



# BMJ Open Assessing the choice of smoke-free policies for multiunit housing and its associated determinants in Bangladesh: a cross-sectional study

Md Golam Kibria <sup>1</sup>, Taslima Islam,<sup>2,3</sup> Muhammad Badiuzzaman,<sup>3,4</sup> Abdullah Al Mamun,<sup>3,5</sup> Papia Sultana,<sup>3,6</sup> Mohammad Delwer Hossain Hawlader <sup>3,7</sup>

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For numbered affiliations see end of article.

**Correspondence to**  
Mr Md Golam Kibria;  
[g\\_kibria@hotmail.com](mailto:g_kibria@hotmail.com)

## ABSTRACT

**Objectives** This study aimed to assess the desire for smoke-free housing, determine the choice of smoke-free policies for multiunit housing (MUH), and identify the factors associated with policy choice among MUH residents in Bangladesh.

**Design** We conducted a cross-sectional study from April to November 2019 using a semi-structured survey questionnaire.

**Setting** This study was conducted in seven divisional cities of Bangladesh: Dhaka, Chattogram, Rajshahi, Khulna, Sylhet, Barishal, and Rangpur.

**Participants** A total of 616 adult individuals living in MUH for at least 2 years participated in the study.

**Primary outcome measure** Multinomial logistic regression was used to identify the determinants of the choice of smoke-free policies for MUH.

**Results** Overall, 94.8% of the respondents wanted smoke-free housing. Among those who wanted smoke-free housing, 44.9% preferred a smoke-free building policy, 28.3% preferred a smoke-free common area policy, 20.2% favoured a smoke-free unit policy, and 6.7% did not know what policy they should choose. Three factors were found to be significantly associated with the choice of a smoke-free building policy: staying at home for more than 12 hours (adjusted OR (aOR): 2.6; 95% CI 1.035 to 6.493), being a non-smoker (aOR: 3.2; 95% CI 1.317 to 7.582), and having at least one family member who smoked (aOR: 3.0; 95% CI 1.058 to 8.422). Results also showed that residents having at least one child under 15 in the family (aOR: 0.3; 95% CI 0.152 to 0.778) were less likely to choose a smoke-free common area policy and that women (aOR: 3.7; 95% CI 1.024 to 13.188) were more likely to choose a smoke-free unit policy.

**Conclusions** MUH residents in urban Bangladesh highly demanded smoke-free housing. Most residents favoured a smoke-free building policy for MUH. Those who stayed at home for a longer time, were non-smokers, and had smoking family members were more likely to choose this policy.

## INTRODUCTION

Exposure to secondhand smoke (SHS) is a significant risk factor for morbidity and

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This study is the first of its kind in Bangladesh and will provide new knowledge about the choice of smoke-free policies for multiunit housing in the country.
- ⇒ Data were collected from individuals living in both private and government multiunit housing complexes.
- ⇒ This study adopted a cross-sectional design and was therefore unable to establish a causal relationship between the choice of smoke-free policies and other variables.
- ⇒ This study used self-reported data that are susceptible to bias.

mortality. Tobacco smoke is known to have more than 7000 chemical components, of which at least 250 are detrimental to health.<sup>1</sup> SHS exposure causes coronary heart disease, stroke, lung cancer in adult non-smokers, sudden infant death syndrome, respiratory infections, ear infections, and asthma attacks in infants and children.<sup>2</sup> Due to SHS exposure, pregnant women are 16% more likely to have low birthweight babies, 20% are more likely to have preterm births, and 23% are more likely to suffer stillbirths.<sup>3,4</sup> Nearly 1.2 million premature deaths per year are attributable to SHS exposure worldwide.<sup>5</sup> In Bangladesh, about 25 000 non-smokers die annually due to exposure to SHS.<sup>6</sup> Furthermore, the annual economic cost of SHS exposure in Bangladesh is enormous, which is estimated at \$3.61 billion.<sup>7</sup>

People living in multiunit housing (MUH) are particularly vulnerable to SHS exposure as tobacco smoke can travel throughout housing complexes via air ducts, cracks in the floor and walls, stairwells, hallways, elevator shafts, electrical lines, and open windows.<sup>8</sup> MUH is a residential building consisting of at least



two separate units with shared areas, including common building entrance, elevators, stairs, basements, lobbies, parking areas, waiting spaces, and roofs. Available literature shows that people living in MUH are more likely to be exposed to SHS than those living in separate houses.<sup>9</sup> Over the last few decades, there has been considerable success in reducing SHS exposure in public settings, such as indoor workplaces, hospital facilities, educational institutions, restaurants, and bars through smoke-free laws,<sup>10–12</sup> but SHS exposure in private settings like MUH has not received adequate attention. In recent years, local government authorities in some developed countries, including the USA, Canada, and Australia, have adopted smoke-free policies with partial and full smoking bans in MUH complexes to protect non-smoking residents from SHS exposure.<sup>13–15</sup> Studies demonstrate that the implementation of smoke-free policies in MUH results in reduced SHS exposure, decreased cigarette consumption, and more smoking cessation among residents.<sup>16 17</sup>

Bangladesh is one of the most densely populated countries in the world, with a population of over 165 million and a density of 1119 people per square kilometre.<sup>18</sup> Remarkably, about two-fifths of the population (39.7%) currently lives in urban areas.<sup>19</sup> The country is divided into eight administrative regions called divisions—Dhaka, Chattogram, Rajshahi, Khulna, Sylhet, Barishal, Rangpur, and Mymensingh, and each division was named after the major city within its jurisdiction. The urban population growth rate across the country is 3.0%,<sup>20</sup> but the rate is substantially higher in all the divisional cities due to high rates of in-migration.<sup>21</sup> To meet the housing needs of an increasing urban population, MUH has become the largest housing option for these city dwellers. However, Mymensingh was established as the country's eighth division in 2015. The infrastructure development of Mymensingh City was still in its embryonic stage when we designed the study; therefore, we did not include this city in the study.

Bangladesh is one of the first signatory countries of the WHO Framework Convention on Tobacco Control (FCTC), which was ratified on 10 May 2004. The country passed the 'Smoking and Tobacco Products Usage (Control) Act 2005' on 15 March 2005 following the spirit of the WHO FCTC<sup>22</sup> and amended it in 2013. Although the Act has imposed smoking restrictions in many public places and on public transportation, it has no provision to outlaw smoking in and around residential settings. The country also has the 'National Housing Policy 2016' to ensure accessible, sustainable, and quality housing for all of its citizens.<sup>23</sup> Unfortunately, smoking in housing facilities has not been restricted by the policy as well. On the other hand, 18.0% of Bangladeshi adults aged 15 years and above (men 36.2% and women 0.8%) smoke some form of tobacco.<sup>24</sup> Among the adult population, 39.0% were exposed to SHS at home due to smoking by other family members.<sup>24</sup> Recent evidence shows that about 55.0% of MUH residents living in the divisional cities of the country are exposed to SHS.<sup>25</sup> Under these

circumstances, thousands of urban dwellers remain unprotected from exposure to SHS in MUH complexes, leading to chronic diseases and premature death.

To date, no research has been conducted in Bangladesh to evaluate MUH residents' preferences for smoke-free housing policies. Therefore, this study aimed to assess the desire for smoke-free housing, determine the choice of smoke-free policies, and identify the factors associated with policy choice among MUH residents from seven divisional cities of Bangladesh: Dhaka, Chattogram, Rajshahi, Khulna, Sylhet, Barishal, and Rangpur.

## MATERIALS AND METHODS

### Study design and participants

A descriptive cross-sectional study was conducted from April to November 2019 among individuals living in both private and government MUH complexes in seven divisional cities of Bangladesh. Flat owners and tenants together make up the resident population of a private MUH complex. On the contrary, government MUH complexes, popularly known as the government residential quarters in Bangladesh, accommodate government employees on a rent basis. There was no smoke-free policy coverage in either of these two housing types. Adults aged 18 or older who had been living in MUH for at least 2 years were eligible to participate in the study. We excluded pregnant women and people with speech and/or hearing impairments from this study to avoid communication barriers.

### Sample

The minimum sample size for this study was calculated at 600 using a single population proportion formula,  $n = \frac{(z_{\alpha/2})^2 p(1-p)}{e^2}$ ,<sup>26</sup> where  $n$  is the desired sample size,  $z$  is the standard normal deviate (1.96) at 95% CI,  $p$  is prevalence of SHS exposure (unknown) among city residents living in MUH in the divisional cities of Bangladesh (50%), and  $e$  is the margin of error (4%).

Dhaka City has a significantly larger number of MUH complexes than any other divisional city in Bangladesh, although the correct proportion was unidentified due to data scarcity. Therefore, we allocated about one-third of the sample to Dhaka City and distributed the remaining two-thirds among the six cities equally. In the first stage, we randomly selected 10 municipality wards from each of the seven cities. Importantly, there are two city corporations under Dhaka City, and therefore we selected five municipality wards from each of the two city corporations. For each city, we prepared a separate list of only those MUH complexes that had a housing management committee. The list included 1067 MUH complexes from Dhaka City, 210 from Chattogram City, 120 from Rajshahi City, 95 from Khulna City, 90 from Sylhet City, 80 from Barishal City, and 105 from Rangpur City. In the second stage, we randomly selected 60 complexes from Dhaka City and 20 complexes from each of the six cities, considering an average of three to five respondents from each

MUH complex. There was an exception for two-unit complexes where at least two residents were recruited per complex. The final stage involved selecting MUH residents at the household level using a convenience sampling technique. Thus, we interviewed a total of 616 MUH residents, including 214 from Dhaka City and 67 from each of the six cities.

## Measures

### Sociodemographic variables

Self-reported sociodemographic variables included sex (male or female), age (18–39 years, 40–59 years, or ≥60 years), marital status (single or ever married), education level (primary, secondary, higher secondary, or bachelor's degree or more), occupation (job holder, business, student, retired, or housewife), religion (Muslim, Hindu, or Buddhist), monthly family income (<50 000, 50 000–99 000, or ≥100 000 Bangladeshi taka), having children under 15 years of age (yes or no), length of stay at home (≤12 hours or >12 hours), type of housing complex (private or government), flat ownership (owned or rented), place of residence (Dhaka City, Chattogram City, Rajshahi City, Khulna City, Sylhet City, Barishal City, or Rangpur City).

### Children

The respondents were asked: 'How many children under 15 years of age are there in your household?'<sup>24</sup> The responses were 0, 1, 2, and 3. A response of 1, 2, or 3 was later recoded as 'Yes', while a response of 0 was recoded as 'No'.

### Smoking variables

The smoking status of the respondents was determined by asking: 'On how many days during the past 30 days did you smoke cigarettes/bidis?' Those who smoked cigarettes/bidis on at least 1 day during the past 30 days were categorised as 'smokers'; on the other hand, those who did not smoke cigarettes/bidis during the past 30 days were categorised as 'non-smokers'.<sup>27</sup> Furthermore, the smoking status of other family members was measured by asking the respondents whether any family members living with them smoked cigarettes/bidis.

### Choice of smoke-free policies

The outcome variable of this study was the choice of smoke-free policies. The outcome variable was assessed by asking the respondents which one of the following policies they would choose to make their MUH smoke-free: (a) smoking is prohibited inside the home but allowed in the common areas of an MUH complex; (b) smoking is prohibited in the common areas of an MUH complex but allowed inside the home; (c) smoking is prohibited inside an MUH complex and within at least 25 feet from entrances, exits, windows that open, and ventilation intakes; and (d) do not know.

### Training and data collection

For data collection, we recruited a total of 18 experienced social science graduates and provided them with

2-day training on the objectives and methodology of the study, the survey questionnaire, and the data collection procedure. We formed six teams with these trained individuals before data collection; each team consisted of one male data collector, one female data collector, and one field supervisor. A semi-structured survey questionnaire, originally developed in English, was forward-translated into the local language Bengali and back-translated into English. Following the training, the Bengali version questionnaire was pretested among 25 respondents in similar study settings to determine its clarity, practicality, and relevance to the study participants. The questionnaire was finalised based on the findings of the pretest.

First, our data collection teams approached the housing management committees of the selected MUH complexes with an official letter to seek permission for data collection. After obtaining permission, they visited the complexes, informed the guards about the purpose of their visit, and the guards connected them with the residents available at home via intercom. The data collectors met the respondents who initially agreed to participate; they explained to the respondents the aims and procedures of the study, the risks and benefits associated with participation, their right to withdraw from the study at any time, and the anonymity and confidentiality of the data they would provide; and finally they interviewed those who gave written consent to participate in the interviews using a semi-structured survey questionnaire. If any respondents declined to participate in or withdrew from the interviews for any reason, those respondents were replaced by new ones, and thus we continued data collection until we reached the sample size. The majority of the interviews were held in the waiting areas of the complexes, although some were organised in the respondent's houses. All the interviews were conducted during daytime on both weekdays and weekends. An interview lasted for approximately 20 minutes. Each completed questionnaire was spot-checked by the field supervisors to assess the accuracy, completeness, and consistency of the data collected. Furthermore, the principal investigator and the co-investigator visited the study sites during data collection to ensure the quality of the data. The respondents were not given any financial benefits for participating in the study.

### Statistical analysis

Data analysis was performed using SPSS V.25.0 statistical software. We used descriptive statistics, such as frequencies and percentages to describe the characteristics of the sample. To determine the associations between categorical variables, we conducted  $\chi^2$  test of independence and Fisher's exact test when more than 20% of the cells had expected cell count less than 5.<sup>28</sup> Multinomial logistic regression was used to compute adjusted OR and 95% CI to estimate the relationships of independent variables with the outcome variable *choice of smoke-free policies*. The outcome variable has four categories: smoke-free building policy, smoke-free common area policy, smoke-free unit



policy, and do not know; the first three categories were compared with the last category 'do not know'. Model fitness was assessed using the  $\chi^2$  goodness-of-fit test.<sup>29</sup> We checked for multicollinearity in the logistic regression model by observing the SEs of regression coefficients. An SE ranging from 0.001 to 5.0 indicates the absence of multicollinearity among independent variables.<sup>30</sup> The SEs for the independent variables in our adjusted model were <2.0, which suggests that there was no multicollinearity among the independent variables. All variables that were significantly associated with the choice of smoke-free policies in bivariate analyses at  $p$  value <0.05 were entered into the multinomial logistic regression model. These variables included sex, occupation, length of daily stay at home, having children under 15 in the family, smoking status, and smoking by family members. All statistics were tested using a two-sided test, and a  $p$  value of <0.05 was considered statistically significant.

### Patient and public involvement

Neither patients nor the public were involved in the research design, recruitment, conduct, reporting and dissemination plans of the study.

## RESULTS

### Description of respondents

Table 1 shows the distribution of the respondents by socio-demographic and smoking-related characteristics. A total of 616 respondents participated in this study. Most of the respondents were male (66.7%), middle-aged (44.5%), ever married (85.4%), at least graduates (62.0%), job holders (44.6%), and Muslims (91.4%). Regarding family income, 44.0% of the respondents claimed that their family earned 50 000–99 000 Bangladeshi taka monthly. More than three-fifths of the respondents (64.3%) reported having at least one child under 15 years of age in the household. Over half of the respondents (53.2%) stayed home for up to 12 hours daily. Three-fourths of the respondents (76.5%) lived in private MUH complexes, and 58.4% lived in rented flats. By place of residence, more than one-third of the respondents (34.7%) were from Dhaka City, and 10.9% were from Chattogram, Rajshahi, Khulna, Sylhet, Barishal, and Rangpur cities each. The findings of this study also showed that 19.6% of the respondents were smokers and 22.1% had at least one family member who smoked.

### Desire for smoke-free housing

As demonstrated in table 2, 94.8% of the respondents (97.8% non-smokers vs 82.6% smokers) wanted smoke-free housing, whereas 5.2% (2.2% non-smokers vs 17.4% smokers) did not want smoke-free housing.

### Choice of smoke-free policies

Figure 1 shows the choice of smoke-free policies among MUH residents. Among the respondents who wanted smoke-free housing, 44.9% preferred a smoke-free

building policy, followed by a smoke-free common area policy (28.3%).

### Comparison of choice of smoke-free policies among MUH residents

As shown in table 3,  $\chi^2$  tests of independence were performed to examine the associations of sociodemographic and smoking-related characteristics with the outcome variable *choice of smoke-free policies* among MUH residents. According to the results of  $\chi^2$  tests, the choice of smoke-free policies was found to be associated with sex ( $p$ <0.001), occupation ( $p$ =0.002), children under 15 ( $p$ =0.011), length of stay at home ( $p$ <0.001), smoking status ( $p$ =0.001), and smoking by family members ( $p$ =0.012).

### Determinants of choice of smoke-free policies

The results of multinomial logistic regression analyses are displayed in table 4. MUH residents who stayed at home for more than 12 hours per day were 2.6 times more likely to prefer a smoke-free building policy than those who stayed at home for 12 hours or less per day (95% CI 1.035 to 6.493). Non-smokers were 3.2 times more likely to prefer a smoke-free building policy than smokers (95% CI 1.317 to 7.582). Residents whose family members smoked were 3.0 times more likely to favour a smoke-free building policy than those whose family members did not smoke (95% CI 1.058 to 8.422). Similarly, MUH residents with at least one child under 15 years of age in the household were 70.0% less likely to choose a common area policy than those with no child under 15 years of age in the household (95% CI 0.152 to 0.778). Females were 3.7 times more likely to prefer a smoke-free unit policy than their male counterparts (95% CI 1.024 to 13.188).

## DISCUSSION

To our knowledge, this is the first study to assess the desire for smoke-free housing, determine the choice of smoke-free policies for MUH, and identify the factors associated with policy choice among MUH residents living in the divisional cities of Bangladesh.

One of the main findings of this study was that 94.8% of MUH residents, including smokers, wanted smoke-free policies for MUH. This finding is similar to those reported in previous studies where 87.0%–91.3% of MUH residents favoured smoke-free housing.<sup>31 32</sup> This high level of desire for smoke-free housing among residents could be attributed to their greater awareness about the adverse health effects of SHS exposure.<sup>33</sup> Reduced risk of fire could be another reason why a substantial proportion of residents preferred smoke-free housing. In Bangladesh, ignited cigarette butts are the third largest cause of fire incidents in residential and industrial buildings.<sup>34</sup> These findings suggest an urgent need to implement a smoke-free legislation within MUH complexes in the country to protect non-smoking residents from SHS exposure. Smoke-free laws and policies are very

**Table 1** Sociodemographic and smoking-related characteristics of the sample

Variable	Category	Frequency	%
Sex	Male	411	66.7
	Female	205	33.3
Age (years)	18–39	269	43.7
	40–59	274	44.5
	≥60	73	11.9
Marital status	Single	90	14.6
	Ever married	526	85.4
Education	Primary	8	1.3
	Secondary	34	5.5
	Higher secondary	192	31.2
	Bachelor's degree or more	382	62.0
Occupation	Job holder	275	44.6
	Business	98	15.9
	Student	59	9.6
	Retired	59	9.6
	Housewife	125	20.3
Religion	Muslim	563	91.4
	Hindu	51	8.3
	Buddhist	2	0.3
Monthly family income (Bangladeshi taka)	<50 000	216	35.1
	50 000–99 000	271	44.0
	≥100 000	129	20.9
Children	Yes	396	64.3
	No	220	35.7
Length of daily stay at home (hours)	≤12	328	53.2
	>12	288	46.8
Type of housing complex	Private	471	76.5
	Government	145	23.5
Flat ownership	Owned	256	41.6
	Rented	360	58.4
Place of residence (city)	Dhaka	214	34.7
	Chattogram	67	10.9
	Rajshahi	67	10.9
	Khulna	67	10.9
	Sylhet	67	10.9
	Barishal	67	10.9
	Rangpur	67	10.9
Smoking status	Smoker	121	19.6
	Non-smoker	495	80.4
Smoking by family members	Yes	136	22.1
	No	480	77.9

crucial for comprehensive tobacco control because these have a binding force. The Global Adult Tobacco Survey Bangladesh Report 2017 shows that there has been a considerable decrease in SHS exposure in workplaces,

restaurants, and healthcare facilities country-wide due to the implementation of the tobacco control law.<sup>24</sup> From the findings of this study, policymakers can become aware of city dwellers' desire for smoke-free housing, and this

**Table 2** Level of desire for smoke-free housing among multiunit housing residents

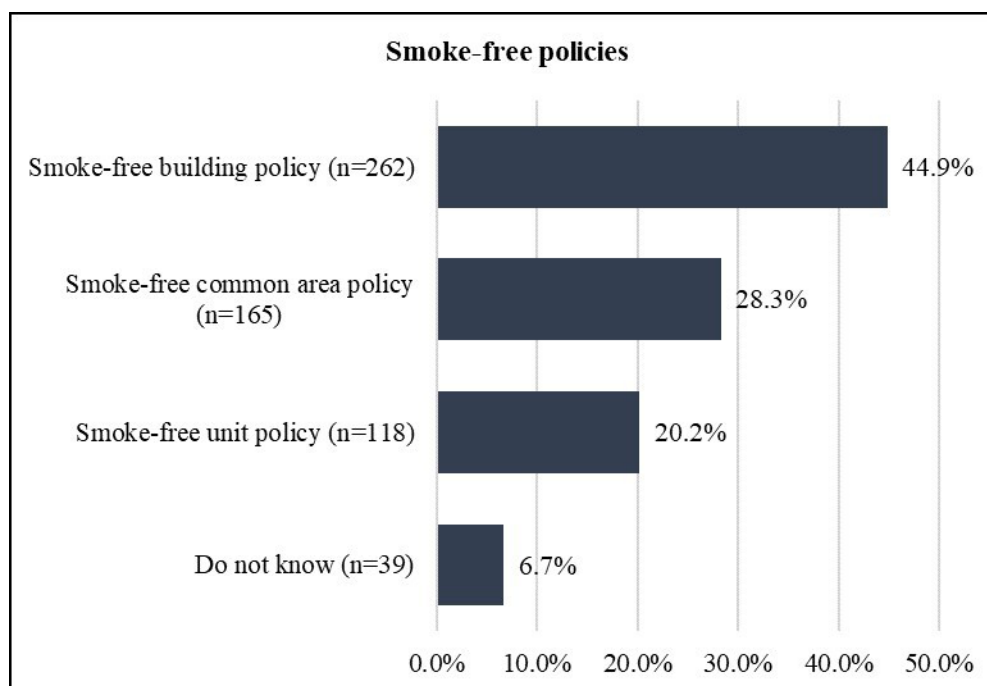
Smoking status	Desire for smoke-free housing (N=616)			
	Yes		No	
	Frequency	%	Frequency	%
Non-smoker	484	97.8	11	2.2
Smoker	100	82.6	21	17.4
Total	584	94.8	32	5.2

may motivate them to include provisions in the tobacco control law and the national housing policy to restrict smoking inside housing complexes.

In the present study, most of the residents (44.9%) preferred a smoke-free building policy for MUH. This finding is supported by other studies where the largest portion of MUH residents favoured smoke-free building policies.<sup>35–37</sup> One possible explanation for the greater support for a smoke-free building policy could be that this policy has the potential to fully protect residents through smoking bans in individual flats, common areas, and adjacent outdoor areas. Although restricting smoking within buildings may help smokers quit smoking, it does not guarantee that they can stop smoking overnight. Therefore, if a smoke-free building policy will be implemented in MUH complexes, a temporary designated smoking area can be established, and this must be located at least 25 feet away from all housing units and administrative buildings.<sup>38</sup> However, smoking cessation services, such as behavioural counselling and pharmacotherapy, should be introduced in MUH complexes so that smokers can quit smoking quickly.

It was found in the present study that MUH residents who spent more than 12 hours a day within a housing complex were more likely to choose a smoke-free building policy than those who spent 12 hours or less a day within a housing complex. An extended stay in housing complexes that do not have a smoke-free policy puts residents at increased risk of exposure to SHS from individual flats, neighbouring flats, shared spaces, next buildings, and adjacent outdoor areas. Existing literature confirms that long-term exposure to SHS causes adverse health effects.<sup>39</sup> However, further research is needed to validate the association between residents' length of stay at home and their preference for smoke-free building policies.

According to the present study's findings, non-smoking MUH residents were more likely to favour a smoke-free building policy than those who were smokers. This finding is supported by previous studies done in the USA, which investigated support for smoke-free policies in MUH.<sup>40–41</sup> One possible explanation for non-smokers' higher support for smoke-free building policies could be that they had better knowledge about the harmful effects

**Figure 1** Choice of smoke-free policies for multiunit housing among residents.

**Table 3** Bivariate analysis showing differences in choice of smoke-free policies by sociodemographic and smoking-related characteristics

Variables	Smoke-free policy options, $\chi^2$ and p value				$\chi^2*$	P value
	Smoke-free building policy (n=262)	Smoke-free common area policy (n=165)	Smoke-free unit policy (n=118)	Do not know (n=39)		
	n (%)	n (%)	n (%)	n (%)		
Sex						
Female	87 (43.5)	41 (20.5)	64 (32.0)	8 (4.0)	30.806	<b>&lt;0.001</b>
Male	175 (45.3)	124 (32.1)	54 (14.1)	31 (8.1)		
Age (years)						
18–39	118 (46.5)	66 (26.0)	53 (20.9)	17 (6.7)	3.744	0.711
40–59	112 (42.9)	76 (29.1)	53 (20.3)	20 (7.7)		
≥60	32 (46.4)	23 (33.3)	12 (17.4)	2 (2.9)		
Marital status						
Single	45 (51.1)	24 (27.3)	14 (15.9)	5 (5.7)	2.045	0.563
Ever married	217 (43.8)	141 (28.4)	104 (21.0)	34 (6.9)		
Education						
Primary	3 (42.9)	3 (42.9)	1 (14.3)	0 (0.0)	0.469†	
Secondary	17 (54.8)	9 (29.0)	4 (12.9)	1 (3.2)		
Higher secondary	83 (44.9)	61 (33.0)	32 (17.3)	9 (4.9)		
Bachelor's degree or more	159 (44.0)	92 (25.5)	81 (22.4)	29 (8.0)		
Occupation						
Job holder	112 (43.1)	77 (29.6)	45 (17.3)	26 (10.0)	31.202	<b>0.002</b>
Business	37 (41.1)	37 (41.1)	11 (12.2)	5 (5.6)		
Student	31 (53.4)	13 (22.4)	11 (19.0)	3 (5.2)		
Retired	25 (45.5)	15 (27.3)	14 (25.5)	1 (1.8)		
Housewife	57 (47.1)	23 (19.0)	37 (30.6)	4 (3.3)		
Religion						
Muslim	235 (44.2)	152 (28.6)	108 (20.3)	37 (7.0)	0.272†	
Hindu	27 (54.0)	13 (26.0)	8 (16.0)	2 (4.0)		
Buddhist	0 (0.0)	0 (0.0)	2 (100.0)	0 (0.0)		
Monthly family income (Bangladeshi taka)						
<50 000	96 (47.1)	57 (28.1)	42 (20.7)	8 (3.9)	6.615	0.358
50 000–99 000	109 (41.9)	72 (27.7)	55 (21.2)	24 (9.2)		
≥100 000	57 (46.7)	36 (29.8)	21 (17.4)	7 (5.8)		
Children						
Yes	168 (45.3)	90 (24.3)	83 (22.4)	30 (8.1)	11.168	<b>0.011</b>
No	94 (44.1)	75 (35.2)	35 (16.4)	9 (4.2)		
Length of daily stay at home (hours)						
≤12	147 (53.3)	54 (19.6)	64 (23.2)	11 (4.0)	30.194	<b>&lt;0.001</b>
>12	115 (37.3)	111 (36.0)	54 (17.5)	28 (9.1)		

Continued



Table 3 Continued

Variables	Smoke-free policy options, $\chi^2$ and p value				$\chi^{2*}$	P value
	Smoke-free building policy (n=262)	Smoke-free common area policy (n=165)	Smoke-free unit policy (n=118)	Do not know (n=39)		
Type of housing complex						
Government	64 (46.0)	32 (23.0)	35 (25.2)	8 (5.8)	4.290	0.232
Private	198 (44.5)	133 (29.9)	83 (18.7)	31 (6.9)		
Flat ownership						
Owned	109 (44.7)	71 (29.1)	48 (19.7)	16 (6.6)	0.177	0.981
Rented	153 (45.0)	94 (27.6)	70 (20.6)	23 (6.8)		
Smoking status						
Non-smoker	227 (46.9)	125 (25.8)	105 (21.7)	27 (5.6)	16.727	<b>0.001</b>
Smoker	35 (35.0)	40 (40.0)	13 (13.0)	12 (12.0)		
Smoking by family members						
Yes	73 (57.5)	28 (22.0)	21 (16.5)	5 (3.9)	10.879	<b>0.012</b>
No	189 (41.4)	137 (30.0)	97 (21.2)	34 (7.4)		
Place of residence (city)						
Dhaka	100 (49.8)	52 (25.9)	40 (19.9)	9 (4.5)	25.943	0.101
Chattogram	27 (42.2)	20 (31.3)	13 (20.3)	4 (6.3)		
Rajshahi	30 (46.2)	16 (24.6)	14 (21.5)	5 (7.7)		
Khulna	24 (36.9)	25 (38.5)	12 (18.5)	4 (6.2)		
Sylhet	24 (38.1)	28 (44.4)	6 (9.5)	5 (7.9)		
Barishal	27 (41.5)	14 (21.5)	17 (26.2)	7 (10.8)		
Rangpur	30 (49.2)	10 (16.4)	16 (26.2)	5 (8.2)		

Bold values indicate significant results.  
\*Pearson's  $\chi^2$ .  
†P value based on Fisher's exact test.

of tobacco smoke compared to smokers.<sup>42</sup> Hence, it is important to improve smokers' knowledge and awareness regarding the adverse consequences of SHS exposure.

Findings from this study showed that residents whose family members smoked were more supportive of smoke-free building policies than those whose family members did not smoke. The higher support for smoke-free building policies among those with smoking family members could be attributed to their concerns about the potential health problems of their family members due to smoking and SHS exposure. The implementation of a smoke-free building policy will guarantee a smoke-free environment in housing complexes where no one can smoke, which may lead smokers to reduce or quit smoking.<sup>17</sup> When people try to quit smoking, family support plays an important role in helping them quit.

The present study revealed that more women than men preferred smoke-free unit policies. This finding is in agreement with other published works that studied smoke-free policies for MUH.<sup>16</sup> One major reason for women's preference for unit policies over men could be

that they see SHS as less socially acceptable compared to men.<sup>43</sup> This phenomenon could also be explained by the fact that women in Bangladesh spend most of their time at home. This prolonged stay intensifies their susceptibility to SHS exposure at home where male family members usually smoke.<sup>44</sup>

In the present study, the respondents who had at least one child were less likely to choose a smoke-free common area policy than those who had no child. This lower preference for smoke-free common area policies could be explained by the fact that introducing a smoke-free common area policy would encourage smokers to smoke at home. Children stay at home for a long time as they have few or no outdoor activities. When their parents and other family members smoke at home, they are at higher risk of SHS exposure. Evidence shows that chronic SHS exposure puts children at increased risk of severe diseases because they have a less developed airways system and an immature immune system.<sup>45 46</sup> Another possible explanation for the lower level of support for smoke-free common area policies among residents is



**Table 4** Multinomial logistic regression analysis for predicting determinants of choice of smoke-free policies

Variables	Smoke-free building policy	Smoke-free common area policy	Smoke-free unit policy
	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)
Sex			
Female	0.7 (0.198 to 2.340)	1.2 (0.324 to 4.164)	3.7 (1.024 to 13.188)*
Male	Reference	Reference	Reference
Children			
Yes	0.5 (0.224 to 1.121)	0.3 (0.152 to 0.778)*	0.7 (0.284 to 1.598)
No	Reference	Reference	Reference
Length of daily stay at home (hours)			
>12	2.6 (1.035 to 6.493)*	1.0 (0.371 to 2.541)	1.1 (0.403 to 2.958)
≤12	Reference	Reference	Reference
Smoking status			
Non-smoker	3.2 (1.317 to 7.582)*	1.0 (0.601 to 3.430)	1.8 (0.662 to 4.970)
Smoker	Reference	Reference	Reference
Smoking by family members			
Yes	3.0 (1.058 to 8.422)*	1.6 (0.540 to 4.610)	1.4 (0.468 to 4.322)
No	Reference	Reference	Reference

Reference category for choice of smoke-free policies: do not know.  
 \*P<0.05  
 aOR, adjusted OR;

that smoking by fathers and other elders at home may inspire children to initiate smoking and accept it as a normal behaviour.<sup>47–49</sup> Thus, these findings indicate that children will not receive greater health benefits even after smoke-free common area policies are implemented in MUH complexes.

### Limitations

This study has some limitations. First, due to the cross-sectional nature of the study, we could not establish a causal relationship between the choice of smoke-free policies and sociodemographic and smoking-related variables. Second, we used self-reported data that are subject to recall and social desirability bias.<sup>50,51</sup> These two types of bias may result in underestimation or overestimation of the association between the outcome variable and other variables. Third, the exclusion of pregnant women and individuals with speech and/or hearing impairments may have biased the study results. Culturally, Bangladeshi women do not go outdoors during pregnancy and experience a sense of embarrassment in conversations with unknown people, especially with adult men. An interviewer-administered survey involves verbal communication between interviewers and respondents, which is challenging for individuals with speech and hearing impairments. Finally, we included only those residents who were available at home during data collection. This may have introduced selection bias into our sample, thus impacting the study results.

### CONCLUSIONS

This study revealed a high demand for smoke-free housing among MUH residents in urban Bangladesh. Most of the residents favoured a smoke-free building policy for MUH which imposes smoking bans inside entire buildings and also within a distance of 25 feet from entrances. Those who stayed at home for a longer time, were non-smokers, and had smoking family members were more likely to choose this policy. However, further research involving diverse stakeholders is needed to generate stronger evidence on policy choice for smoke-free MUH.

### Author affiliations

<sup>1</sup>Department of Research, Centre for Development Action, Dhaka, Bangladesh

<sup>2</sup>Department of Monitoring, Evaluation and Learning, Social Development Foundation, Dhaka, Bangladesh

<sup>3</sup>Centre for Development Action, Dhaka, Bangladesh

<sup>4</sup>Department of Research and Policy, Transparency International Bangladesh, Dhaka, Bangladesh

<sup>5</sup>High Court Division, Supreme Court of Bangladesh, Dhaka, Bangladesh

<sup>6</sup>Department of Statistics, University of Rajshahi, Rajshahi, Bangladesh

<sup>7</sup>Department of Public Health, North South University, Dhaka, Bangladesh

X Md Golam Kibria @Md. Golam Kibria

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#### ORCID iDs

Md Golam Kibria <http://orcid.org/0000-0002-1499-7505>

Mohammad Delwer Hossain Hawlader <http://orcid.org/0000-0002-1443-6257>

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