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Tobacco smoking patterns, awareness and expenditure: a cross-sectional overview from Surat City, India

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BACKGROUND: As smoking is a major risk factor in India, the objective of present study was to assess smoking patterns, expenditure and awareness amongst smokers and to examine factors associated with the severity of smoking in Surat city.

METHODS: Community-based cross-sectional study was conducted with the use of pre-structured questionnaire tool targeting 281 current smokers in the slums of 20 Urban Health Centers. Smokers were categorized based on pack-years, which means the number of packs smoked per day multiplied by the duration of smoking (mild <5, moderate 5-15, and severe >15), and based on the number of cigarette/bidis smoked per day without the duration component (mild <10, moderate 10-19, and severe ≥20). Factors associated with severity of smoking were examined within two approaches with help of Epi-info mediated analysis.

RESULTS: Lower severity of smoking was associated with smaller number of family members who

smoke ($p < 0.001$). Groups of mild and moderate-severe smokers were similar with regards to education, socioeconomic class, and awareness regarding hazards of smoking ($p > 0.05$). With the influence of friends (50%), about 60% smokers engage into this habit before the age of 20 years. Though only 20% of current smokers were not aware of the consequences of active smoking, more than 50% did not know about the same for passive smoking. The lowest socioeconomic class spends 44% of their income on tobacco products compared to 7% in the highest class.

CONCLUSION: The study provides insights for information, education and counseling (IEC) activities which should take into account health impact of bidi smoking, low awareness of health impact of passive smoking, and higher percentage of total monthly expenditure on tobacco among low-income household resulting in crowding out of expenditures on other needs.

KEYWORDS: tobacco smoke; awareness; expenditure; bidi; India.

Стереотипы потребления табака, осведомленность и затраты на табачные изделия: результаты опроса в городе Сурат, Индия

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АКТУАЛЬНОСТЬ: Поскольку курение является важным фактором риска в Индии, целью данного исследования была оценка стереотипов потребления табака, расходов на табак и знаний о влиянии на здоровье, а также факторов, связанных с тяжестью курения, среди курильщиков города Сурат.

МЕТОДЫ: Одномоментный опрос 281 курильщика с использованием структурированной анкеты был проведен на базе населенного пункта в трущобах, окружающих 20 городских центров здоровья. Курильщиков классифицировали в зависимости от показателя пачко-лет, то есть количества пачек, выкуриваемых в день, перемноженных на количество лет курения (легкие – менее 5 пачко-лет, умеренные – 5-15 пачко-лет, тяжелые – более 15), и в зависимости от количества сигарет, выкуриваемых в день, без учета длительности курения (легкие – менее 10 сигарет в день, умеренные – 10-19 сигарет в день, тяжелые – 20 и более сигарет в день). Факторы тяжести курения, измеренной с помощью двух подходов, анализировали с использованием программы Epi-info.

РЕЗУЛЬТАТЫ: Меньшая тяжесть курения сочеталась с меньшим количеством курящих членов семьи ($p < 0.001$). Группы курильщиков различной тяжести не различались по образованию, социально-экономическому статусу, уровню знаний об опасности курения. Под влиянием друзей (50%) около 60% курильщиков вовлекаются в курение до 20 лет. Хотя только 20% не знали о последствиях активного курения, более 50% не знали о влиянии пассивного курения. Представители низшего социального класса затрачивают на курение 44% своих доходов по сравнению с 7% доходов представителей высшего класса.

ОБСУЖДЕНИЕ: Исследование дает информацию для просветительских действий, которые должны принимать во внимание влияние на здоровье курения биди, низкую осведомленность о влиянии на здоровье пассивного курения, а также более высокую долю расходов на табак в бюджете малоимущих курильщиков, что ведет к вытеснению расходов на другие важные потребности.

КЛЮЧЕВЫЕ СЛОВА: табачный дым, осведомленность, расходы, биди, Индия.

INTRODUCTION

Today, around the world, tobacco is one of the most widely distributed and commonly used drugs (Makwana, Shah, & Yadav, 2007). There are more than one billion smokers worldwide with nearly 80% of them living in low- and middle-income countries (World Health Organization [WHO], 2011).

Globally, around five million deaths every year are attributable to direct tobacco use, which is the largest preventable cause of death (WHO, 2012).

In India, among people aged 30 years and over the mortality due to tobacco use is 206 per 100,000 in men and 13 per 100,000 in women with proportion of deaths attributable to tobacco reaching 12% for men and 1% for women (WHO, 2012).

Bidi, typically made with Indian tobacco, hand wrapped in a tembhurni leaf, nabbed on one end and bound with a thin string, is the traditional Indian smoking product (Gajalakshmi et al., 2003; Gupta, Murti, Bhonsle, 1996; Rapiti, Jindal, Gupta, & Boffetta, 1999). In comparison to bidi, cigarette smoking is a relatively new habit in India with its prevalence increasing steadily only in the past 40 years (The World Bank, 2011). Globally, tobacco is responsible for 14% of all deaths related to non-communicable diseases (NCD), whereas in India it is responsible for 9% of all deaths related to NCD (WHO, 2012).

In majority of smokers, tobacco usage starts before the age of 19 years with adverse health effects cumulating over a longer period of lifespan, which ranges from lung and other cancers, cardiovascular diseases and stroke to infertility, spontaneous abortions and stillbirths; in both smokers and surrounding non-smokers due to

effects of passive smoking (Center for Disease Control [CDC], 2002; CDC, 2008; Makwana et al., 2007; US Department of Health & Human Services, 2004).

In addition to the various health effects, smoking also lays a catastrophic burden on family budget (Alachkar, 2008). In smoking households, expenditure on cigarettes and tobacco constitutes a remarkable percent of total household expenditure (Alachkar, 2008). Some studies on India have found that tobacco-consuming households had lower use of certain commodities such as milk, education, clean fuels, and entertainment with more direct burden on women and children; the vicious cycle of higher likelihood of smoking being associated with lower spending on education, which again in turn being associated with higher smoking, and clearly leads to negative intergenerational consequences (Hu, Mao, Liu, De Beyer, & Ong, 2005; Rijo, 2008; Wang, Sindelar, & Busch, 2006).

One problem that has been consistently faced by all researchers in studying smoking and its consequences is the precise quantification of the burden of smoking. A widely used approach is calculating pack-years based on number of cigarettes smoked per day and the duration of smoking with one pack equaling 20 cigarettes ("National Cancer Institute definition of pack year", n.d.).

There is a wide regional difference in smoking patterns in India with prevalence of cigarette/bidi smoking among men ranging from as high as 73.6% in Mizoram to as low as 13.6% in Goa (International Institute for Population Sciences [IIPS] & Macro International, 2007). In Gujarat, the prevalence of cigarette/bidi smoking is 26.1% in men and 0.6% in women (IIPS &

Macro International, 2007). There is also a wide difference in rural and urban areas with prevalence of cigarette/bidi smoking being 35% and 28.7% in men, respectively (IIPS & Macro International, 2007). So the study findings in any particular region cannot accurately describe smoking pattern of another region (IIPS & Macro International, 2007). The objective of our study is to investigate the patterns of smoking and related expenditures along with awareness about its hazards among current smokers as well as to categorize individuals for severity of smoking and to explore its correlates in the Surat city of Gujarat, as there is not much literature available from this region.

METHODS

In the month of October, 2010, a rapid cross-sectional survey was carried out among the smokers residing in the slum areas nearest to 20 UHCs (Urban Health Centers) of Surat city. The 20 UHCs were selected randomly by lottery method after obtaining a complete list of all 34 UHCs from Surat Municipal Corporation. Smokers from each UHC-catered slum area were selected by doing a house-to-house survey. The goal was to cover 15 smokers from each UHC-covered slum aiming at 300 altogether. Selection of subjects from different UHC areas was aimed at obtaining an equal representation from every part of the city. The survey was stopped in each area when first 15 smokers were covered regardless of refusal. The response rate for all UHCs was 93% with on average one subject out of 15 refusing per UHC. So, the final sample size obtained was of 281 subjects.

An oral informed consent was obtained from all the participants. Those participants who voluntarily consented for participation were

subjected to in-depth interviews using semi-structured questionnaire. Only current smokers who have smoked tobacco in any form at any point of time during last month were included.

The semi-structured questionnaire was prepared after a detailed literature review followed by piloting of 20 subjects in one UHC area to check for feasibility and necessity of corrections. Data of subjects interviewed in the piloting stage were not included into the analysis. The survey tool focused on assessing demographic variables, smoking patterns, and knowledge about hazards among smokers.

Data analysis

Double data entry was done in an Excel sheet. Based on the compiled data, using the standard formula from the National Cancer Institute, USA, pack-years were calculated for each individual by multiplying the number of packs of cigarettes smoked per day by the number of years the person has been smoking, where one pack equaled 20 cigarettes. Assuming four bidi equal in its nicotine content to one cigarette (Gajalakshmi et al., 2003; Malik, 1974; Malson, Sims, Murty, Pickworth, 2001; Mohan et al., 2006), for bidi smokers the above index

Table 1: Smoking pattern (n=281)

Parameter	Frequency (Percent)
Type of smoking	
Bidi	208(74.0)
Regular cigarette	73(26.0)
Associated substance abuse (Multiple response)	
Chewable tobacco	46(16.4)
Alcohol/Country liquor	30(10.7)
Gutka/Mawa	26(9.3)
Tabkhir	4(1.4)
Number of associated substances of abuse	
None	192(68.3)
One	74(26.3)
More than or equal to two	15(5.4)
Smoking severity based on pack-years(p-y)	
Mild smoker(<5 p-y)	236(84)
Moderate smoker(5-15 p-y)	43(15.3)
Heavy smoker(>15 p-y)	2(0.7)
Smoking severity based on number of bidi/cigarettes smoked per day	
Mild smoker(<10 bidi/cigarettes)	170(60.5)
Moderate smoker(10-19 bidi/cigarettes)	31(11)
Heavy smoker(\geq 20 bidi/cigarettes)	80(28.5)
Age of smoking initiation	
< 10 years	15(5.4)
Pre-pubertal (11-13 years)	5(1.8)
Pubertal (14-16 years)	33(11.7)
Post-pubertal (17-20 years)	121(43.1)
> 20 years	107(38.0)
Duration of smoking (in years)	
< 11	107(38.1)
11-20	116(41.2)
> 20	58(20.7)
Ever tried to quit smoking in the past	126(44.8)

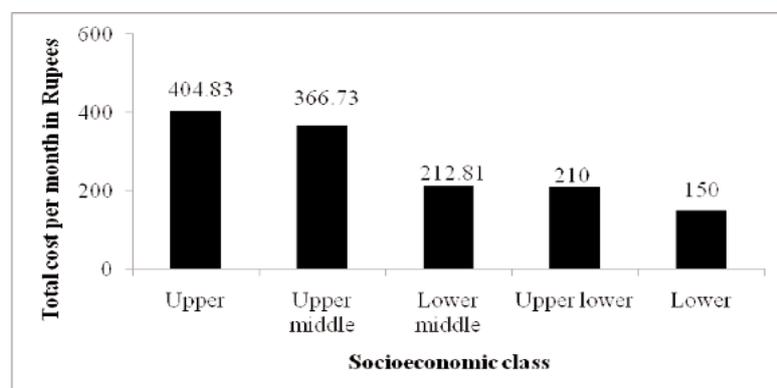


Figure 1: Absolute cost per month spent on substances of abuse (n=281)

was further multiplied by 0.25 to derive pack-years for bidis.

The smokers in the study were divided into mild, moderate, and heavy smokers using two different approaches. The first approach was based on pack-years: smokers with <5 pack-years were considered as mild, 5-15 pack-years as moderate, and >15 pack-years as severe smokers. The second approach was based only on numbers of cigarettes/bidi smoked per day regardless of the duration component from pack-years: smokers with less than 10 cigarettes/bidi per day were

considered as mild, 10-19 cigarettes/bidi per day as moderate, and 20 or more cigarettes/bidi per day as severe smokers. As there were only two individuals under heavy smoker category when using the first approach, for the purpose of analysis we clubbed moderate and heavy smokers into one category. The same was also done for the second approach to maintain uniformity.

For both approaches, comparison of mild and moderate-heavy smokers was conducted with the use of Epi Info 7 with respect to demographic and other variables to explore the difference between the two groups. Chi-square test of independence with calculation of crude odds ratios in 2x2 tables was used for categorical variables.

RESULTS

All 281 participants in the sample were males and 78.7% of them were either illiterate or educated up to primary level only. Majority of participants (73.6%) in the study were laborers and semi-skilled workers. When the subjects were classified based on socioeconomic status as per Modified Prasad's classification, 68% were falling in class two (Kumar, 1993; Prasad, 1961). Categorization of individuals for severity of smoking based on two approaches is given in Table 1.

As seen from Table 1, 174 (62%) of participants in the study had their first puff before the age of 20 years. As for the duration of smoking, 61.9% of the current smokers in the study have been smoking for more than 10 years.

Average amount spent on all types of psychoactive substances used per month was found to be 348.5 (SD 360.9) Rupees, which constitutes on average 11.3 (SD 11.6) percent of monthly income. Though absolute amount spent on

Table 2: Awareness regarding smoking hazards, family history and expenditure (n=281)

Parameter	Frequency (Percent)
Aware of hazards of active smoking	249(88.6)
Aware of hazards of passive smoking	135(48.0)
Reported hazards of passive smoking in those who said they were aware (Multiple response) (n=135)	
Respiratory problems in general	45(33.3)
Cough	14(10.4)
Asthma /Bronchitis	4(2.96)
Lung infection, Pneumonia, TB	7(5.19)
Cancer	27(20.0)
Problems to others	8(5.93)
Don't know	50(37.04)
Total number of family members with history of substance abuse	
None	63(26.6)
One	10(3.5)
Two	100(35.6)
More than two	82(29.2)
First introduced to smoking by	
Self	89(31.6)
Parents	7(3.0)
Sibling/Cousin	12(5.1)
Other relatives	17(7.2)
Friends	126(53.2)
Colleague	7(3.0)
Neighborhood	5(2.1)
Percent of monthly income spent on abuse	
< 6	108(38.4)
6-10	76(27.0)
> 10	84(29.9)

psychoactive substances is lower among lower socioeconomic class (Figure 1), they spend more as a percentage of total income due to lower average income in comparison to higher socio-economic class (Figure 2).

Approximately 249 (90%) and 135 (50%) of smokers under study had knowledge of active and passive smoking being harmful, respectively; however, asked about what harms it caused, 37% didn't know the answer. Enumerated harms are presented in Table 2. Those who were knowledgeable about the harmful effects of smoking were found significantly more likely to

be mild smoker at $p < 0.05$ with Chi-square test as evident from Table 3 for approach 1. It is known that young smokers are more aware of the harms of smoking. Younger smokers due to their age also have shorter duration of smoking and hence less pack-years. Hence, to control for the possible confounding effect of age on the relation between awareness and severity, adjustment for age was done. The age-adjusted odds ratio for awareness and severity is 1.78 (Confidence interval: 0.1-4.2), which is non-significant. Using the second approach, no association between awareness of smoking harms and

severity of smoking (OR=1.41, CI=0.7-2.9, p-value=0.36) was seen as well.

A majority – 161 (64.6%) smokers – were not able to quit smoking due to compulsive habit as the main reason for continuing smoking despite being aware of its dreadful consequences as seen from Figure 3. About half 22 (48%) of moderate-heavy and 104 (44%) of mild smokers had past history of unsuccessful attempts to quit, which indicates their probable willingness to quit, but failure due to lack of proper guidance and support, which is an unmet demand for smoking cessation help.

Factors associated with the severity of smoking are shown in Tables 3 and 4. On applying Chi-square test, no statistically significant association was found between education and severity of smoking based on pack-years (OR=1.72, CI=0.8-3.8, p-value=0.17) (Table 3). The non-significant relation persisted even after removing the duration component from the model as seen from Table 4 (OR=1.92, CI=0.9-2.6, p-value=0.13). Similarly, on application of Chi-square for linear trend, socioeconomic class and severity of smoking were also not found to be significantly associated in both models (p=0.26).

On application of Chi-square for linear trend, it becomes evident that as the total number of smoking members in the family increases, the chances of remaining a mild smoker decrease for a subject (p<0.01) (Tables 3 and 4).

DISCUSSION

National Family Health Survey (NFHS-3) and other large scale surveys in India have shown higher prevalence of cigarettes/bidi smoking among illiterates (50.1% men and 3% women) and lowest income quintiles (42.9% men and 3.3% women) in comparison to literates

Table 3: Factors associated with severity of smoking based on pack-years, approach 1 (n=281)

Parameter	Frequency		Crude OR	CI	P-value
	Mild	Moderate-severe			
Education vs. Smoking severity					
Illiterate	71(88.7)	9(11.3)	1.72	0.8-3.8	0.17
Literate	165(82.1)	36(17.9)	1.00		
Socioeconomic status vs. Smoking severity					
Lower	10(83.3)	2(16.7)	1.00	-	0.26
Middle	190(85.2)	33(14.8)	1.15	0.2-5.5	
Upper	36(78.3)	10(21.7)	0.72	0.1-3.8	
Total family members smoking vs. Smoking severity					
One	102(92.7)	8(7.3)	1.00	-	0.004
Two	64(78.1)	18(21.9)	0.28	0.1-0.7	
Three	45(81.8)	10(18.2)	0.35	0.1-0.9	
Four	25(73.5)	9(26.5)	0.22	0.1-0.6	
Knowledge of harmful effect vs. Smoking severity					
Yes	213(85.5)	36(14.5)	2.31	1.0-5.4	0.04
No	23(71.8)	9(28.1)	1.00		
Knowledge of harmful effect vs. Smoking severity (Adjusted for age)					
Lowest quartile age group(≤30)			1.78*	0.7-4.2	0.44†
Second quartile age group(31-36)					0.47†
Third quartile age group(37-45)					0.01†
Highest quartile age group(≥46)					0.73†

* Adjusted OR for age

† Fisher-exact values have been used

(20.1% men and 0.1% women) and highest quintiles population (21.7% men and 0.2% women) (IIPS & Macro International, 2007; Rani, Bonu, Jha, Nguyen, & Jamjoun,

2003). In the present study, we found 71.5% smokers were literates and 68% were belonging to socioeconomic class two (Kumar, 1993; Prasad, 1961). Additionally,

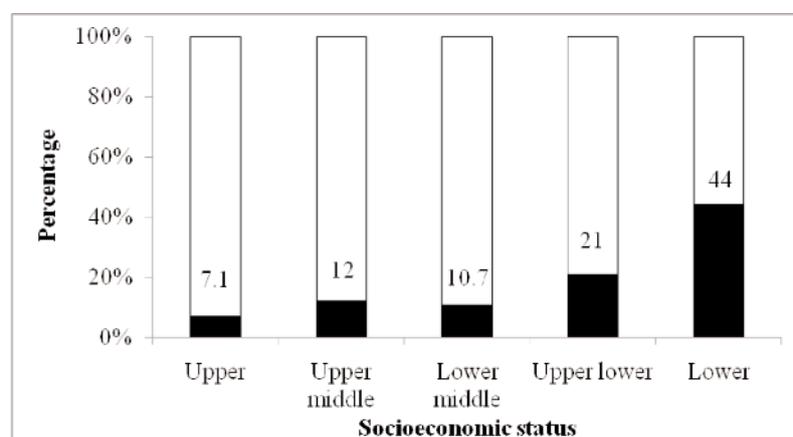


Figure 2: Percent of income spent on substances of abuse in each socioeconomic class (n=281)

Table 4: Factors associated with severity of smoking based on number of cigarettes/bidi smoked per day, approach 2 (n=281)

Parameter	Frequency(Percent)		OR	CI	P-value
	Mild	Moderate-severe			
Education vs. Smoking severity					
Illiterate	54(67.5)	26(32.5)	1.52	0.9-2.6	0.13
Literate	116(57.7)	85(42.3)	1.00		
Socioeconomic status vs. Smoking severity					
Lower	9(75.0)	3(25.0)	1.00	-	0.26
Middle	135(60.5)	88(39.5)	0.51	0.1-1.9	
Upper	26(56.5)	20(43.5)	0.43	0.1-1.8	
Total family members smoking vs. Smoking severity					
One	90(81.8)	20(18.2)	1.00	-	0.000
Two	36(43.9)	46(56.1)	0.17	0.1-0.3	
Three	33(60.0)	22(40.0)	0.33	0.2-0.7	
Four	11(32.4)	23(67.6)	0.11	0.0-0.2	
Knowledge of harmful effect vs. Smoking severity*					
Yes	153(61.4)	96(38.6)	1.41	0.7-2.9	0.36
No	17(53.1)	15(46.9)	1.00		

*As duration component is removed, age can no longer be a confounder, hence not adjusted

no association was found between the education and socioeconomic class, on the one hand, and the severity of smoking in both approaches, on the other. This can derive from the insufficient variance in variables of education and socioeconomic status due to the selection of all study participants from slums only, which is a limitation of present study.

Bidis are hand-rolled cigarettes originating in India and due to their lesser cost than cigarettes, are more popular among slum dwellers (Mohan et al., 2006) as confirmed by the present study with three quarter subjects found to be bidi smoker. Important consideration here is the fact that though bidis are conventionally believed by the population to be less harmful than cigarettes due to their lower tobacco content (215.3 mg in bidi against 738.6 mg in cigarettes), many recent studies have shown bidis to deliver carbon monoxide (CO) and presumably other toxic

components in equal or greater amounts than conventional cigarettes (Malson et al., 2001). As three quarters of subjects in the present study were bidi smokers, emphasis on equivalent harms of bidi in all information, education, and counseling (IEC) activities and materials is needed. Further research of local tobacco products is necessary as well.

Additionally, very similar to NFHS-3 showing that 42.8% of male smokers use more than 10 bidi/cigarettes per day (IIPS & Macro International, 2007), our study has found this to be around 40%. The health hazards of smoking are proportional to the number of cigarettes/bidi smoked per day and therefore this burden of 40% is quite disturbing. In addition to this, based on pack-years calculation, mild, moderate and heavy male smokers constituted 84%, 15.3%, and 0.7% respectively. The same classification based on number of cigarettes/bidis smoked per day

found the proportions to be 60.5%, 11% and 28.5% respectively which differs from an African study findings of 40%, 33% and 27% respectively among total population (Okuyemi, Ahluwalia, Richter, Mayo, & Resnicow; 2001) which translates into a larger percentage of heavier smokers than in our study.

An important fact about smoking initiation is that despite being aware of the harmful effects of tobacco, many youngsters experiment with smoking during adolescence to gain social approval from peers as well as to look like adults, and once having experimented approximately 50% continue to smoke and become addicted (Makwana et al., 2007). Makwana et al. (2007) show that 61.69% of adolescent smokers have started tobacco smoking with friends (53.2% in present study), 11.03% have done so with parents (3% in present study) and 7.79% with sibling (5.1% in current study). Other epidemiological studies have also rated peer effects stronger than parental in influencing adolescents smoking (Avenevoli & Merikangas, 2003). Similarly, Madan Kumar, Poornima & Ramachandran (2006) showed the smoking prevalence among school-going adolescents to be 44.25% and 25.6% for boys and girls respectively. The current study shows that more than 60% subjects have started smoking before the age of 20 years under the influence of friends (50%). But due to this the role of family will not be dampened as evident from significant association between the number of family members who smoke and the severity of smoking ($p < 0.001$). Obviously, both peer and familial factors are important. Another important finding of the current study is the past unsuccessful quit attempt among 44% of the

current smoker, which was around 60% in one Thai survey of police officers (Vitavasiri & Pausawasdi, 2009). These attempts indicate the willingness to quit but failure to do so due to the developed dependence.

Moreover, though around 80% of the smokers in current study were aware of the health outcomes of active smoking, less than half were aware of the same regarding passive smoking. Even among those who were aware, more than 30% could not enumerate the harmful effects. Another study in Andhra on college students found about one in three smokers were unaware of its harmful effects (Gavarasana, Doddi, Prasad, Allam, & Murthy, 1991). The study would have thrown more light in the area if component of awareness and opinions regarding Control of Tobacco Product Act (COTPA) had been included in the study. Future research in the direction should be carried forward. Intensive IEC activity in public through mass media emphasizing on second-hand smoke hazards on family and society in addition to adverse effects of active smoking; as well as the rights of the public in context of passive smoking; and legal aspect of ban on public place smoking and fine under COTPA; also needs to be carried out.

In addition to the smoking pattern discussed above, economical implication of addiction is an important area to be studied. Similar to the present study, a Syria-based study depicted that while households with lower-than-average income tend to spend (on average) around the same amounts on all tobacco products as higher-income households, average spending on all tobacco products as a percentage of total monthly expenditure is higher among low-income household due to their overall low income resulting in crowding out of expenditures on other requirements (Alachkar, 2008; Hu et al., 2005). This is an important finding to be incorporated in the behavior change communication (BCC) of smokers by explaining them their amount of spending and possible saving if quit.

Despite of certain limitations like small sample, no differentiation by health centers, and lack of variance with respect to demographic variables due to entire population being from slum areas, in general the study adds important knowledge regarding tobacco epidemiology of the study area as limited data is available from the region. But for the extrapolation of results to wider population and for policy decisions larger sample survey in the region needs to be carried out.

CONCLUSIONS

While more than three quarters of the smokers were aware of the harms due to active smoking, less than half of smokers were aware of the hazards of passive smoking. Moreover, even out of those who were aware more than a quarter did not know what exactly the passive smoking adverse effects were. This indicates the need of emphasizing the second-hand smoke effects in IEC activity among smokers as well as general population.

Familial as well as peer factors were shown to be important in establishing smoking. Lower severity of smoking was associated with smaller number of family members who smoke.

Average spending on tobacco products as a percentage of total monthly expenditure is higher among low-income household resulting in crowding out of expenditures on other requirements.

Equivalent emphasis on harms of bidi smoking in all IEC activities is the need of the hour.

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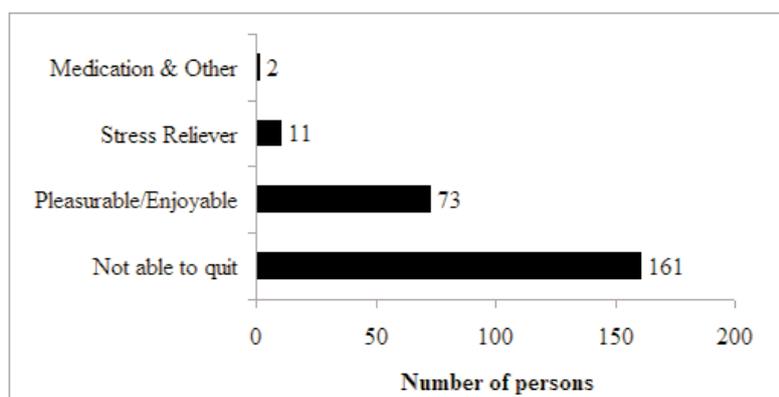


Figure 3: Reasons for continued smoking (n=281)

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