RESEARCH ARTICLE

Hardcore Smoking in Three South-East Asian Countries: Results from the Global Adult Tobacco Survey

Jugal Kishore[1], Pratap Kumar Jena[2]*, Chandan Bandyopadhyay[3], Monali Swain[4], Sagarika Das[5], Indrani Banerjee[6]

Abstract

Background: Hardcore smoking is represented by a subset of daily smokers with high nicotine dependence, inability to quit and unwillingness to quit. Estimating the related burden could help us in identifying a high risk population prone to tobacco induced diseases and improve cessation planning for them. This study assessed the prevalence and associated factors of hardcore smoking in three South-East Asian countries and discussed its implication for smoking cessation intervention in this region. Materials and Methods: Global Adult Tobacco Survey (GATS) data of India, Bangladesh and Thailand were analyzed to quantify the hardcore smoking prevalence in the region. On the basis of review, an operational definition of hardcore smoking was adopted that includes (1) current daily smoker, (2) no quit attempt in the past 12 months of survey or last quit attempt of less than 24 hours duration, (3) no intention to quit in next 12 months or not interested in quitting, (4) time to first smoke within 30 minutes of waking up, and (5) knowledge of smoking hazards. Logistic regression analysis was carried out using hardcore smoking status as response variable and gender, type of residence, occupation, education, wealth index and age-group as possible predictors. Results: There were 31.3 million hardcore smokers in the three Asian countries. The adult prevalence of hardcore smoking in these countries ranges between 3.1% in India to 6% in Thailand. These hardcore smokers constitute 18.3-29.7% of daily smokers. The logistic regression model indicated that age, gender, occupation and wealth index are the major predictors of hardcore smoking with varied influence across countries. Conclusions: Presence of a higher number of hardcore smoking populations in Asia is a major public health challenge for tobacco control and cancer prevention. There is need of intensive cessation interventions with due consideration of contextual predictors.

Keywords: Tobacco - hardcore smoking - nicotine dependence - cessation - India, Bangladesh, Thailand

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Introduction

Tobacco smoking is a major risk factor for preventable and premature deaths (IARC, 1986; Peto et al., 2001). Current trend of increasing smoking prevalence in developing countries (Giovino et al., 2012), would result in higher mortality in these countries in near future (Peto et al., 2001; Jha et al., 2008). In this context, tobacco control efforts targeted at cessation of smoking behavior has bearing on smoking attributable deaths including cancer mortality (Coambs et al., 1989; Jha et al., 2009; Moolgavkar et al., 2012). Experience from developed nations suggest that such intervention helped light smokers to quit with decreased prevalence of tobacco use, but also caused hardening of remaining smokers over time (Emery et al., 2000; Warner et al., 2003; Hughes, 2011). This view has been supported and linked with severity of nicotine dependence (Fagerstrom et al., 2008). However some authors argued that it is premature to conclude about hardening over time, without full implementation of tobacco control interventions (Cohen et al., 2012).

Hardcore smoking (HCS) refers to a subset of daily smokers with least possibility of quitting and responds less to tobacco control interventions (Emery et al., 2000; Warner et al., 2003; Fagerstrom et al., 2008; Hughes, 2011). Also smokers relapsed or failed with smoking cessation interventions have been named as hardcore (Londo et al., 1996; Tonnesen et al., 1996; Pierce et al., 1998). In absence of standard definition of 'hardcore' smoking, multiple component constructs comprising of motivational, dependence and behavioural variables have been used to define it (Cohen et al., 2012). These are daily or regular smoking, history of long term smoking, nicotine dependence, no quit attempt in the past, no future intention to quit, smoking despite of knowledge of smoking hazards and social disapprobation of smoking

*[1]Department of Community Medicine, Maulana Azad Medical College, [2]STEPS, Public Health Foundation of India, [3]Statistics, SIM Solutions, [6]Independent Statistician, New Delhi, [4]Medical, Tata Memorial Hospital, Mumbai, [5]Hospital, Central Institute of Psychiatry, Ranchi, India *For correspondence: drpratapjena@gmail.com*

(Costa et al., 2010). Hardcore smokers are usually older males with poor education and income (Jarvis et al., 2003; Auguston et al., 2004; MacIntosh et al., 2006; Ferketich et al., 2009; Jena et al., 2012a). Such high tobacco users are high risk group which need to be addressed by tobacco control interventions (Christiansen et al., 2012). Figure 1 represents the concept of hardcore as a subset of daily smokers.

Smoking attributable diseases including cancers are dose dependent like amount smoked, age of starting to smoke, duration of smoking, duration of quitting, etc (Hart et al., 2012; Peter et al., 2012). The dose dependent nature of different component constructs of hardcore smoking suggests that, they represent high risk groups for tobacco induced diseases. Therefore it is pertinent to assess the high risk smoker with the use of hardcore definitions. There is academic merit in exploring and improving our understanding about hardcore smoking behaviour (Docherty et al., 2012). Other smoking products like bidi are prevalent and predominant (Giovino et al., 2012) in SEA region, therefore the use of hardcore definition in relation to cigarette use, limits it application in this region. Therefore it is essential to extending the definition of hardcore to all smoking products.

The hardcore component constructs excluding nicotine dependence could be applied to all smoking products (Jena et al., 2012b). Hardcore smoking without dependence construct had observed that higher proportion of hardcore smokers, smoke their first cigarette within 30 minutes of waking up and also use more cigarettes (≥15) per day (Jarvis et al., 2003; MacIntosh et al., 2006). Other studies that included dependence component construct, used heaviness of smoking index (HSI) and cigarette per day (CPD≥15) as a measure of dependence (Costa et al., 2010). It is to be noted that CPD and time to first smoke (TTFS) together constitute HSI (Fagerstrom et al., 1990; Heatherton et al., 1991). Culture, regulatory environment, tobacco control interventions etc. influence CPD estimation over time; whereas time to first smoke is more stable and considered as the best single community surveillance indicator of tobacco dependence assessment (Fagerstrom et al., 2003; Jena et al., 2012b; 2012c). Use of time to first smoke (TTFS) to define and measure hardcore smoking is a recent phenomenon and justified as CPD is product specific and TTFS has ability to represent multiple smoking products at the same time (Jena et al., 2012b).

Global Adult Tobacco Survey (GATS) in SEA region has made available the national data with information on some hardcore smoking component constructs. The current study examined the prevalence of and factors influencing hardcore smoking in SEA region using component construct information available from GATS data.

Materials and Methods

GATS is a nationally representative cross-sectional household survey of adults (≥15 years). It is standard for systematically monitoring of adult tobacco use and tracking of key tobacco control indicators, comparable across countries. GATS was conducted in SEA countries like India (2009-10), Bangladesh (2009) and Thailand (2009). The survey employed a multi stage probability sampling technique to provide national estimates by gender and residence (GATS Bangladesh, 2009; GATS Thailand, 2009; GATS India, 2010). GATS had collected information on adult tobacco (smoking and smokeless) use, socio-demographic characteristics of tobacco users, tobacco cessation practice, exposure to second hand smoke, expenses on tobacco products, exposure to different media on tobacco related information and knowledge, attitudes and beliefs about tobacco. In this study hardcore smoking prevalence was estimated by adapting population study definitions for any smoking product use in these countries.

For the purpose of current study, hardcore smoking is defined as (1) current daily smoking, (2) no quit attempt in the past 12 months of survey or last quit attempt lasting ≤24 hours, (3) no intention to quit in next 12 months or not interested in quitting, (4) Time to first smoke ≤30 minutes, and (5) Knowledge of smoking hazards. In this study wealth index was estimated using principal component analysis (PCA), and the households were categorized into five economic groups (quintiles) the lowest 20% referring to the poorest quintile while the highest 20% referring to the richest quintile (WHO, 2010; Howe et al., 2012). Occupation categories reclassified as (1) Unemployed/Retired, (2) Employed (Govt./Non-govt.), (3) Self-employed and (4) Others for uniformity and better statistical analysis. The industry workers were kept under employed category. The univariate and multivariate analysis were done to assess the factors predicting hardcore smoking in these countries. The sample weights were used to estimate prevalence, bivariate and multivariate analysis. STRATA software was used to analyse country specific data separately.

Results

Characteristics of daily smoker as per component constructs of hardcore

More than half to two third of daily smokers in SEA region had reported no quit attempt in the past 12 month preceding the survey. Female daily smokers reported less quit attempt than males except in Bangladesh. More females were unable to remain abstinent for a day than

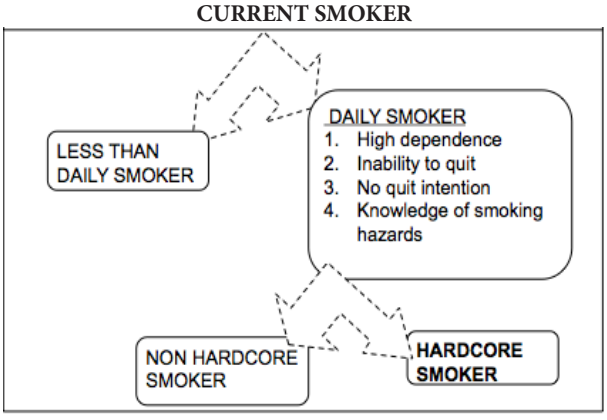

Figure 1. Concept of Daily and Hardcore Smoking

males during their last quit attempt. The trend was similar across three countries. Indian daily smokers were least interested in quitting than their counterparts in Bangladesh and Thailand. More female daily smokers reported their nil interest in quitting than males in all the three countries whereas reverse trend was observed while reporting about the possibility of quitting some time after next 12 month. Considering time to first smoke within 30 minutes of waking up, around two-third Indians were found to be dependent, whereas daily smokers in Bangladesh found to be least dependent. Female daily smokes were less dependent than males except in Bangladesh. Knowledge about smoking causing serious illness was quite high among the daily smokers in all the three countries but least in India (Table 1).

Prevalence of hardcore smoking in SEA

The estimated number of hardcore adult smokers in the three SEA countries was 31.1 million. The absolute number of hardcore smokers was higher in India than other two countries. Higher proportion of adults and daily smoker were found to be hardcore in Thailand than India and Bangladesh. Gender wise data indicated that males outnumber females in all the three countries. But female

Table 1. Distribution of Daily Smokers According to Different Hardcore Component Constructs

Hardcore component constructs	India (%)			Bangladesh (%)			Thailand (%)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Quit attempt during past 12 months*									
No quit attempt in the past 12 month	66.2	65.4	66.1	54.8	71.5	55.3	54.0	53.5	53.9
Last quit attempt lasting ≤24 hours	2.3	3.7	2.4	2.9	12.4	3.2	2.4	5.5	2.6
Quit Intention*									
Not interested in quitting	44.3	46.3	44.5	21.2	50.3	22.1	37.0	39.0	37.2
Quit some day but not in next 12 months	21.7	12.6	20.7	29.3	16.3	28.9	38.2	27.7	37.5
Tobacco Dependence*									
Time to first smoke ≤30 minutes	66.5	59.4	65.7	44.2	45.9	44.3	60.9	47.1	60.1
Knowledge									
Know or believe that tobacco causes serious illness	87.8	79.7	86.9	96.9	84.7	96.6	97.2	96.7	97.2

*Percentages (column) given in the table are not mutually exclusive

Table 2. Distribution of Hardcore Smoker Across Three SEA Countries

SEA country	No. (millions)			Hardcore smoking prevalence across three SEA countries					
				Proportion of adult population			Proportion of daily smoker		
	Male	Female	Total	Male % (CI)	Female % (CI)	Total % (CI)	Male % (CI)	Female % (CI)	Total % (CI)
India	22.53	1.78	24. 31	5.5 (5.0, 6.0)	0.5 (0.4, 0.6)	3.1 (2.8, 3.3)	29.9 (27.8, 32.0)	19.0 (14.7, 28.5)	28.7 (26.7, 30.7)
Bangladesh	3.44	0.21	3.65	7.2 (6.1, 8.6)	0.4 (0.3, 0.8)	3.8 (3.2, 4.6)	17.8 (15.1, 20.8)	33.6 (18.6, 52.9)	18.3 (15.6, 21.4)
Thailand	3.04	0.14	3.18	11.9 (10.8, 13.1)	0.5 (0.2, 0.9)	6.0 (5.5, 6.6)	30.3 (27.9, 32.9)	20.9 (14.9, 28.5)	29.7 (27.4, 32.2)

Table 3. Distribution of Estimated Hardcore Smokers Across Select Socio Demographic Characteristics in SEA Regions

		India		Bangladesh		Thailand	
		N	%	N	%	N	%
Overall		24,309,857	28.7	3,651,921	18.3	3,180,566	29.7
Gender	Male	22,526,346	29.9	3,437,617	17.8	3,043,529	30.3
	Female	1,783,511	19.0	214,304*	33.6	137,038	20.9
Type of residence	Urban	5,665,976	29.1	732,192	15.3	895,782	29.7
	Rural	18,643,882	28.5	2,919,729	19.3	2,284,785	29.8
Occupation	Unemployed/Retired	964,959	24.4	109,848	11.3	204,901	31.6
	Others	2,660,933	23.5	271,899	17.6	89,929	13.2
	Employed	8,478,433	28.0	134,518*	9.3	1,174,648	28.3
	Self-employed	12,201,417	31.1	3,135,656	19.6	1,711,088	32.9
Education	No formal education	10,254,388	29.8	2,156,555	22.2	136,829	27.4
	Primary incomplete	4,057,687	26.1	702,613	18.8	1,120,757	32.3
	Primary to HS completed	8,753,657	28.5	770,817	12.8	1,704,289	28.4
	College and above	957,190	27.0	21,937*	4.9	217,639	29.8
Wealth Index	Lowest	8,835,779	30.2	1,744,643	25.3	899,633	30.1
	Second	7,083,731	29.9	817,909	17.2	597,619	28.5
	Middle	3,418,212	25.8	570,502	18.1	807,125	31.1
	Fourth	3,379,162	27.2	365,822	11.5	605,965	27.7
	Highest	1,592,973	26.0	153,045	7.8	270,224	32.9
Age Group	15-24	1,074,507	16.8	269,757*	9.4	332,364	21.6
	25-34	4,165,005	27.7	866,149	19.6	600,719	30.6
	35-44	6,271,585	28.5	1,096,474	21.0	926,615	31.1
	45+	12,798,761	30.9	1,419,542	19.1	1,320,868	31.4

*Estimates based on actual sample size <25 individuals in Bangladesh GATS survey. HS= Higher secondary

Table 4. Logistic Regression Model Predicting Hardcore Smoking in SEA Regions

		India		Bangladesh		Thailand	
		Odds Ratio (CI)	p-value	Odds Ratio (CI)	p-value	Odds Ratio (CI)	p-value
Residence	Rural	Reference Category					
	Urban	1.11 (0.91-1.36)	0.290	1.13 (0.79-1.61)	0.501	1.07 (0.87-1.32)	0.525
Gender	Female	Reference Category					
	Male	2.1 (1.33-3.29)	0.001	0.6 (0.27-1.36)	0.223	1.47 (0.96-2.25)	0.077
Employment	Unemployed/Retired	Reference Category					
	Employed	1.21 (0.90-1.63)	0.201	0.98 (0.32-2.97)	0.970	0.86 (0.58-1.26)	0.436
	Self-employed	1.34 (1.02-1.74)	0.034	1.46 (0.61-3.50)	0.368	1.05 (0.73-1.50)	0.798
	Others	1.29 (0.78-2.13)	0.329	1.64 (0.68-3.96)	0.271	0.39 (0.22-0.69)	0.001
Education	College & above	Reference Category					
	No formal education	1.1 (0.72-1.68)	0.652	2.26 (0.78-6.55)	0.132	0.96 (0.51-1.79)	0.891
	Up to primary	0.96 (0.62-1.48)	0.848	1.90 (0.65-5.60)	0.243	1.07(0.70-1.63)	0.761
	HS completed	0.98 (0.66-1.44)	0.905	2.39 (0.83-6.95)	0.108	0.9 (0.59-1.37)	0.625
Age groups (years)	15-24	Reference Category					
	25-34	1.9 (1.2-3.0)	0.006	2.32 (1.22-4.41)	0.010	1.37 (0.84-2.24)	0.209
	35-44	1.94 (1.26-2.99)	0.003	2.43 (1.26-4.71)	0.008	1.33 (0.83-2.14)	0.242
	45+	2.34 (1.52-3.60)	0.001	2.18 (1.18-4.06)	0.014	1.34 (0.83-2.16)	0.228
Wealth Index quintile groups							
	Highest	Reference Category					
	Lowest	1.27 (0.90-1.79)	0.166	3.15 (1.67-5.97)	0.001	1.28 (0.92-1.77)	0.138
	Second	1.29 (0.92-1.81)	0.135	2.68 (1.42-5.05)	0.003	1.04 (0.75-1.43)	0.825
	Middle	1.17 (0.85-1.60)	0.329	1.93 (1.07-3.50)	0.030	1.00 (0.75-1.33)	0.980
	Forth	1.08 (0.80-1.47)	0.598	1.49 (0.83-2.67)	0.176	1.08 (0.80-1.45)	0.626

hardcore users constituted a higher proportion of daily smokers in Bangladesh (Table 2).

Distribution of hardcore smoking across various socio-demographic characteristics

Prevalence of hardcore smoking was higher among males in India and Thailand but reverse trend was observed in Bangladesh. The rural and urban difference in hardcore smoking was negligible in Thailand and India, whereas, higher prevalence was seen in rural Bangladesh. Higher prevalence of hardcore smoking was noted among self employed than other occupational categories across all the countries. The prevalence of hardcore smoking decreased with increase in educational status in Bangladesh and India which was more striking in Bangladesh. Interestingly people without any formal education in Thailand were less hardcore than other educational groups. A similar trend was noticed for wealth index groups with the exception of Thailand, where more hardcore smoking prevalence was observed in the highest wealth index category. Hardcore smoking increased with increase in age in all the SEA countries (Table 3).

Determinants of hardcore smoking

Socio-demographic categorical variables were included in the binary logistic regression model to predict HCS in SEA countries (Table 4). Residence and education status remained insignificant predictor of HCS in all the three SEA countries. Higher age of daily smoker was a significant predictor of becoming HCS in India and Bangladesh. The odds of becoming HCS were higher with increase in age in these countries. Gender remained significant predictors of HCS in India only. Male daily smokers had higher odds in India (2.1) of becoming HCS.

Occupation status was a significant predictor of HCS in India and Thailand. Self-employed daily smoker in India had 33% increased odds (1.33) of becoming HCS than unemployed/retired daily smoker. 'Other' daily smokers had less risk (OR 0.38) of becoming HCS than the unemployed or retired daily smokers in Thailand. Wealth Index in India and Thailand remained an insignificant predictor of HCS. In Bangladesh, daily smokers in the lowest, second and middle wealth index quintile groups had higher odds than the highest quintile group.

Discussion

The present study quantified prevalence of HCS in developing nations in SEA region. With the use of TTFS as a measure of nicotine dependence, this study represented hardcore use of myriad variety of smoking tobacco products in SEA region. This study could form the baseline indicators for future evaluation of tobacco control efforts and examination of hardening hypothesis. Also this study constructed hardcore use as a subset of daily smoker and compared between hardcore and non hardcore daily user, which helps to identify attributes of daily smokers that make them hardcore user.

Emery et al. (2000) used 'expect never to quit', 'no quit attempts in the past one year' and 'CPD>15' as component construct of HCS and found that 1.3% of the California population were hardcore smokers. Using 'no quit attempt', 'no six month quit intention' and 'HSI>4', Costa et al. (2010) found that 1.47% of Ontario (Canada) population are hardcore smokers. MacIntosh et al. (2006) used 'no quit attempts longer than 24 hr over past year', 'no intention to quit over next 4 week' and 'no desire to quit' to define hardcore smoking. He found that 16.1% of regular smokers visiting UK general practitioner are hardcore users. Jarvis et al. (2003) estimated hardcore smoking prevalence in UK using 'long term regular smoking', 'no quit attempts over past year' and 'no future

quit intention'; and found that 16% of all smokers were hardcore smokers. Lund et al. (2011) defined HCS as 'no quit attempt during the previous year', 'no intention to quit during the next six months', and 'a belief in continued smoking status in five-year time and estimated that 6% of adults are hardcore smoker. When compared with these studies having dependence construct, our study indicates that prevalence of hardcore smoking among adult is 3.1-6% and among daily smoker is 18.7-29.7% which is higher than developed countries. It is to be noted that lack of uniform definition is a problem for direct comparison and also it is seen that more relaxed definition yielded higher prevalence estimate and vis-a-versa (Costa et al., 2010; Docherty et al., 2012). As far as high risk group identification is concerned, standardization of hardcore definition is a need of the time.

Multiple studies in industrialized nations indicated that lower education, lower economic status, higher age group and male gender are independent predictors of HCS (Costa et al., 2010). This study highlights higher age, male gender and lower economic status as independent predictors of hardcore smoking but varied across countries. However, this study does not find any significant association between lower education and HCS. Further studies for country specific factors affecting HCS needs to be explored.

The tobacco dependence has implication for continued smoking, success at quit attempt, while motivational and behavioural components of tobacco use have implication for predicting failure to make quit attempts (Vangeli et al., 2011; Ip et al., 2012). Since dependence, motivational and behavioural attributes of tobacco use characterize hardcore smoking; it has implication for success of tobacco cessation interventions. Studies suggest that more intensive tobacco control interventions are required to influence hardcore smokers (Fagerstrom et al., 1996). Some authors argued that there is need of universal tobacco cessation approach along with targeted approach for the hardcore smokers (Docherty et al., 2012). Hence tobacco cessation planning should factor in these high risk groups while designing and implementing the cessation interventions.

India has only 19 tobacco cessation centers attached to tertiary care health facilities (Varghese et al., 2012). These centers are less accessible to rural India population where 18.6 million hardcore smokers reside. GATS-India (2010) report has recommended for wide availability of tobacco cessation facilities with trained health care providers so that it could be easily accessed tobacco users with lower education and in higher age group (GATS India, 2010). Thailand had 1120 cessation clinics in 2005; however GATS-Thailand report in 2009 had indicated policy need to build capacity among health care providers and to expand cessation facilities in primary health care services. Similarly, GATS- Bangladesh (2009) emphasized policy need to build capacity among heath care providers to implement tobacco cessation services and also there is need to expand cessation facilities in health-care settings as well as in communities. As all the three countries in SEA region have inadequate cessation facilities and human resources, there is an unmet need to expand the cessation facilities in these countries.

While designing cessation services for hardcore smokers there should be emphasis for treatment of tobacco dependence and inclusion of behavioural approaches for motivation. Since these hardcore users have knowledge of smoking hazard but unwilling to quit, a personalized message indicating risk to the individual concerned may be tried.

Limitation of the study: Self reported smoking behaviour may not be true prevalence. Due to cross sectional nature of the data collection, examination of hardening over time was not possible. History of alcohol use and mental disorders was not assessed which could be confounders for hardcore smoking.

In conclusion, a large number of adults in SEA are hardcore smokers who smoke daily just within 30 minutes of waking up and were either unable to quit or unwilling to quit despite of awareness about smoking hazards. Presence of a higher number of hardcore smoking populations in three SEA countries with inadequate cessation service and trained human resource is a major public health challenge for tobacco control and cancer prevention. These hardcore smokers should be given due importance during smoking cessation planning and interventions. The contextual nature of hardcore smoking behaviour also highlights country specific cessation intervention planning. The study results also emphasize for the need of standard definition of hardcore smoking so that different study results can be compared across the globe.

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