:** Around three quarters (36%) of smokeless tobacco users from Maharashtra and two thirds (62%) from Bihar had a 'bad' opinion about smokeless tobacco use. About 77% believed that smokeless tobacco use causes mouth cancer, followed by gum disease (66%) and difficulty in opening the mouth (56%). Significant differences were found in health knowledge between urban and rural smokeless tobacco users in both states. Only 38% of smokeless tobacco users reported having intentions to quit, and only 11% had intentions to quit within the next 6 months. Smokeless tobacco users who reported higher knowledge of the specific health effects from smokeless tobacco use were more likely to have intentions to quit. **Conclusion:** Despite the fairly high levels of awareness of health effects from smokeless tobacco use in Maharashtra and Bihar, the majority of smokeless users had no intentions to quit. Increased educational efforts about the detrimental health effects from smokeless tobacco use may result in higher levels of knowledge about the harms of smokeless tobacco and this in turn could increase quit intentions and subsequent quitting among users.

**Keywords:** India - opinion about smokeless tobacco - knowledge of health effects - beliefs about harm - intention to quit

*Asian Pacific J Cancer Prev*, 12, 1233-1238

### Introduction

Globally, the most popular form of tobacco use is cigarette smoking, the health effects from which have been studied extensively in most parts of the world. However, cigarette smoking is not the only predominant form of tobacco use in countries such as India and Bangladesh, where over one-third of tobacco users consume tobacco in the smokeless form (Gupta and Ray, 2003). The prevalence of smokeless tobacco use in India is the highest in the world. According to the Global Adult Tobacco Survey (GATS) 2010 report, 60% of tobacco users in India currently use only smokeless tobacco and an additional 15% are mixed users, that is, they use both smokeless

tobacco and smoked tobacco (GATS INDIA, 2010). There is a wide variety of smokeless tobacco in India, and these varieties vary considerably across different regions of the country, including chewing, holding in the mouth, or applying over teeth and gums. In India, using smokeless tobacco is not only common among males, but also among females and youth.

Smokeless tobacco use poses a number of health risks. In particular, smokeless tobacco is a well established cause of oral cancer, one of the most common cancers in India (IARC, 2004). About 800,000 new cases of cancer are estimated to occur every year in India. The age-adjusted incidence rates of all types of cancers in men vary across the country, from 44 per 100,000 in rural Maharashtra

<sup>1</sup>Healis - Sekhsaria Institute for Public Health, Navi Mumbai, India, <sup>2</sup>Department of Psychology, University of Waterloo, Ontario, <sup>3</sup>Ontario Institute for Cancer Research, Toronto, Canada, <sup>4</sup>Department of Health Behavior, Roswell Park Cancer Institute, New York, USA, <sup>5</sup>School of Preventive Oncology, Patna, India \*For correspondence: rautel@healis.org

to 121 per 100,000 in Delhi (NCRP, 2002). The major effects of smokeless tobacco are seen in the oral cavity, pharynx and oesophagus, which together account for a large proportion of the tobacco-related cancers that occur in the country (Gupta et al., 1984; 2005; Gupta and Mehta, 2000).

Thus, there is an urgent need for more active and complete awareness among Indians about the health risks of tobacco—smokeless as well as smoked tobacco. Most people are unaware that even the smallest level of tobacco use is dangerous (Gupta et al., 2005), in part because this is not the case with other behavioral health risks, such as eating habits and the consequences of a sedentary lifestyle (WHO report on global tobacco epidemic, 2008). Well-conducted global research has established that people can overcome their tobacco use; increased knowledge about the dangers of tobacco use has been shown to improve quit success. For example, a study by Gupta et al. in 1995 reported that an intervention designed to increase awareness related to tobacco avoidance and control was shown to positively alter tobacco use practices among adults, where within the intervention area (Ernakulum district of Kerala), the incidence rates of oral lesions were lower among those who gave up their habits (Gupta et al., 1986; 1995). Similar effects of this intervention were found among youth (Reddy et al., 2002).

To date, however, there are few studies that have focused on knowledge and beliefs about smokeless tobacco use in India. Psychosocial studies of smokeless tobacco use are important in that they can identify key predictors of behaviour change, for example, quitting and intentions to quit, as they have been important in research conducted on smoked tobacco. The aim of the present study was to examine knowledge and beliefs about the harms of smokeless tobacco and intentions to quit among a sample of current adult smokeless tobacco users from the 2006 International Tobacco Control Policy Evaluation (ITC) India Pilot Study Survey.

## Materials and Methods

### Background

In India, the International Tobacco Control Policy Evaluation Project (ITC Project) is known as the “Tobacco Control Policy (TCP) India Pilot Study Survey” to avoid confusion with the “India Tobacco Company.” The TCP India Pilot Study Survey is a cross-sectional survey conducted in urban areas of Mumbai and Patna, and their surrounding rural areas in the states of Maharashtra and Bihar respectively in 2006. The target population of this pilot study consists of users and non-users of tobacco who are 18 years and older.

The TCP India Pilot Study Survey was a lead-in to the larger TCP India Project, currently in the data collection stage. The TCP India Pilot Study Project, as with the TCP India Project and all other International Tobacco Control (ITC) Surveys being conducted in 20 countries, was designed to evaluate and understand the psychosocial and behavioral effects of national-level tobacco control policies (Fong et al., 2005; 2006; Thompson et al., 2006).

### Methodology

**1234** *Asian Pacific Journal of Cancer Prevention, Vol 12, 2011*

A total of 764 adult participants (aged 18 years and older) were surveyed from the states of Maharashtra (n=337) and Bihar (n=427). The survey sample was recruited from four areas: urban Maharashtra (Mumbai), rural Maharashtra, urban Bihar (Patna), and rural Bihar. The distribution of users and nonusers of tobacco was predetermined, with approximately equal numbers, i.e. current smokers (n=249), current smokeless tobacco users (n=248) and current non-users of tobacco (n=267) surveyed in both states. Dual users of tobacco (i.e., those who reported using both smoked and smokeless tobacco) were excluded from the study.

Face-to-face individual interviews were conducted through a household survey. In the household enumeration process, information on gender, age, and current tobacco use were collected for members of all enumerated households. Written informed consent was obtained from all participants at the time of recruitment. The survey was conducted in Maharashtra and Bihar in the Marathi and Hindi languages respectively. All participants were given a token of appreciation for their time.

The study protocol and survey materials were approved by the Office of Research Ethics at the University of Waterloo, Canada and by the Healis-Institutional Review Board at the Healis-Sekhsaria Institute for Public Health, India.

### Data Analysis

Statistical analyses were conducted using SPSS version 13. Demographic and tobacco use characteristics were evaluated for all survey respondents. A total of 248 smokeless tobacco users' data was used for assessment of the knowledge of health effects and intentions to quit smokeless tobacco use. Respondents who said 'Yes' to the question “Do you currently use any smokeless tobacco product, such as paan with tobacco, paan masala or gutka?” and said 'No' to the question “Do you currently smoked tobacco in any form, such as bidi, cigarette, hukka, etc?” at the time of data collection were classified as “current smokeless tobacco users”. Chi-square tests were performed to examine bivariate differences in the key measures between the urban and rural areas of the two states.

## Results

Table 1 shows selected demographic characteristics of all respondents from Maharashtra and Bihar. In the rural areas of Maharashtra and Bihar, the majority of respondents were illiterate (57% and 52% respectively). In urban areas (Mumbai and Patna) of both the states, around three-quarters of respondents had middle and higher level of education. Table 1 also provides details about the tobacco use status of the survey respondents. We used the sample of 248 smokeless tobacco users for further data analyses.

Table 2 shows variables associated with opinions and thoughts about smokeless tobacco use. Opinion of smokeless tobacco use: When asked the question “Do you think smokeless tobacco use is good for your health?” approximately two-thirds of the total smokeless tobacco

**Table 1. Selected Demographic Characteristics of Respondents in the TCP India Pilot Study Survey (2006) (N=764)**

Characteristics		Maharashtra (n = 337)			Bihar (n = 427)		
		Urban N (%)	Rural N (%)	Total N (%)	Urban N (%)	Rural N (%)	Total N (%)
Gender	Male	100 (65.8)	116 (62.7)	216 (61.1)	79 (60.8)	165 (55.6)	244 (57.1)
	Female	52 (34.2)	69 (37.3)	121 (35.9)	51 (39.2)	132 (44.4)	183 (42.9)
Age	18-20 yrs	4 (2.6)	15 (8.1)	19 (5.6)	11 (8.5)	36 (12.2)	47 (11.0)
	21 – 30 yrs	20 (13.2)	28 (15.1)	48 (14.2)	31 (23.8)	77 (26.0)	108 (25.4)
	31 – 40 yrs	30 (19.7)	29 (15.7)	59 (17.5)	29 (22.3)	67 (22.6)	96 (22.5)
	41 – 50 yrs	31 (20.4)	61 (33.0)	92 (27.3)	25 (19.2)	48 (16.2)	73 (17.1)
	51 – 60 yrs	30 (19.7)	36 (19.5)	66 (19.6)	19 (14.6)	33 (11.1)	52 (12.2)
	61 and above	37 (24.4)	16 (8.7)	53 (15.8)	15 (11.6)	35 (11.8)	50 (11.7)
Education level*	Illiterate	15 (9.9)	106 (57.3)	121 (35.9)	16 (12.3)	154 (51.9)	170 (39.8)
	Primary	17 (11.2)	37 (20.0)	54 (16.0)	11 (8.5)	41 (13.8)	52 (12.2)
	Middle	49 (32.2)	25 (13.5)	74 (22.0)	26 (20.0)	28 (9.4)	54 (12.6)
	Secondary	43 (28.3)	11 (5.9)	54 (16.0)	29 (22.3)	45 (15.2)	74 (17.3)
	College & above	27 (17.7)	6 (3.2)	33 (9.8)	47 (36.1)	28 (9.4)	75 (17.5)
Tobacco use status	Smoker	46 (30.3)	38 (36.8)	114 (33.8)	23 (17.7)	112 (37.7)	135 (31.6)
	Smokeless user	57 (37.5)	57 (30.8)	114 (33.8)	40 (30.8)	94 (31.6)	134 (31.4)
	Non user	49 (32.2)	60 (32.4)	109 (32.3)	67 (51.5)	91 (30.6)	158 (37.0)

\*3 cases are missing due to non response

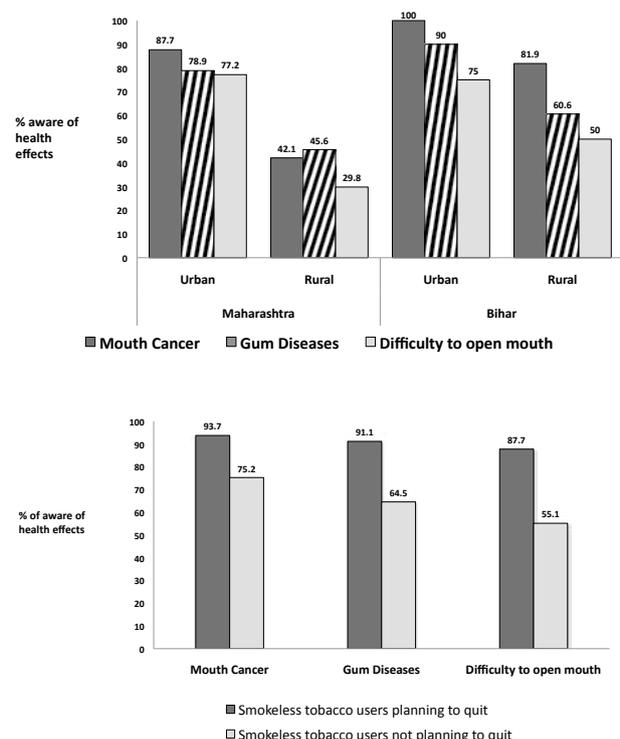
users from both the states opined that smokeless tobacco use is ‘not good’ for health. Furthermore, there were significant differences in opinion between urban and rural smokeless tobacco users. Overall, total urban smokeless users were more likely (56%) to report that smokeless tobacco use is ‘not good’ for health than were rural users (44%). However, this difference was significant only in Bihar, not in Maharashtra. In Bihar, urban smokeless users were more likely (88%) than rural smokeless users (65%) to hold that opinion ( $X^2=6.69, p=0.010$ ). In addition, 74% of respondents from Maharashtra and 65% from Bihar had a ‘bad’ or ‘very bad’ opinion about smokeless tobacco use ( $X^2=2.21, p=0.137$ ).

Beliefs about the harm: A significant proportion of

urban smokeless users (72%) compared to rural smokeless users (28%) stated that in the last month, they ‘never’ thought about the harm their smokeless tobacco use might be doing to them ( $X^2=16.11, p<0.001$ ). Among rural respondents, these figures differed significantly between the two states, with 76% of smokeless tobacco users from rural Maharashtra and 52% from rural Bihar reporting the same result ( $X^2=6.60, p=0.010$ ). Finally, 72% of smokeless tobacco users from the state of Maharashtra and 44% from the state of Bihar thought that smokeless tobacco use has not damaged their health at all ( $X^2=15.90, p<0.001$ ).

Planning and intentions to quit: Overall, around half of the total smokeless tobacco users reported that they had no plans to quit, and in the last month, they ‘never’ seriously considered quitting smokeless tobacco use. Most notably, 66% of rural smokeless users reported that they had no plans to quit relative to 34% of urban smokeless users ( $X^2=7.43, p=0.006$ ). In the last month, a significantly higher number of rural smokeless users (68%) never seriously considered quitting smokeless tobacco use compared to urban smokeless users (38%;  $X^2=16.19, p<0.001$ ).

Knowledge of health effects: Figure 1 shows the extent to which smokeless tobacco users had knowledge of whether smokeless tobacco use caused each of the three health effects. Overall, 77% of smokeless tobacco users believed that smokeless tobacco use causes mouth cancer; 66% believed it causes gum diseases and 56% believed it causes difficulty in opening the mouth. Significant differences were found in health knowledge of smokeless users between Maharashtra and Bihar, with higher levels of knowledge in Bihar for each health effect. Significant differences in health knowledge were also found between urban and rural smokeless tobacco users in Maharashtra but not in Bihar. In rural Maharashtra, only 42% of smokeless tobacco users knew or believed that smokeless tobacco use causes mouth cancer, compared to 88% in urban Maharashtra ( $X^2=20.40, p<0.001$ ), and only one-fourth were aware of the difficulty to open the mouth in rural Maharashtra (vs. 77% in urban Maharashtra,



**Figure 1. Knowledge of the Health Effects of Smokeless Tobacco Use**

**Table 2. Variables Associated with Opinions and Thoughts of Smokeless Tobacco Users about Use (N=248)**

Variables	Maharashtra (MH)(n = 114)			Bihar (BR)(n = 134)		
	Urban N (%)	Rural N (%)	Total N (%)	Urban N (%)	Rural N (%)	Total N (%)
Overall opinion about smokeless tobacco use	Bad and Very bad vs. Other#:					
Bad and Very bad	54 (74.7)	30 (52.6)	84 (73.7)	21 (52.5)	66 (70.2)	87 (64.9)
Other	3 (5.3)	27 (47.4)	30 (26.3)	19 (47.5)	28 (29.8)	47 (35.1)
**1.X2 =2.21, p=0.1372.X2 =5.21, p=0.015. 3.MH: X2 =26.06, p<0.001BR: X2 =3.87, p=0.0494. X2 =23.91, p<0.0015. X2 =4.71, p=0.030						
Whether smokeless tobacco use good for health	Not good vs. Other##:					
Not good	40 (70.2)	33 (57.9)	76 (64)	35 (87.5)	61(64.9)	96(71.6)
Other	15 (26.3)	24 (42.1)	39 (34.3)	5 (12.5)	32 (34.1)	37 (27.6)
**1.X2 = 1.39, p=0.2382.X2 =7.21, p=0.0073.MH: X2 =2.71, p=0.100BR: X2 =6.69, p=0.0104. X2 =3.04, p=0.0815. X2 =0.90, p=0.344						
Thought about the harm smokeless tobacco might be doing to them (2)*	Never vs. Other###:					
Never	23 (40.4)	43 (75.4)	66 (57.9)	13 (32.5)	49 (52.1)	62 (46.3)
Other	34 (59.7)	13 (22.8)	47 (42.2)	26 (65)	39 (41.5)	65(48.5)
**1.X2 =2.21, p=0.1372.X2 =16.11, p=0.000. 3.MH: X2 =15.44, p<0.001BR: X2 =5.40, p=0.0204. X2 =0.487, p=0.4855. X2 =6.60, p=0.010						
Extent to which smokeless tobacco damaged their health (6)*	Not at all vs. Other####:					
Not at all	36 (63.2)	46 (80.7)	82 (71.9)	14 (35)	45 (47.9)	59 (44)
Other	16 (28.1)	9 (15.8)	25 (22)	22(55)	35 (37.2)	57 (42.5)
**1.X2 =15.90, p<0.0012.X2 =2.57, p=0.109 3.MH: X2 =3.10, p=0.078BR: X2 =2.99, p=0.0844. X2 =7.99, p=0.0055. X2 =11.12, p=0.001						
Planning to quit smokeless tobacco use (2)*	Not planning to quit vs. Other#####:					
Not planning	23 (40.4)	46 (80.7)	69 (60.5)	21 (52.5)	39 (41.5)	60 (44.8)
Other	30 (52.6)	10 (17.6)	40 (35)	14 (35)	29 (30.9)	43 (32)
**1.X2 =0.57, p=0.4512.X2 =7.43, p=0.0063.MH: X2 =17.60, p<0.001BR: X2 =0.067, p=0.7964. X2 =2.33, p=0.1275. X2 =8.76, p=0.003						
Thought about seriously quitting smokeless tobacco use (3)*	Never vs. Other###:					
Never	26 (45.6)	46 (80.7)	72 (63.2)	12 (30)	51 (54.3)	63 (47)
Other	29 (50.9)	10 (17.5)	39 (34.2)	26 (65)	37 (39.4)	63 (47)
**1.X2 =5.32, p=0.0212.X2 =16.19, p<0.0013.MH: X2 =14.80, p<0.001BR: X2 =7.39, p=0.0074. X2 =2.29, p=0.1305. X2 =9.10, p=0.003						
Does smokeless tobacco use cause Mouth Cancer (1)*	Yes vs. No:					
Yes	50 (87.7)	24 (42.1)	74 (64.9)	40 (100)	77 (81.9)	117 (87.3)
No	6 (10.5)	25 (43.9)	31 (27.2)	0 (0)	2 (2.1)	2 (1.5)
**1.X2 =34.43, p<0.0012.X2 =9.62, p=0.002 3.MH: X2 =20.40, p<0.001BR: X2 =1.03, p=0.3104. X2 =4.57, p=0.0335. X2 =42.72, p<0.001						
Does smokeless tobacco use cause Gum Disease (1)*	Yes vs. No:					
Yes	45 (78.9)	26 (45.6)	71 (62.3)	36 (90)	57 (60.6)	93 (69.4)
No	10 (17.5)	24 (42.1)	34 (29.8)	2 (5)	13 (13.8)	15 (11.2)
**1. X2 =15.17, p<0.0012.X2 =9.51, p=0.002 3.MH: X2 =10.64, p=0.001BR: X2 =3.65, p=0.0564. X2 =3.34, p=0.068 5. X2 =11.85, p=0.001						
Does smokeless tobacco use cause Difficulty to open mouth (1)*	Yes vs. No:					
Yes	44 (77.2)	17 (29.8)	61 (53.5)	30 (75)	47 (50)	77 (57.5)
No	9 (15.8)	33 (57.9)	42 (36.8)	2 (5)	12 (12.8)	14 (10.4)
**1.X2 =10.28, p=0.001.2.X2 =18.65, p<0.0013.MH: X2 =25.60, p<0.001BR: X2 =3.16, p=0.0754. X2 =2.04, p=0.1535. X2 =23.28, p<0.001						

\*\* Test of Significance: 1. MH vs. BR2. Urban vs. Rural3. MH vs. BR x Urban vs. Rural4. MH U Vs Bihar U5. MH R Vs Bihar R; \* Number of cases missing due to non response; \*\* Don't know/ can't say has been excluded from test of significance; # Other category includes Very good, Good and Neither good or nor bad categories; ## Other category includes Good and Neither good or nor bad categories; ### Other category includes Sometimes and Often categories; #### Other category includes A little and Very much categories; ##### Other category includes Within the next month, Within next 6 months, Sometime in the future categories

X2=25.60, p<0.001) (Table 2).

Figure 1 also shows the levels of knowledge for those who reported having some plans to quit. Ninety-four percent (94%) of smokeless tobacco users who planned to quit and 75% of smokeless tobacco users who had not planned to quit believed that smokeless tobacco use causes mouth cancer (X2=11.8, p<0.001). Similar results were also found for knowledge of gum disease (X2=18.5, p<0.001) and difficulty to open the mouth (X2=21.4, p<0.001). Therefore, knowledge levels of specific diseases caused by smokeless tobacco use were significantly different when stratified by intention to quit.

## Discussion

This paper examined beliefs about smokeless tobacco among smokeless tobacco users in two states in India. International research has proven that there is no safe form of tobacco, including smokeless tobacco, which contains at least 28 chemicals that cause cancer (WHO International Agency for Research on Cancer, 2007). Awareness of the

health risks of tobacco is the key to tobacco control efforts. In the present study, there was considerable awareness in both Maharashtra and Bihar that smokeless tobacco use causes mouth cancer. However, there were lower levels of awareness on two other health risks of smokeless tobacco: gum disease and difficulty to open the mouth. Only one-third of smokeless tobacco users in Maharashtra and half from Bihar were aware of the difficulty to open the mouth, which is a clinical sign for oral sub-mucous fibrosis (OSF), a potentially pre-cancerous condition caused primarily by chewing areca nut and its mixtures (Murti, 1995).

Another finding was the comparatively low level of awareness of the harms of smokeless tobacco among rural smokeless tobacco users, in both the states. Moreover, the prevalence of each type of smokeless tobacco product is higher in rural than in urban areas of India (GATS INDIA, 2010). This suggests that low knowledge of health risks is one of the factors contributing to the high prevalence of smokeless tobacco use in rural areas. This low level of knowledge may well be due to the fact that over two-thirds of India's rural population are without access to primary

health care providers and services, services that could help inform the rural population of the adverse health consequences of smokeless tobacco.

Findings related to intentions to quit indicated that the majority of smokeless tobacco users had no plans to quit using smokeless tobacco. These findings are consistent with the recent report from GATS 2010, which showed that among current and former users of smokeless tobacco, around one-third made an attempt to quit smokeless tobacco use in the past 12 months (GATS INDIA, 2010). In contrast, studies from Western countries such as Canada and Australia have found that approximately three-quarters of all smokers intend to quit smoking (Hammond, 2004). In the present study, smokeless tobacco users who reported higher knowledge of the specific health effects of smokeless tobacco use were more likely to have intentions to quit. Effective interventions to quit using smokeless tobacco do exist, including over-the-counter nicotine replacement therapies, prescription drugs and counseling (Fiore et al., 2000) However, in India, greater effort is needed for cessation assistance to reach urban and rural populations.

Another alarming finding revealed through this study was that most smokeless tobacco users from rural areas were not concerned about the negative consequences of smokeless tobacco use on their own personal health and had the perception that they are in good health. This is consistent with studies conducted previously such as the ITC Survey of four high-income countries (Canada, United States, United Kingdom and Australia), where it was seen that current smokeless tobacco users were 2.7 times more likely to report that smokeless tobacco was less harmful than cigarette smoking (O'Connor R et al., 2007).

In spite of having the perception that they are in good health, two-thirds of smokeless tobacco users had a 'bad' opinion of smokeless tobacco use and believed that it is not good for their health. People continue to use tobacco products despite being aware of the adverse health effects. From a public health perspective, there is no doubt that zero level of tobacco use would be ideal. Thus there is a need for more comparative research which would give strong evidence that tobacco use in any form would have harmful consequences on the health of an individual. There is also a need to inform the population of these consequences through intervention programs. Such programs have been successful in other countries; for example, a recent study of community based interventions done in two countries (India and Indonesia) revealed that health system interventions resulted in increased diagnosis and better management of non-communicable diseases at health facilities (Krishnan A et al. 2010).

Despite of having an overall negative opinion about smokeless tobacco use, around half of smokeless tobacco users in the present study reported having no plans to quit and they never seriously considered quitting tobacco. Rural smokeless tobacco users from both Maharashtra and Bihar had the perception that they are in good health despite their habits. The greatest level of knowledge of the specific health effects of smokeless tobacco was found for mouth cancer as a health risk, followed by gum disease and difficulty to open the mouth. Awareness was also found

to be higher in urban areas than rural areas of both states. These findings highlight the need to increase awareness about the health risks of smokeless tobacco use in India, particularly in rural areas, where levels of education and health knowledge are lower.

## Acknowledgements

We would like to thank the Data Management Centre of the ITC Project, at the University of Waterloo, Canada, for their assistance in the data analyses. Funding: The India Pilot Study Survey was supported by the grant from the Canadian Institutes of Health Research (79551). The authors declare no conflicts of interest.

## References

- Fiore MC, Bailey WC, Cohen SJ, et al (2000). Treating Tobacco Use and Dependence. Clinical Practice Guideline.
- Fong GT, Cummings KM, Borland R, et al (2005). The conceptual framework of the International Tobacco Control (ITC) Policy Evaluation Project. *Tob Control*, **15**, 3-11.
- Fong GT, Cummings KM, Shopland DR (2006). Building the evidence base for effective tobacco control policies: the International Tobacco Control Policy Evaluation Project (the ITC Project). *Tob Control*, **15**, 1-2.
- Gupta PC, Aghi MB, Bhonsle RB, et al (1986): Intervention study of chewing and smoking habits for primary prevention of oral cancer among 12212 Indian villagers, in Tobacco: A Major International Health Hazard. IARC Scientific Publications No. 74. eds D.G. Zaridze and R. Peto, Lyon, International Agency for Research on Cancer, .
- Gupta PC, Bhonsle RB, Mehta FS, et al (1984). Mortality experience in relation to tobacco chewing and smoking habits from a 10-year follow-up study in Ernakulam district, Kerala. *International Journal of Epidemiology*, **13**, 184-7.
- Gupta PC, Murti PR. Bhonsle RB, et al (1995). Effect of cessation of tobacco use on the incidence or oral mucosal lesions in a 10 year follow-up study of 12,212 users. *Oral diseases*, **1**, 54-58.
- Gupta PC, Mehta HC (2000). A cohort study of all-cause mortality among tobacco users in Mumbai, India. *Bulletin of World Health Organization*, **78**, 877-83.
- Gupta PC, Ray CS (2003). Smokeless tobacco and health in India and South Asia. *Respirology*, **8**, 419-31.
- Gupta PC, Pednekar MS, Parkin DM, et al (2005). Tobacco associated mortality in Mumbai (Bombay) India. Results of the Bombay Cohort Study. *Int J Epidemiol*, **34**, 1395-402.
- Hammond D, Fong GT, McNeill A, et al (2006). Effectiveness of cigarette warning labels in informing smokers about the risks of smoking: findings from the International Tobacco Control (ITC) Four Country Survey. *Tob Control*, **15** (Suppl III), 19-25.
- IARC (2004). Monographs on the evaluation of carcinogenic risks to humans. Betel-quid and areca nut chewing and some related nitrosamines. vol. 85. Lyon: IARC.
- International Agency for Research on Cancer (2007). Smokeless Tobacco and Some Tobacco-Specific N-Nitrosamines. Lyon, France: World Health Organization International Agency for Research on Cancer. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans Volume 89.
- International Institute for Population Sciences (IIPS), Mumbai and Ministry of Health and Family Welfare, Government of India (2010). Global Adult Tobacco Survey India (GATS INDIA), . [http://www.mohfw.nic.in/global\\_adult\\_tobacco\\_survey.htm](http://www.mohfw.nic.in/global_adult_tobacco_survey.htm)

- Krishnan A, Ekowati R, Baridalyne N, et al (2010). Evaluation of community-based interventions for non-communicable diseases: experiences from India and Indonesia. *Health Promotion International* 10.1093/heapro/daq067.
- Murti PR, Bhonsle RB, Gupta PC, et al (1995). Etiology of oral submucous fibrosis with special reference to the role of areca nut chewing. *J. Oral Pathol. Med*, **24**, 145–52.
- Moore SR, Johnson NW, Pierce AM, et al (2000). The epidemiology of mouth cancer: a review of global incidence. *Oral Dis*, **6**, 65–74.
- Thompson ME, G T Fong, D Hammond, et al (2006). Methods of the International Tobacco Control (ITC) Four Country Survey. *Tob Control*, 15: iii12 iii18 doi:10.1136/tc.2005.013870.
- National Cancer Registry Programme (2002). Two year report of the population based cancer registries 1997 – 1998. Incidence and distribution of cancer. New Delhi: Indian Council of Medical Research, .
- O'Connor RJ, McNeill A, Borland R, et al (2007). Smokers' beliefs about the relative safety of other tobacco products: findings from the ITC collaboration. *Nicotine Tob Res*, **9**, 1033-42.
- Reddy KS, Arora M, Perry C L, et al (2002). Tobacco and alcohol use outcomes of a school-based intervention in New Delhi. *American journal of health behavior*, **26**, 173-81.
- WHO Report on the global tobacco epidemic (2008). the MPOWER package. Geneva: World Health Organization, 2008.