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Invited Article

Tobacco use in Northern India—Part 1: The detailed habit

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ABSTRACT

Background: The finite details of tobacco consumption practices in north Indian population are hitherto not well described. This study depicts the modes of tobacco use, their relative frequency, demographic and psychosocial determinants.

Materials and Methods: Random stratified sampling from the list of blocks, villages and urban localities was done. The study was community-based house-to-house survey using interview schedule.

Results: There were 1607 tobacco users: 1399 male and 208 female; 1195 urban and 412 rural. Single mode of tobacco use was reported by 769 (47.85%). Chewing tobacco was prevalent in 511 (31.80%), smoking in 258 (16.55%) subjects and majority 838 (52.15%) had consistent multiple habit of smoking and chewing. Of the 10 preparations of tobacco use, the 'top 5' ranked as *tobacco-betel, gutka, cigarette, bidi and khaini*. Gutka consumption was significantly higher between age group of 25 years and 55 years ($\chi^2 = 17.2$; $P < 0.000$). Majority of users, 576 (35.84%), started tobacco before 25 years of age and about a fifth, 439 (27.32%) before 18 years. Men significantly used tobacco more than women ($\chi^2 = 73.2$; $P < 0.000$). Women ($\chi^2 = 73.2$; $P < 0.000$) preferred smokeless tobacco and perceived social barrier for smoking.

Conclusion: Multiple or overlapping tobacco practices and other substances abuse were documented in Lucknow, the capital city of the most populous state Uttar Pradesh where chewing tobacco was the commonest as opposed to smoking.

Keywords: *Gutka, tobacco.*

INTRODUCTION

Tobacco—a plant native to America, introduced by Portuguese in India in 1605, was used initially for ceremonial and medicinal purposes.[1] It is now used in various forms all over the world. Cigarettes became a dominant form of tobacco use with the advent of machine-manufactured cigarettes in late 1800s. India is the third largest tobacco-producing country (13%) after China (40%) and USA (15%), and ninth largest exporter of tobacco.[2] The Indian National Sample Survey revealed that 35% men and 12% women use tobacco in one form or another.[3] In India, several types such as smoking practices (e.g. cigarette, bidi, hukka, chutta and pipe), tobacco chewing (e.g. tobacco-beetle*, gutka and khaini), rubbing tobacco powder/paste on gums and teeth, and snuffing tobacco are prevalent with varying frequency in different communities. The production of tobacco besides being an activity of multinational companies is also a large

**Tobacco-betel:* Beetle leaf smeared with lime, katcheu and sprinkled with areca nut, tobacco etc. *Gutka:* Mixture of tobacco, lime, areca nut and condiments packed and sold. *Khaini:* Local tobacco with lime rubbed on palm used as quid. *Bidi:* Dry tendu leaf, hand-rolled with tobacco. *Gul:* Powder and paste with tobacco used for rubbing on gums and teeth. *Hukka/pipe:* Mud pipe/pipe filled with tobacco used for smoking. *Chutta:* Reverse smoking of bidi with burning tip inside mouth. *Snuff:* Fine tobacco powder inhaled through nostrils.

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cottage industry. Tobacco industries here generate employment and excise revenue for the government. Widespread tobacco consumption contributes to the loss of national productivity due to reduced efficiency, disability and disease, resulting in avoidable expenditure on medical treatment that may far outweigh the abovementioned benefits. About 800,000 deaths occur every year in India directly as a result of cardiovascular diseases, chronic obstructive lung diseases and tobacco-related cancers.[4] If current smoking patterns persist, tobacco is set to cause about one-third of all deaths.[5] Oral cancer is the commonest cancer among men in this region and is believed to be associated with the peculiar tobacco consumption practices in the population.[6] Furthermore, a majority of tobacco-consuming population is illiterate, rural, less exposed to Western-type mass media and is addicted to local or unbranded tobacco preparations. It is not well-known, at present, as to how people choose their brand of tobacco and what marketing strategy the local tobacco dealers and vendors adopt.

Tobacco habit of Indians is different from the rest of the world. In China, Japan, Europe, USA and Latin America, tobacco use is equally prevalent, but over 95% users simply smoke cigarettes. In India, four types of tobacco use are common in various forms, namely, smoking (bidi/cigarette/hukka/chutta/chilam), chewing (betel/gutka/khaini), snuffing and rubbing (gul/tooth powder). A lot of people have multiple tobacco practices with one of which may be dominant. ICMR bulletins have published comprehensive reviews of tobacco-related problems, role of health professionals and economics of tobacco in India,[7,8] which indicates that tobacco control is a national health priority. Two major efforts notably that of community education programes at Goa, Bangaluru, Trivandrum and Agra and that the radio DATES are indeed laudable.[9] However, the Indian tobacco control programe as opposed to some of the advanced countries, where serious anti-tobacco measures have been instituted, grossly lacks the fundamental knowledge about the components of community education for tobacco control. The community education programes undertaken in India so far have been driven from common sense and some soft data. As until today, the details of various tobacco habits in India are unknown. Similarly, there are no reports of use of a well-tried health-risk behavior model to determine the components of most effective anti-tobacco education.[10–12]

MATERIALS AND METHODS

This study was conducted in Lucknow (population 3.6 million)—the capital city of India's most populous state—Uttar Pradesh with the objective to study the relative frequency of various smoking/smokeless tobacco practices, preparations of tobacco, frequency, place/context of use, starting age, procurement, affect and quid habit.

Important components of habit to be studied were created in a mesh and finally shortlisted after focus groups and pilot studies. Thus, a well-tested interviewer-administered instrument was created. The setting was 1 rural and 3 urban strata of Lucknow district, namely low-, middle- and upper-class urban localities. The main outcome measures were proportions of modes of tobacco use, namely, chewing/smoking/rubbing/snuffing, preparations, frequency, starting age, supply, place and context of use, quid habit, affect, facilitating conditions/barriers and opinion on control measures.

The interviewers were trained graduates in social work, supervised by the research officer on the project. They interviewed the households in the locality and people on the streets especially in the respective area. Those confessing to regular tobacco use in any form, participated in the study. A brief explanation of the study was given to them and their verbal consent was taken for completing the survey. Majority of those approached agreed to participate and those who refused (<2%) were excluded. The questionnaire was interviewer-administered.

RESULTS

A total of 1618 questionnaires were administered, 1607 were complete, of which 1399 (87.06%) were male and 208 (12.94%) were female tobacco users. There were 1195 (74.36%) urban and 412 (25.64%) rural subjects. 46 (2.8%) children <10 years of age were interviewed unintentionally. About a third of subjects 1161 (72.25%) interviewed were between 25 and 55 years: 315 (19.60%) were <25 years and 131 (8.15%) were <55 years (Table 1).

Modes of tobacco use

Of the 4 modes of tobacco use—chewing, smoking, oral rubbing and nasal snuffing, a considerable overlap existed as many users practiced 2 or more consistent regular modes. Chewing was prevalent in 511 (31.80%) respondents and smoking in 258 (16.55%) respondents. Majority of subjects, 838 (52.15%), had consistent multiple mode (mostly smoking and chewing) of tobacco consumption, 769 (47.85%) had single habit of either smoking or chewing. 122 (8%) reported tobacco rubbing as tooth powder/paste and only 3 (0.2%) reported tobacco snuff.

Table 1 Modes of tobacco consumption in different study groups

Modes of consumption	*Single habit (769 [47.85%])*		*Multiple habits (838 [52.15%])*	*Total (1607 [100%])*
	Smokeless (511 [31.8%])	*Smoking (258 [16.55%])*		
Age (yr)				
<25	108 (6.72)	24 (1.49)	183 (11.39)	315 (19.60)
25–55	350 (21.78)	207 (12.88)	604 (37.59)	1161 (72.25)
>55	53 (3.30)	27 (1.68)	51 (3.17)	131 (8.15)
Sex				
Female	126 (7.84)	1 (0.06)	81 (5.04)	208 (12.94)
Male	385 (23.96)	257 (15.99)	757 (47.10)	1399 (87.05)
Area				
Rural	121 (7.53)	43 (2.68)	248 (15.43)	412 (25.63)
Urban	390 (24.25)	215 (13.38)	590 (36.71)	1195 (74.36)

Table 2 Frequency of tobacco use—its derivatives and other related products

Substance	*Daily used frequency*		
	n (%)	*Mean±SD*	*Median (range)*
Smokeless			
Sada pan	38 (2.36)	3.95±4.25	2.5 (1–25)
Pan with tobacco	601 (37.40)	6.33±5.68	4 (1–50)
Sada pan masala	38 (2.36)	7.47±6.63	6 (1–31)
Pan masala with tobacco	753 (46.86)	8.36±6.46	6 (1–50)
Khaini/mainpuri/surti	360 (22.40)	7.65±6.02	6 (1–50)
Smoking			
Cigarette	460 (28.62)	10.78±9.04	10 (1–80)
Bidi	240 (14.93)	60.89±10.94	14 (1–70)
Chutta	9 (0.56)	8.44±7.40	6 (2–22)
Hukka	2 (0.12)	2.5±.71	2.5 (2–3)
Pipe/cigar	2 (0.12)	15±12.73	15 (6–24)
Oral rub			
Gul/michhli/paste (tobacco)	122 (7.59)	2.70±4.07	2 (1–40)
Nasal snuff			
Sunghni tobacco	3 (0.19)	2.33±1.53	2 (1–4)
Any other derivative	9 (0.56)	5.11±2.26	6 (1–8)
Alcohol	172 (10.70)	1.46±1.83	1 (1–20)
Ganja	35 (2.18)	6.71±10.81	3 (1–50)
Cannabis	17 (1.06)	1.59±1.12	1 (1–5)
Opium/morphine/injection	4 (0.25)	139.5±164.56	112 (2–332)

Table 1 shows age, sex and rural/urban distribution between smoking/smokeless and multiple modes of tobacco users.

Frequency of consuming tobacco

Table 2 shows different forms of tobacco use and their daily average frequency. Because some of the subjects interviewed used tobacco along with ganja, cannabis and opium, these items were also included. Of the total 1607 consistent users of tobacco interviewed, 753 (46.86%) used pan masala with tobacco and 601 (37.40%) used tobacco with pan. Other common forms of tobacco use were cigarette by 460 (28.62) and khaini/mainpuri/surti by 360 (22.40%) subjects. Practices like surti, khaini and bidi that were prevalent in villages were less common in urban areas where gutka and

cigarettes were used. About 5% responders acknowledged consistent occasional or infrequent use of tobacco. Majority (54.3%) subjects used it between 7 and 24 times/day. However, 9.5% were heavy users of ≥25 times. Figure 1 shows that there was more or less normal distribution for the numbers of cigarette/bidi smoked or quid consumed per day.

Nature of brand of tobacco

Majority of the subjects 1423 (88.55%) consumed fixed brand of tobacco. Only 184 (11.45) subjects switched to multiple brands. Of the question asked as to what influenced them most for their choice of brand of tobacco, 1164 subjects (72.43) chose their brand on their own as seen in Table 3.

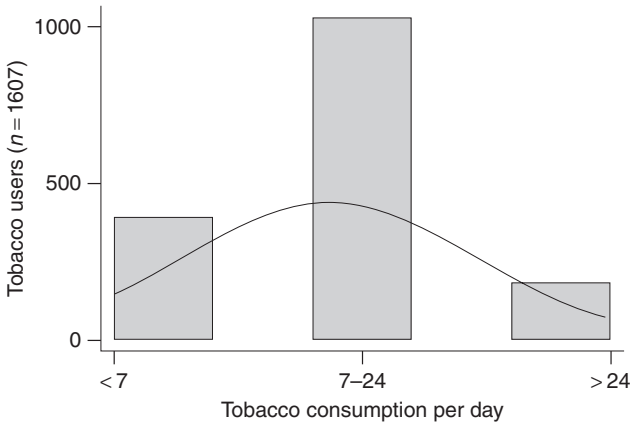

Figure 1 Normal distribution curve of tobacco use per day.

Table 3 Brand choice for tobacco use

	n (%)	*Mean ± SD*	*Median (range)*
Brands			
Fixed brand	1423 (88.55)	NA	
Multiple brand	184 (11.45)	2.81 ± 1.14	3 (1–8)
Choice of brands (What influence the choice of brand)			
Self	1164 (72.43)		
By shopkeeper/ locally available	52 (3.24)	NA	
Friends/relatives	390 (24.27)		
TV/radio	1 (0.06)		
Newspaper/ magazine	0		

Starting age of tobacco use

More than one-fifth subjects (439) started regular tobacco use between 11 years and 18 years. A small proportion of subjects, 46 (2.86%), who were < 10 years of age also used tobacco. Majority, 576 (35.84%), took tobacco when they were 18 to 25 years of age. There was a consistent decline in starting tobacco use as the age advanced. The question if their own child fended tobacco/pan, etc., 403 (30.79%) fended tobacco and 906 (69.21%) were unsure. 'What stimulated first use of tobacco?' was answered by 1525 subjects. Of these, 864 (56.66%) started tobacco use under peer pressure, 294 (19.28%) started because of curiosity, 201 (13.18%) started themselves without any influence, 43 (2.82%) started it to avoid bad smell and to keep mouth fresh and clean, 39 (2.56%) did it for fun and 34 (2.23%) used tobacco because of promotional activities and other factors. When asked whether used tobacco before/after marriage, 657 (40.88) respondents used it before marriage, 548 (34.10%) after marriage and 402 (25.02%) were bachelors as seen in Table 4.

Place/context of tobacco use

These are overlapping data. The knowledge of what prompts a person to use tobacco will allow the appropriate choice of time, place and person to launch the anti-tobacco message. The common site where tobacco was mostly consumed was at workplace in 1190 (82.70), in loneliness in 1130 (70.36) and at home in 1116 (69.49%) subjects. On being asked about the time when they would usually use tobacco, 1481 (92.16%) subjects reported using it after lunch, 1410 (87.74%) after breakfast, 1333 (82.95%) during travel, 1100 (68.45%) while waiting for transport, 1092 (67.95%) in stress and 1006 (62.60%) to avoid sleep at night as shown in Table 5.

The quid habit

Keeping a tobacco quid in mouth is a special practice adopted by the chewers. Of the 1607 subjects interviewed,

Table 4 Starting age for substance use

Age (yr)	*Subjects (n [%])*
< 10	46 (2.86)
11–18	439 (27.32)
18–25	576 (35.84)
25–30	260 (16.18)
30–40	229 (14.25)
> 40	57 (3.55)

Table 5 Place and context of tobacco use

Source	*Always* n (%)	*Sometimes* n (%)
At home	1116 (69.49)	316 (19.68)
At workplace	1190 (82.70)	161 (11.19)
When alone	1130 (70.36)	421 (26.21)
With some special friends only	911 (56.72)	595 (37.05)
In stress	944 (58.74)	439 (27.32)
When relaxed	692 (43.09)	422 (26.28)
Any where other than residence/workplace	634 (39.77)	621 (38.96)
At common places	826 (51.50)	590 (36.78)
When do critical work (while concentrating)	899 (56.12)	464 (28.96)
While journey	807 (50.31)	576 (35.91)
At cinema/theater like places	503 (32.24)	383 (24.55)
During sex	50 (3.78)	128 (9.67)
During fast/religious days	193 (12.44)	159 (10.25)
Near religious places/priest	139 (8.83)	101 (6.41)
Anywhere else	179 (12.44)	282 (19.60)

Table 6 Quid habit

Duration	*Always* n (%)	*Sometimes* n (%)
<2 minutes	262 (20.86)	291 (23.17)
2–5 minutes	563 (44.79)	322 (25.62)
Till 30 minutes	406 (32.32)	195 (15.54)
>30 minutes	81 (6.45)	210 (16.73)
Swallow it	36 (2.87)	199 (15.86)
Sleep whole night	24 (1.91)	76 (6.06)

night or sleeping with tobacco quid in mouth was practiced by 24 (1.91%) subjects and 36 (2.87%) subjects generally swallowed it. 563 (44.79%) kept the quid in mouth for 2–5 minutes, 406 (32.32%) for 30 minutes, 81 (6.45%) for >30 minutes and 262 (20.86%) for <2 minutes. In addition, 688 (54.43%) rotated the quid in mouth, 445 (35.21%) preferred to keep the quid at one place in mouth and 131 (10.36%) simply spat the quid as shown in Table 6.

DISCUSSION

The battle to reduce tobacco epidemic is shifting from the rich to the poor countries.[13] India belatedly responded to WHO call for ban on advertising and policy of taxation, foreign sales and package design of tobacco. WHO denounces tobacco as being responsible for 12% of total worldwide deaths by 2020s. Tobacco-related mortality to rise from the present annual global toll of 3 million to over 10 million by the year 2025.[14] About 70% of these deaths are expected to occur in developing countries. Basic epidemiological information is lacking in many developing countries, some of which have still to undertake a national survey on prevalence of tobacco use for evaluating the cost of tobacco habit to their economy. Estimation of the cost of tobacco-related cancers was studied by Indian Council of Medical Research (ICMR).[15]

Tobacco consumption data for various forms of tobacco use were reported by states Indian National Sample Survey.[3] In a recent survey on over 300,000 subjects reported, 47% men and 14% women have used tobacco translating to 195 million people in India.[16] Only minor variations in prevalence of smoking and smokeless tobacco, socio-demographic data have been described in a large number of studies but the finer details of tobacco habit have not been described.[17–26] A reverse smoking practice (*chutta*) was described in Andhra Pradesh.[27] Besides smoking, chewing, snuffing and rubbing, a new fifth mode of drinking tobacco water (*tuibur and hidakphul*) in which tobacco smoke was passed through water was described from north-eastern states of India.[28]

A survey on 702 people in 10 villages in Arunachal Pradesh, a north-eastern state of India reported tobacco use in 24.3% (40.5% male and 10.8% female), besides alcohol and opium use among all respondents. Chewing (67%) was far more common than smoking (20%) in both men and women. Only 13% practiced both, whereas this study reports 838 (52.15%) subjects practicing multiple habit of tobacco. This study also reports forms of tobacco use according to age, religion, education and age at first use.[29] *Vaidya* from Goa, the founder of National Organization of Tobacco Eradication (NOTE, India) studied the influence of adolescents' perceptions and behavior following sports sponsorship by tobacco companies in high school students.[9]

This study describes tobacco consumption practices in Lucknow, the results may also be applicable to all the northern Hindi-speaking states as they are culturally similar. The study underlines the fact that there are multitude modes and preparations of tobacco available which men, women and children use. A robust instrument/format, validated and reliable to conduct tobacco survey has been developed in this study after two pilot studies and a preliminary report.[22]

In this study 22% respondents started using tobacco before they were 15 years of age. Chewing ($n=511$, 66.45%; $\chi^2=73.24$, $P=0.000$) was reported as a major habit in this

study. It was seen as a growing habit and younger people ($n=108$, 81.82%; $\chi^2=17.24$, $P=0.000$) were taking up *gutka* chewing. Tobacco chewing was reported as an increasing practice in the West.[30,31] The reason for this may be that the *Gutka* (mixture of tobacco and areca nut) industry has become lucrative with attractive sachet packaging, and its consumption can be compared with that of chewing gum in the Western countries. Furthermore, there used to be only few shops vending beetle in Indian areas, in European and North American countries. *Gutka* is now clandestinely sold through Indian grocers' abroad and the practice is sure being exported from India. Smoking is still considered the privilege of men and is socially unacceptable among women as was seen in this study. It is well-known that within the vestibule it is the quid-bearing area or the juxta-quid area that is prone to oral cancer. Longer quid duration may be imposing higher risk for cancer locally. Ghosh et al (1992) studied the pattern of tobacco addiction in 176 subjects, 105 oral cancer patients and 71 tobacco users without cancer, in a case-control design. High odds of night quid habit (odds ratio=12.5) were reported in oral cancer cases.[32] About 5% subjects in this survey admitted to sleep with the tobacco quid in mouth. It is noteworthy here that the salivary secretion stops during sleep. Similarly, those swallowing the quid (2% in this survey) may develop oesophageal and stomach cancer more frequently. Smokeless tobacco can safely be used in the privacy of one's mouth in a classroom or at home. It does not lead to a third-party affliction and is a socially accepted practice among men, women and children. Thus, a legislative mandate banning its use in public places is not likely to be granted or effective either. For chewing, legislative ban on littering and spitting in public offices and toilets—a common practice in this state can be considered.

At workplaces, construction sites and household sharing of tobacco or having a common pool of supply is conducive to tobacco culture. Surprisingly, a quarter of regular tobacco users in this study did not spend their own money to procure tobacco (always: $n=77$, 4.79%; sometimes: $n=1167$, 72.62%). Those gifting tobacco enjoy patronage from users and tend to work less. A regulation against this in industries can be considered. Children steal tobacco from the common pools kept at home for the older consumers. Discouraging the practice of bulk purchase and storage should certainly help curtail use by children in the house. This study also showed that a quarter of 403 (30.79%) subjects used to fend tobacco for others during childhood. Rubbing, a unique practice of mixing tobacco in tooth powder (*gul or michili*) and paste can easily be tackled by a law, strictly banning manufacture and sale of tobacco mixed in tooth powders/paste. It is a surrogate sale of tobacco in tooth powders/paste. This product builds cognitive pro-health role of tobacco in dental health ($n=42$, 2.61%) as was borne out in this study. Because tooth powder/paste is shared in the family, children get used to its taste and are more likely to get addicted to tobacco, as they grow older. A separate questionnaire developed for the child tobacco user addresses this issue.

A wider social awareness and awakening in support of anti-tobacco measures is therefore the need of the hour. Studies on tobacco habit and opinion on practice should provide important cues for constructing, devising and evolving anti-tobacco propaganda and tobacco control strategy through formal and normal education of masses and legislative actions. For decades, the concept of tobacco control focused solely on cessation strategies for individual smokers. More recently the emphasis has broadened to encompass prevention strategies that stress discouraging of tobacco use for the entire community. Hence, the above-mentioned research provides the key dimensions for a holistic approach that includes pharmacological cessation therapies, tobacco taxes, mass media and counter-advertising, tobacco litigation and agricultural tobacco settlement.

CONCLUSION

Multiple or overlapping tobacco practices and other substances abuse were documented in Lucknow, the capital city of the most populous state Uttar Pradesh where chewing tobacco was the commonest as opposed to smoking. Chewing tobacco in the form of gutka was a major habit which was seen as a growing habit in younger people.

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REFERENCES

1. Council of Scientific and Industrial Research (CSIR). *Drug Addiction with Special Reference to India 1965.* New Delhi: Publication and Information Division (PID).

2. Department of Agriculture and Co-operation, Government of India. *Tobacco in India—A Handbook of Statistics, 1987.* Madras: Directorate of Tobacco Development, Ministry of Agriculture.
3. Ministry of Planning, Government of India, New Delhi. National Sample Survey Organisation. Sarvekshan 1991;15:48.
4. Director General of Health Services, Ministry of Health and Family Welfare, Government of India. *Health Information of India 1993.* New Delhi: Central Bureau of Health Intelligence.
5. Mortality and smoking in Hong Kong: case control study of all adult deaths in 1998. http:/bmj.com/cgi/content/full: 323/7309/361.
6. Chaudhry K. Is pan masala—containing tobacco carcinogenic? *Nat Med J India* 1999;12:21–7.
7. *ICMR Bulletin* Vol 23, No 5 & 6; May–June 1993.
8. *ICMR Bulletin* Vol 25, No 5; May 1995.
9. Vaidya SG, Naik UD, Vaidya JS. Effect of sports sponsorship by tobacco companies on children's experimentation with tobacco. *Br Med J* 1996;313:400.
10. Triandis HC. Values, attitudes and interpersonal behaviour. In: *Nebraska Symposium on Motivation*, 1979. Lincoln, Nebraska: University of Nebraska Press 1980;27:195–259.
11. Gupta PC, Mehta FS, Pindborg JJ, et al. Intervention study for primary prevention of oral cancer among 36000 Indian tobacco users. *Lancet* 1986:1235–9.
12. Anantha N, Nandakumar A, Vishwanath N, et al. Efficacy of an anti-tobacco community education programme in India in the Kolar district, Karnataka. Cancer. *Cancer Causes Control* 1995;6:119–29.
13. Mackay JL. The fight against tobacco in developing countries. *Tuber Lung Dis* 1994;75:8–24.
14. Peto R, Lopez AD. Worldwide mortality from current smoking pattern. In: *The Global War – Proceedings of the 7th World Conference on Tobacco and Health* Durston B, Jamrozik K, eds. *Health Department of Western Australia, Perth* 1990: 66–8.
15. Rath GK, Chaudhry K. Estimation of cost of tobacco related cancers. *Indian Council of Medical Research* 1999.
16. Rani M, Bonu S, Jha P, Nguyen SN, Jamjoun L. Tobacco use in India: prevalence and predictors of smoking and chewing in a national cross sectional household survey. *Tob Control* 2003;12:e4. tc.bmjjournals.com/cgi/content/full/12/4/e4.
17. Vaidya SG, Naik UD. Tobacco addiction in India. *Tobacco Control SAARC Edition* 1995;1:307–21.
18. Kutty RV, Balakrishnan KG, Jayashree AK. Prevalence of coronary heart disease in the rural population of Thriuvananthapuram district, Kerala, India. *Int J Cardiol* 1993;39:59–70.
19. Venkat Narayanan KM, Chaddha SL, Hanson RL. Prevalence and patterns of smoking in Delhi: a cross sectional study. *BMJ* 1996;312:1576–9.
20. Gupta PC, Prakash H, Gupta VP. Survey of socio-demographic characteristics of tobacco use among 99,598 individuals in Bombay, India using handheld computers. *Tob Control* 1996; 5:114–20.
21. Shah S, Vaite S. Pavement dwellers in Mumbai, India: prioritizing tobacco over basic needs. In: *Tobacco and Poverty: Observation from India and Bangladesh 2002* Efroymson D, ed. PATH, Canada. http://wbb.globalink.org/public/tobacco_ poverty.PDF.
22. Pradeepkumar AS, Mohan S, Gopalkrishnan P, Sankara Sarma P, Thankappan KR, Nichter M. Tobacco use in Kerala: findings from three recent studies. *Natl Med J India* 2005; 18:148–53.
23. Kumar S, Pandey U, Bala N, Tewari V, Oanh KTH. Tobacco Habit in Northern India. *J Ind Med Assn* 2006; 104:19–24.
24. Yunus M. A baseline study of tobacco use among staff of Aligarh Muslim University. *J Roy Soc Health* 1997;117: 259–65.
25. Venkataraman S, Mukopadhya A, Muliyil J. Trends of smoking among medical students. *Indian J Med Res* 1996;104: 316–20.
26. Ramakrishna GS, Sarma PS, Thankappan KR. Tobacco use among medical students in Orissa. *Natl Med J India* 2005; 18:285–9.
27. Pindborg JJ, Mehta FS, Gupta PC, Daftary DK, Smith CJ. Reverse smoking in Andhra Pradesh, India: a study of palatal lesions among 10169 villagers. *Br J Cancer* 1971; 25:10–20.
28. Sinha DN, Gupta PC, Pednekar M. Tobacco water: a special form of tobacco use in Mizoram and Manipur states of India. *Natl Med J India* 2004;17:245–7.
29. Chaturvedi HK, Phukan RK, Mahanta J. Epidemiological study on substance use among tribal population of Arunachal Pradesh. *Ann Natl Acad Med Sci (India)* 1997;33:53–60.
30. Leopardi EA, Poulson TC, Neiger BL, Lindenmuth JE, Greer RO Jr. A report of two smokeless tobacco survey and associated intervention strategies among Utah adolescents. *J Cancer Educ* 1989;4:125–34.
31. Boyle RG, Gerend MA, Peterson CB, Hatsukami DK. Use of smokeless tobacco by young adult females. *J Subst Abuse* 1998;10:19–25.
32. Ghosh S, Shukla HS, Mohapatra SC, Shukla PK. Pattern of tobacco addiction in epidermoid carcinoma oral cavity. *Eur J Surg Oncol* 1996;22:359–60.