Familial and socio-cultural barriers in maintaining tobacco-free homes in Bangladesh: a comparative cross-sectional study

Familial and socio-cultural barriers in maintaining Tobacco Free Homes in Bangladesh: a comparative cross-sectional study

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ABSTRACT

Objectives: Children, pregnant women and the elderly at a global level are all being dangerously exposed to tobacco use in the household (HH). However, there is no understanding of the familial and socio-cultural factors that provide barriers to ensuring tobacco-free homes in Bangladesh either in urban or rural areas (U&RAs). This study therefore investigates those barriers to help enable a move towards tobacco free homes in Bangladesh.

Design: Comparative cross-sectional study.

Settings: Data were collected from both urban and rural settings in Bangladesh.

Participants: A probability proportional sampling procedure was used to select 808 participants in U&RAs out of a total of 3,715 tobacco users.

Results: The prevalence of tobacco use at home was 25.7% in urban areas and 47.6% in rural areas. In urban areas: marital status (*AOR*=3.23, 95%CI=1.37-6.61), education (*AOR*=2.14, 95%CI=1.15-3.99), the smoking habits of elderly family members (*AOR*=1.81, 95%CI=0.91-2.89), offering tobacco as a traditional form of leisure activity at home (*AOR*=1.85, 95%CI=.94-2.95), and lack of religious practices (*AOR*=2.39, 95%CI=1.27-4.54) were identified as significant socio-cultural predictors associated with tobacco use at home. In rural areas: age (*AOR*=5.11, 95%CI=2.03-12.83), extended family (*AOR*=3.08, 95%CI=1.28-7.38), lack of religious practices (*AOR*=4.23, 95%CI=2.32-7.72), using children to buy or carry tobacco (*AOR*=3.33, 95%CI=1.11-9.99), lack of family guidance (*AOR*=4.27, 95%CI=2.45-7.42), and offering tobacco as a traditional form of leisure activity at home (*AOR*=3.81, 95%CI=2.23-6.47) were identified as significant determinants for tobacco use at home.

Conclusion: This study concludes that socio-cultural traditions and familial norms in Bangladesh provide significant barriers for enabling tobacco-free homes**.** The identification of these barriers can aid policy makers and programme planners in Bangladesh in devising

appropriate measures to mitigate the deadly consequences of tobacco use in the home. The consequences also include the dangers involved in family members being exposed to second-hand smoke.

Strengths and limitations of the study

- This study is the first to comparatively explore the barriers present in rural and urban areas of Bangladesh for encouraging tobacco free homes.
- It provides crucial evidence for policy makers in developing appropriate policies and laws to declare homes as tobacco-free zones and to initiate anti-tobacco measures to ensure compliance.
- A multi-stage randomized sampling from both U&RAs was used in this study that means the findings could be applicable to other parts of Bangladesh.
- A limitation of this study occurred during data collection when up to a third of participants were unavailable due to being out at work, for example, in which case the next participant in the sampling frame was chosen. This could potentially cause selection bias. Also, due to the cross-sectional design, this study identified adjusted associations rather than causality.

Key Words

Socio-cultural barriers, Tobacco use, Second-hand smoking, Tobacco free homes, Bangladesh.

INTRODUCTION

Tobacco use and its effects kills more than 8.2 million people worldwide each year. Within this total, 7 million deaths are caused by direct tobacco use, while 1.2 million are due to non-smokers being exposed to second-hand smoke (SHS) [1]. Despite various global and national efforts aimed at reducing the extent of tobacco use, the prevalence rates are still high in many parts of the developing world [2]. Historically, there is a significant relationship between familial and socio-cultural traditions around tobacco use particularly in Asian and African countries where tobacco is an entrenched part of leisure and hospitality activities [3]. Nevertheless, socio-cultural practices around the use of tobacco differ in relation to gender, religion, ethnicity, and local beliefs across those countries and there are in-country variations between rural and urban areas [3]. These socio-cultural practices provide significant barriers for enabling tobacco free homes.

Bangladesh is among the top ten tobacco producing and consuming countries in the world, and is facing deadly health and economic consequences [4]. Around 35.3% of Bangladeshi adults use tobacco whether for smoking or in smokeless form and 39.0% are exposed to tobacco smoke in their homes [5]. The prevalence of smoking is higher in urban areas and with increased urbanisation, this could become a rising trend [6]. The evidence shows that urban dwellers are more aware than those in rural areas about the health consequences of tobacco use but often do not take the threats seriously and continue using it at home [6]. Social custom and perception can often influence the smoking behavior of urban people. For example, when gathering together, they can often overestimate the extent of smoking within their own age group and adopt the fallacy that smoking will make them look smarter [7, 8]. However, when taking smokeless tobacco (SLT) into account, the overall prevalence of tobacco use is greater among rural residents than it is among their urban counterparts. Although the use of SLT is

common among adults in rural areas, there is a general lack of awareness about its harmful effects [9]. Previous studies have highlighted the differences in knowledge and attitudes between people in U&RAs towards the harmful effects of tobacco use [10]. In spite of the detrimental effects of SLT [11], people in rural areas do not generally believe that the commonly used *Zarda*, *Gul*, *SadaPata*, and other forms of smokeless products are actually made from tobacco. The use of SLT at the household level is perceived as a socio-cultural tradition that is widely accepted and will be served to guests as part of cultural celebrations [12]. The use of tobacco (both smoking and SLT) is common in Bangladesh after having food, tea and snacks both in small and large social gatherings [13, 14, 15]. It has been established, however, that such traditions are harmful and detrimental to health and wellbeing [13, 14, 15, 16].

Exposure to second hand smoke (SHS) is another hidden problem and studies suggest that it is associated with serious health issues among children and adults. Life-time risks of exposure to SHS among non-smokers, for example, are 20-30% more in the case of coronary heart disease and lung cancer and more than 600,000 deaths worldwide have been attributed to SHS exposure [1]. The WHO's Framework Convention on Tobacco Control (WHO-FCTC) concluded that having 100% smoke-free environments is the only way to adequately protect people from the harmful effects of SHS because there is no acceptable level of exposure [17]. In this regard, smoke-free laws have been positively associated with people quitting the habit and in preventing young people from being tempted to start smoking in the first place [18, 19]. A recent study of four European countries (Germany, Netherlands, Ireland and France) that have smoke-free legislation, revealed that banning it did not encourage more smoking at home but rather prompted total smoking bans to be followed at home compared to the impact in the UK that was used as the control country [20]. In Bangladesh, smoking in healthcare settings and

educational institutions are prohibited by law and this has been well-enforced so far, and there is also a partial smoking ban in public places [21]. However, the existing tobacco control policies in the country are yet to make second-hand smoking at the household level a priority [21].

As far as can be discerned from the literature, the majority of studies conducted in Bangladesh focused solely on the prevalence, burden and other general issues around tobacco use and concentrated either on urban areas or rural areas but, to-date, there has been no comparative study between the two areas. Previous studies have rarely explored the socio-cultural traditions around tobacco use and how they operate as barriers for establishing tobacco free households [6, 7, 11, 12, 14, 15]. This study fills a gap in knowledge by focusing on the prevailing familial and socio-cultural barriers for creating tobacco free homes in Bangladesh.

METHODS

Study design and settings

A comparative cross-sectional survey was conducted in both the U&RAs of Bangladesh using multi-stage random sampling. This approach provided comparative information on familial and socio-cultural barriers and helped in triangulating and observing real scenarios about obstacles between the urban and rural contexts. Dhaka is a mega-crowded city and was selected as the urban area for this study as it could provide useful scenarios for understanding all urban areas in Bangladesh. There are two city corporations in Dhaka namely, the North City Corporation and the South City Corporation. Two areas from each of the administrative parts were randomly selected and included Mohammadpur and Uttara Sector-6 from the North City Corporation, with Dhanmondi, and Motijheel selected from the South City Corporation.. In rural areas, four districts namely, Narayanganj, Comilla, Natore, and Narshingdi were randomly selected from the 64 districts of Bangladesh and a village was then randomly selected from each of these four districts (Figure 1) for data collection.

(Place Figure 1 here)

Study participants and sampling

The sample size was calculated using the following formula:

$$n = \frac{z^2 p(1-p)}{d^2} [\times (\text{design effect})]$$

Where n = desired sample size; z = 1.96 at 95% Confidence Interval (CI); p = prevalence of overall current tobacco use = 35.3% [GATS 2017]; d = precision level (5%), and design effect is considered as 2. The calculated sample size is n = 349.33×2 = 699. A 15% non-response of

699 was anticipated, and therefore 808 participants were selected from the urban and rural areas.

Prior to collecting the data, a list of 6,065 households was gathered from the city corporation offices (urban) and from the Union Parishad (the lowest rural administrative unit) involving a total population of 24,078. After a short enumeration survey, a total of 3,715 tobacco users were identified (urban - 1436 and rural - 2279) and used as the sampling frame and by the means of a probability proportional sampling procedure, 808 participants were identified (urban n = 400; and rural n = 408) for data collection. One participant from every third tobacco user in urban areas and one in every fifth tobacco user in rural areas were identified. Inclusion criteria for participants in the survey included: i) any kind of tobacco use (smoking or SLT); ii) only one participant from each household; iii) aged 18 years and above; iv) physically capable; v) males and females and vi) willing to participate in the survey. Participants were diverse in terms of ethnicity, religion, education and economic status. Around one-third of participants in urban areas and one-fourth of participants in rural areas in the sampling frame were unavailable during the data collection period, so the next participant in the frame was selected who fulfilled the inclusion criteria (Figure 1).

Development of tools, data collection and analysis

A multidisciplinary team contributed to the development of the data collection tools. The PI had a pivotal role in drafting the semi-structured interview questionnaire that was then checked and finalized by the technical expert team. The Bangla version of the questionnaire was pre-tested among 40 eligible people (urban - 20; rural - 20) in non-sample sites and amended according to the feedback. The investigators and interviewers were trained, and the field data were collected under the strict supervision of the PI and technical team. The data collected were

quickly checked for completeness and errors before being coded and entered into a database using SPSS software. A Chi-Square (χ^2) and bivariate logistic regression were used to explore the factors associated with tobacco use at home. Multivariate logistic regression was used to adjust the effect of confounders on the association of risk factors - a response of "Yes or No" to the question of 'tobacco use at home' was a dependent variable, where "No" was used as reference. Socio-cultural and familial factors were used as independent variables, and the findings were interpreted using odds ratio with 95% CI for each category.

Patient and Public Involvement:

The participants of the study were adult tobacco users selected from the study population. They were not involved in setting the research question or the outcome measures, but they were involved during the data collection of the study. The tobacco users from the selected households were interviewed and were involved in the dissemination of the results.

Ethical considerations

As the research involved participation of human subjects for interviews, ethical clearance was sought from the National Research Ethics Committee (NREC), the highest ethics body in Bangladesh. The protocol for the study was also reviewed and approved by the Bangladesh Medical Research Council (BMRC) and provided with an ethics ID number of BMRC/NREC/2016-2019/1429. When first meeting participants, the interviewers explained the background and objectives of the study and obtained written informed consent from each of them. Anonymity and confidentiality were strictly maintained.

RESULTS

Socio-demographic characteristics of the participants

The mean ages (± SD) of participants were 30.4 ± 10.4 and 27.58 ± 6.7 years in U&RAs respectively. Age and sex were found to be significantly associated ($p<0.001$) with place of tobacco use in urban areas. The majority of female tobacco users did so at home both in urban (84.6 %) and rural (49.1%) settings. In urban areas, there was a highly significant association ($p<0.001$) between marital status and place of tobacco use, with more married participants (25.4%) found to use tobacco products at home. Additionally, the living status of participants was found to be significantly associated ($p<0.001$) with place of tobacco use in rural areas and a higher proportion of them (55.9%) living alone/outside of their own family were using tobacco at home. More participants at lower-and-middle socioeconomic levels and living in rural areas were using tobacco at home, and this association was found to be significant ($p<0.01$) (Table 1).

Table 1: Socio-demographic characteristics of the participants

Demographic characteristics	Urban n=400			Rural n=408		
	Place of Tobacco use by participants		χ^2	Place of Tobacco use by participants		χ^2
	At home n (%)	Outside home n (%)		At home n (%)	Outside home n (%)	
Age						
≤ 30 Years	28 (10.7)	234 (89.3)	25.94***	51 (26.3)	143 (73.7)	4.440
>30 Years	43 (31.2)	95 (68.8)		77 (36.0)	137 (64.0)	
Mean ± SD	*30.4 ± 10.4*			*27.58 ± 6.7*		
Sex						
Male	60 (15.5)	327 (84.5)	41.14*** †	76 (25.2)	226 (74.8)	20.801***†
Female	11 (84.6)	2 (15.4)		52 (49.1)	54 (50.9)	
Marital status						
Unmarried	17 (9.1)	170 (90.9)	18.03***	33 (28.2)	84 (71.8)	0.764
Married	54 (25.4)	159 (74.6)		95 (32.6)	196 (67.4)	
Living place						

With family	54 (18.2)	243 (81.8)	0.15	76 (24.1)	239 (75.9)	33.696***
Alone/Outside of own family	17 (16.5)	86 (8.5)		52 (55.9)	41 (44.1)	
Family type						
Nuclear Family	42 (14.3)	251 (85.7)	8.75***	38 (40.4)	56 (59.6)	4.649
Extended Family	29 (27.1)	78 (72.9)		90 (28.7)	224 (71.3)	
Education						
Primary- Secondary	29 (23.8)	93 (76.2)	11.86***	67 (26.2)	189 (73.8)	8.632
Higher education	42 (15.1)	236 (84.9)		61 (40.1)	91 (59.9)	
Socio-economic condition						
Low and middle income	21 (19.3)	88 (80.7)	0.24	99 (41.4)	140 (58.6)	27.068**
Upper and high income	50 (17.2)	241 (82.8)		128 (31.4)	280 (68.6)	

Note: †Fisher's exact test was used as some of the expected cell value (for sex) found <5.
**p<0.01; ***p<0.001

Prevalence of tobacco use at household level

The prevalence of tobacco use at home was calculated by dividing the total number of people (either participant or any other family member) that used tobacco products inside their homes within all the sample households. The prevalence of tobacco use overall (smoking or SLT) at home was calculated to be 25.7% in urban areas (participants: 17.7%; other family members: 8.0%) and 47.6% in rural areas (participants: 19.4%; other family members: 28.2%). See Figure 2 below.

(Place Figure 2 here)

Risk factors for tobacco use at home

Bivariate analysis showed that age, religious practice, children being used to carry and buy tobacco and offering tobacco as a tradition of leisure and entertainment activities at the household level, were all associated with tobacco use at home both in urban and rural areas. In addition, marital status, lower education levels and the smoking habits of elderly family

members were significantly associated with tobacco use at home in urban areas. Living status, family type, and lack of family guidance (on the overall consequences of tobacco use) were found to be significant with tobacco use at home in rural areas (Table 2).

Tale 2. Adjusted risk factors associated with place of tobacco use in U&RAs of Bangladesh

Characteristics/ Risk factors		Urban areas		Rural areas	
		Bivariate analysis OR (95% CI)	Multivariate analysis AOR (95% CI)	Bivariate analysis OR (95% CI)	Multivariate analysis AOR (95% CI)
Age	≤30 Years[RC]	1	1	1	1
	>30 Years	3.78*** (2.22-6.44)	3.13** (1.45-6.78)	4.79*** (2.76-8.31)	5.11*** (2.03-12.83)
Marital Status	Unmarried[RC]	1	1	1	1
	Married	3.39*** (1.89-6.10)	3.23*** (1.37-6.61)	0.81 (0.51-1.29)	0.76 (0.46-1.26)
Socio-economic condition	Low and middle income[RC]	1	1	1	1
	Upper and high income	1.15 (0.65-2.02)	0.66 (0.33-.1.30)	0.51** (0.31-0.84)	0.41** (0.23-0.72)
Living status	Living with family[RC]	1	1	1	1
	Living alone/others	1.12 (0.62-2.04)	0.69 (0.35-1.37)	5.07*** (2.92-8.80)	7.93*** (3.01-20.89)
Education	Higher education[RC]	1	1	1	1
	Primary-Secondary	2.46*** (1.46-4.16)	2.14** (1.15-3.99)	0.52** (0.34-0.81)	1.99 (1.24-3.21)
Family type	Nuclear family[RC]	1	1	1	1
	Extended family	0.45*** (0.26-0.77)	0.49* (0.28-0.85)	4.39*** (2.52-7.61)	3.08** (1.28-7.38)
Occupation	Non-working[RC]	1	1	1	1
	Working	0.40** (0.21-0.75)	0.96 (0.44-2.12)	0.78 (0.50-1.20)	1.48 (0.89-2.45)
Practice of Religiosity	Practice[RC]	1	1	1	1
	Lack of Practice	2.25** (1.20-4.21)	2.39** (1.27-4.54)	5.17*** (2.91-9.19)	4.23** (2.32-7.72)
Smoking habit of any elder family members	No[RC]	1	1	1	1
	Yes	1.97*** (1.28-2.28)	1.81* (0.91-2.89)	1.04 (0.64-1.68)	1.01 (0.58-1.74)
	No[RC]	1	1	1	1

Perception that smoking makes one look smart	Yes	0.79(0.47-1.35)	0.61(0.34-1.07)	0.23*** (0.15-0.37)	0.38*** (0.23-0.63)
Tobacco restriction at home	No[RC]	1	1	1	1
	Yes	0.66 (0.40-1.13)	0.70 (0.40-1.21)	0.16*** (0.10-0.25)	0.15 (0.09-0.24)
Children are used to buy/carry/light tobacco	No[RC]	1	1	1	1
	Yes	2.07** (1.14-3.79)	2.28 (1.21-4.29)	4.58*** (2.64-7.95)	3.33** (1.11-9.99)
Lack of family guidance	No[RC]	1	1	1	1
	Yes	0.89 (0.36-2.21)	0.94 (0.35-2.46)	3.86 (2.34-6.38)	4.27*** (2.45-7.42)
Offering tobacco as a tradition of entertainment	No[RC]	1	1	1	1
	Yes	1.81*** (0.94-3.51)	1.85** (0.94-2.95)	3.48*** (2.14-5.65)	3.81*** (2.23-6.47)
Peer influences (smoking)	No[RC]	1	1	1	1
	Yes	0.49 (0.14-1.67)	0.41 (0.11-1.45)	0.13 (0.8-0.22)	0.20 (0.12-0.36)
Impact of advertisement and publicity	No[RC]	1	1	1	1
	Yes	1.29 (0.77-2.16)	1.31 (0.76-2.26)	0.15*** (0.09-0.24)	0.12*** (0.07-0.21)

Note: OR=Odds Ratio; AOR=Adjusted Odds Ratio; [RC] =Reference Category
*p<0.05, **p<0.01, ***p<0.001.

Multivariable analysis (adjusted) showed that participants aged 30 years and above had increased odds of using tobacco products at home by more than three times in urban areas (AOR=3.13, 95%CI=1.45-6.78) and more than five times in rural areas (AOR=5.11, 95%CI=2.03-12.83). This risk among the lower-educated participants was shown to be double for both urban (AOR=2.14, 95%CI=1.15-3.99) and rural areas (AOR=1.99, 95%CI=1.24-3.21). In rural areas, participants living alone or outside their own family had approximately an eight times (AOR=7.93, 95%CI=3.01-20.89) higher chance of adopting tobacco practices at home, but in urban areas the risk was found to be neutral. Similarly, participants with a lack of religious practice at the family level were more prone to use tobacco at home in both urban (AOR=2.39, 95%CI=1.27-4.54) and rural areas (AOR=4.23, 95% CI=2.32-7.72). Where tobacco was offered as part of the tradition of leisure and entertainment activities, the likelihood

of its use was found to be higher both in urban (AOR=1.85, 95%CI=0.94-2.95) and rural areas (AOR=3.81, 95% CI=2.23-6.47). Furthermore, the odds of tobacco use was also found to be significantly higher among both urban (AOR 2.28, 95%CI=1.21-4.29) and rural areas (AOR=3.33, 95%CI=1.11-9.99) where children were used to buy or carry tobacco and to light cigarettes.

Other factors such as marital status (married), the smoking habits of older family members (AOR=3.23, 95%CI=1.37-6.61;AOR=1.81, 95%CI=0.91–2.89 respectively) were significantly associated with tobacco use at home in urban areas, whereas extended family and lack of family guidance (AOR=3.08, 95%CI=1.28-7.38;AOR=4.27, 95%CI=2.45-7.42 respectively) were significant barriers for tobacco use at home in rural areas only. However, multivariate analysis found that socio-economic conditions, occupations, peer influences, the perception that smoking makes people look smarter, restrictions on tobacco use, the impact of advertising and publicity were insignificant predictors of tobacco use at home in both urban and rural areas (Table 2).

DISCUSSION

Research, policies and interventions carried out in Bangladesh to-date have paid very little attention to the impact that tobacco free homes [5, 21] could have on the health and wellbeing of its people. This situation is in spite of recent studies showing that SHS inhalation is around four times more toxic, and side-stream condensate is two-to-six times more carcinogenic, than mainstream smoking [22].

Comparative analysis between the socio-cultural impacts of tobacco use at home in urban and rural contexts is also quite limited. This study compares tobacco use at home in both urban and

rural areas in Bangladesh and shows that more than one-fourth (25.7%) of urban dwellers, and nearly half (47.6%) of rural dwellers use tobacco at home (either smoking or SLTs). Aligned with this finding, a rural community-based Bangladeshi study showed that smoking at home was common practice in more than half (55.0%) of households [23]. A similar trend was also observed in the neighbouring country of India where 40.0% of adults reported that they smoked tobacco products at home [24].

Multivariate analysis found that age was an important factor for using tobacco at home both in urban and rural areas and is in harmony with the findings of other studies conducted in similar settings in Bangladesh and in India [10, 25]. Also, adults aged 30 or above were found to be more likely to use tobacco at home, a practice more prevalent in rural areas than in urban areas.

The likelihood of using tobacco at home in urban areas among the married participants was more than three times higher than for their unmarried counterparts. A possible reason for this could be that unmarried family members in urban areas are often dependent, and so are less likely to be allowed to use tobacco products at home [6, 12]. In contrast, and consistent with the findings in this study from rural areas, another study concluded that marital status was not associated with tobacco use at the household level in rural areas [14].

The lower-educational status of people in urban areas appeared to significantly contribute towards the use of tobacco at home. This could happen due to being deprived of a proper education, a lack of good jobs, and low economic status. This situation is related to reduced opportunities for smoking outdoors and where homes often come with the territory of socio-economic deprivation. Lower-educated people also often overestimate their tobacco use based

311 on various socio-cultural misconceptions [6, 12, 14]. The findings in this study are also
312 consistent with other multinational studies conducted in similar setting [26, 27].
313
314 Though family type was not associated with tobacco use at home in urban areas, participants
315 living with extended family in rural areas were three times more likely to use tobacco at home.
316 In comparison to a study carried-out with Nigerian youths [28], the findings in this study
317 identified a higher chance of tobacco use at household level where children were being used to
318 buy or carry tobacco, or to light the cigarettes or pipes. However, the risk of initiating tobacco
319 use at home was higher among those families where older family members already had the
320 smoking habit. Other studies conducted in developed and developing countries identified that
321 youngsters usually followed in the footsteps of older family members, including their parents,
322 that made them more likely to take up smoking in order to show themselves as older or grown
323 up [29, 30, 31, 32].
324
325 Those households in rural areas that showed a lack of family guidance on the overall negative
326 consequences of tobacco products had a more than four times likelihood of using tobacco.
327 Similar findings were observed in other developing countries. A study conducted in Vietnam,
328 for example, showed that family guidance and interactions related to smoking behaviours had
329 a strong influence on a smoker's intention to quit [33]. However, this was found to be a non-
330 significant predictor in the urban setting for this study. Evidence further suggests that the
331 cultural practice of offering tobacco as part of leisure and entertainment activities at household
332 level was almost two times riskier in urban areas and three times riskier in rural areas for
333 continuing the use of tobacco products (especially SLTs). Another study conducted in the urban
334 areas of Bangladesh reported that SLT use is perceived as a traditional part of hospitality and

335 is practiced widely at social gatherings such as weddings, baby shower ceremonies, religious
336 events and other occasional festivals [13].
337
338 This study found there is a significant association between tobacco use and regular religious
339 practices both in urban and rural areas. The findings indicate that those participants that
340 regularly practiced religious activities (such as praying, fasting, donating to charity and reading
341 religious books) were less likely to use tobacco at home. This finding is consistent with other
342 recently conducted studies that also found those individuals that engaged in regular religious
343 practices were more restrictive in their use of tobacco or alcohol mainly because such practices
344 are discouraged by almost all conventional religions due to their addictive nature and the
345 explicit physical harms they can cause [34, 35]. In many parts of the USA, however, tobacco
346 use is not influenced by religion but rather considered to have an important role in local rituals,
347 and to be an essential part of cultural traditions [36, 37].
348
349 This study has conducted a comparative analysis of familial and socio-cultural barriers to
350 enabling tobacco free homes in urban and rural areas, but it does not put forward any causal
351 associations and suggests that an observational study is likely to be more useful for assessing
352 any causal linkage. However, the samples in this study have been included in a systematic
353 manner for both urban and rural areas and therefore provided a comprehensive overview of the
354 prevailing constraints and barriers that hinder the enablement of tobacco free homes in
355 Bangladesh. A generalisation of similar scenarios of the socio-familial barriers to creating
356 tobacco free homes could be applied to other areas of the country.
357
358 This study also provides baseline information that can be used by policy makers, researchers
359 and national and international agencies to help the understanding of similar scenarios in a

broader context and therefore also help in the development of necessary policies. The findings from this study can be useful in three areas. Firstly, they can be used to help design and deliver appropriate interventions, anti-tobacco campaigns and other promotional activities that may, in turn, be useful for creating a lasting impact on awareness among the whole population about the consequences of tobacco use at home for people in both urban and rural areas. Secondly, the findings provide insights for local authorities and NGOs, when they are planning and initiating any home-based measures such as creating a model of 'Tobacco Free Homes,' with a special focus on periodic parental guidance and counselling and building good family ties so that they can share any problems among family members. Thirdly, the findings can influence policies around religious based interventions such as training of *Imams* (religious leaders in Islam) and clergymen, who could encourage the regularizing of religious practices at family level during their *Khutba* (a large weekly gathering of Muslims) that ultimately could lead to a reduction of tobacco use in the home.

CONCLUSION

This study found that the overall prevalence of tobacco use at home (smoking or SLT) is higher in rural areas (nearly half) than it is in urban areas (one-fourth) and represents an alarming public health issue for Bangladesh. It also reveals that age is an important factor for using tobacco at home - adults aged 30 or above are more likely to do this and it is more prevalent in rural than urban areas. Familial and social factors such as the smoking habits of family members, tobacco being offered as part of a cultural tradition of leisure and entertainment, children being used to buy or carry tobacco or for lighting cigarettes, and the lack of religious practice all contribute to continued tobacco use at home in both urban and rural areas. A number of factors in rural areas such as, living with the extended family and lack of family guidance on the consequences of using tobacco, were shown to be leading predictors of its use at home.

Strengthening the national commitment to controlling the use of tobacco at home, and the emerging threat of second-hand smoke exposure, is essential. It is time to adopt a comprehensive approach for cessation and for appropriate laws to be devised that would ensure homes are made smoke free. A mass media campaign should be geared up to urge change in the idea of smoking at home being socially acceptable as has already been carried out in many other countries of the world.

Funding

This study was funded by the Bangladesh Center for Communication Programs (BCCP) (www.bangladesh-ccp.org) in collaboration with the Institute for Global Tobacco Control (IGTC) based at the Johns Hopkins Bloomberg School of Public Health, Baltimore, USA. The research grant number is: GC# BCCP/Tobacco Control/2016-06.

Conflict of interests

Authors have declared that there is no conflict of interest.

Data sharing statement

There is no additional data available.

Authors' contributions

MIH contributed to the development of the overall study concept, design, analysis, and writing the first draft of the paper. TA and TT were involved in data acquisition and analysis. AAC was involved in designing the study and developed the questionnaire. MKH and AAM were actively performed the data coding and analysis and HTAK was involved in statistical part of the analysis. ANZU was involved in refining the results section, reviewed the whole manuscript and contributed substantially to improve it, and will act as corresponding author. MGDH was involved with MIH in design and preparing data collection tool. All authors contributed equally in analysis, interpretation and writing the manuscript. All the authors have read the manuscript thoroughly and approved its contents.

REFERENCES

1. World Health Organization. WHO Report on the Global Tobacco Epidemic, 2017external icon.Geneva: World Health Organization, 2017 https://www.who.int/news-room/fact-sheets/detail/tobacco. Accessed 31 Jan. 2020.
2. World Health Organization. WHO Fact Sheet: Key Facts of Tobacco, 27 May 2020. https://www.who.int/en/news-room/fact-sheets/detail/tobacco. Accessed 01 June. 2020
3. Culture and Smoking: Do Cultural Norms Impact Smoking Rates? Available: https://tobaccofreelife.org/resources/culture-smoking/. Accessed 9 Nov. 2019.
4. Barkat A, Chowdhury AU, Nargis N, et al. The economics of tobacco and tobacco taxation in Bangladesh. International Union Against Tuberculosis and Lung Disease, 2012. https://www.tobaccofreekids.org/assets/global/pdfs/en/Bangladesh_tobacco_ taxes_ report.pdf. Accessed 20 March 2020.
5. Global adult tobacco survey (GATS) Fact sheet: Bangladesh Report (Preliminary) 2017. World Health Organization, 2017. http://www.searo.who.int/bangladesh/gatsbangladesh 2017fs14aug2018.pdf?ua=1. Accessed 22 Sept. 2019.
6. Idris BI, Giskes K, Borrell C et al. Higher smoking prevalence in urban compared to non-urban areas: time trends in six European countries. Health Place2007; 13: 702–12.
7. Simons-Morton BG, Farhat T. Recent findings on peer group influences on adolescent smoking. J Prim Prev 2010; 31 (4): 191–208.
8. Ausems M, Mesters I, Breukelen GV, Vries HD. Do Dutch 11-12 years olds who never smoke, smoke experimentally or smoke regularly have different demographic backgrounds and perceptions of smoking? Eur. J. Public Health2003; 13(2):160-67.
9. Nargis N, Thompson ME, Fong GT et al. Prevalence and Patterns of Tobacco Use in Bangladesh from 2009 to 2012: Evidence from International Tobacco Control (ITC) Study. PLoS ONE2015; 10(11): e0141135.

10. Singh A, Sahoo N. Urban-rural differentials in the factors associated with exposure to second-hand smoke in India. BMJ Open 2013; 3(11):e003542.
11. Rahman MA, Mahmood MA, Spurrier N, Rahman M, Choudhury SR, Leeder S. Why do Bangladeshi people use smokeless tobacco products? Asia Pac J Public Health2015; 27(2): 2197–209.
12. Uddin G, Rahman MM, Hussain SMA. Determinants of Tobacco use in a Selected Urban Area of Bangladesh. Bangladesh Med J 2009; 38, 48–52.
13. Haque MI, Chowdhury AA, Hassan MS, Khan HTA, Harun MGD. Prevailing familial, social and cultural obstacles in keeping tobacco free homes in urban areas of Bangladesh: A mixed-method study. PLoS ONE 2019; 14(8):e0220777.
14. Choudhury K, Haniff SMA, Mahmood SS, Bhuiya A. Socio-demographic characteristics of tobacco consumers in a rural area of Bangladesh. J Health PopulNutr2007; 25, 456–64.
15. Hossain MS, Kypri K, Rahman B, Arslan I, Akter S, Milton AH. Prevalence and Correlates of Smokeless Tobacco Consumption among Married Women in Rural Bangladesh. PLoS ONE 2014; 9(1):e84470.
16. US Department of Health and Human Services. The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General. Washington, DC: USDHHS, Centers for Disease Control and Prevention, 2006. http://www.Surgeongeneral.gov/library/reports/secondhandsmoke/fullreport.pdf.
17. WHO. Report on the global tobacco epidemic, 2009.http://apps.Who.int/iris/bitstream/10665/44229/4/9789241563918_engfull.pdf. Accessed 16 Feb. 2020.
18. World Health Organization. Tobacco-Fact Sheet No339. http://www.wpro who.int/media centre/factsheets/fs_201203_tobacco/en/. Accessed 25 March 2019.
19. Smoke-free Policies in China: Evidence of effectiveness and implications for action, World health Organization (WHO) Western pacific Region 2015; Available at:

http://www.wpro.who.int/china/tobacco_report_20151019 _en. pdf [Accessed on 26 march 2018]

20. Mons U, Nagelhout GE, Allwright S et al. Impact of national smoke-free legislation on home smoking bans – Findings from the International Tobacco Control (ITC) Policy Evaluation Project Europe Survey. Tob Control. 2013; 22(0): e2–e9. doi:10.1136/tobaccocontrol-2011-050131
21. Tobacco Control Laws: Analysis of legislation and litigation from around the word. Bangladesh; 2013. https://www.tobaccocontrollaws.org/legislation/country/bangladesh/summary.
22. World Health Organization. Tobacco and its environmental impact: an overview, 2017. http://apps.who.int/iris/bitstream/handle/10665/255574/9789241512497-eng.pdf?sequence=1. Accessed 20 Feb. 2018.
23. Ullah ANZ, Huque R, Akter S et al. Children's exposure to second-hand smoke at home in Bangladesh: a community survey. BMJ Open 2013; 3(11):e003059.
24. Dey S. 40% of Indians exposed to second hand smoke at home: WHO. The Times of India, Sept 21, 2015. https://timesofindia.indiatimes.com/india/40-of-Indians-exposed to-second-hand-smoke-at-home-WHO/article show/49038293.cms.
25. Hossain S, Hossain S, Ahmed F, Islam R, Sikder T, Rahman A. Prevalence of Tobacco Smoking and Factors Associated with the Initiation of Smoking among University Students in Dhaka, Bangladesh. Cent Asian J Glob Health 2017; 6(1): 244.
26. Hossein AR, Parker LA, d'Espaignet ET, Chatterji S. Socioeconomic inequality in smoking in low-income and middle-income countries: results from the World Health Survey. PloSONE 2012; 7: e42843.

27. Giovino GA, Mirza SA, Samet JM et al. Tobacco use in 3 billion individuals from 16 countries: an analysis of nationally representative cross-sectional HH surveys. The Lancet2012; 380(9842):668–79.
28. Egbe CO, Petersen I, Meyer-Weitz A,Asante KO. An exploratory study of the socio-cultural risk influences for cigarette smoking among Southern Nigerian youth. BMC Public Health 2014; 14(1204):1-9.
29. Jarvis MJ. Why People Smoke. The BMJ 2004; 328: 277–80.
30. Rugg M. Teenage Smoking Behaviour Influenced by Friends and Parents Smoking Habits. J Adolesc Health 2013; 143:120-5.
31. Scalici F, Schulz PJ. Parents' and peers' normative influence on adolescents' smoking: results from a Swiss-Italian sample of middle schools students. Subst Abuse Treat Prev Policy 2017; 12(1):5.
32. Hossain A, Hossain QZ, Rahman F. Factors Influencing Teenager to Initiate Smoking in South-west Bangladesh. Univers J Public Health 2015; 3(6):241-50. 35.
33. Tsoh JY, Tong EK, Gildengorin G et al. Individual and family factors associated with intention to quit among male Vietnamese American smokers: Implications for intervention development. Addict Behav 2011(36): 294–301.
34. McCullough ME, Willoughby BL. Religion, self-regulation, and self-control: Associations, explanations, and implications. Psychol Bull 2009; 135:69-93.
35. Jabbour S, Fouad FM. Religion based tobacco control interventions: how should WHO proceed? Bull. World Health Organ 2004; 82:923-27.
36. Charlton A. Medicinal uses of tobacco in history. J R Soc Med. 2004; 97: 292–6.
37. Tobacco Use –A Cross-Cultural Comparison, 2010. http://entheology.com/research/tobacco use-a-cross-cultural-comparison/. Accessed 9 Nov. 2019.

Figure legends:

Figure 1. Multi-staged probability proportional sampling strategy.

Figure 2. Prevalence of tobacco use at home by participants and other family members in the urban and rural areas.