Association of tobacco use initiation with sociodemographic characteristics of children living in the slums of Dhaka city, Bangladesh

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ABSTRACT

INTRODUCTION Teenage period is the most crucial life stage for lowering tobacco usage and its effects, because at this crucial stage of life, the onset of tobacco use may begin and become a habit. This study aimed to determine whether tobacco use is associated with sociodemographic characteristics among children living in urban slums.

METHODS This cross-sectional study included 288 children (aged 10–17 years) living in a slum urban area in Dhaka, Bangladesh. The data were compiled using descriptive statistics of sociodemographic characteristics. A chi-squared test was used to determine the association between sociodemographic characteristics and both the types of tobacco used and the first initiation of tobacco use. In addition, a logistic regression model was employed to evaluate the first initiation of tobacco, adjusting for potential confounding variables.

RESULTS Among the respondents, 69.8% reported cigarette smoking, while 30.2% used other tobacco products. Notably, 44.8% of cigarette smokers and 85.1% of other tobacco users began using tobacco before the age of 13 years. A significant association was found between the age of initiation and the type of tobacco used (p=0.00), with early initiators more likely to use other types of tobacco. Males predominantly smoked cigarettes (72.1%), whereas females favored other tobacco products (83.3%) (p=0.01). Education level was strongly associated with the age of initiation; participants with non-formal education were more likely to initiate use before the age 13 years (AOR=3.84, p=0.01). Tobacco use before the age of 13 years was more likely among respondents who were unemployed, and those whose parents, particularly mothers, were business women, and the fathers were day laborers (AOR=3.86 and AOR=3.47, respectively).

CONCLUSIONS These findings highlight the need for targeted interventions addressing early tobacco use amongst teenagers and its strong socioeconomic determinants.

INTRODUCTION

A significant number of children live in urban slum areas of Dhaka city and live below the poverty line, as stated by the International Centre for Diarrheal Disease Research, Bangladesh (ICDDR, B) in its 2019 report on Slum Health in Bangladesh. It also stated that one-third of Dhaka's slum population are children aged <15 years[1]. Exposure to various hazardous practices and environments is common for most of these children[2]. Slums are risk factors for numerous non-communicable diseases. Among them, the main contributory factor is the use of tobacco[2]. As reported from a survey, among children aged 13–15 years, 29 million boys and 14 million girls used tobacco in 2018[3].

Cigarette smoking caused 7.5 million prevalent cases of chronic obstructive pulmonary disease (COPD) in the United States in 2009[4]. It is also responsible for cancer,

and cardiovascular diseases, including coronary heart disease, stroke, and abdominal aortic aneurysm[5]. A report of Bangladesh in 2017 stated that people used both smoked tobacco (cigarettes, bidi) and smokeless tobacco (betel quid and gul)[2], and it was determined that smokeless tobacco is significantly associated with hypertension[6].

Additionally, a study found that low socio-economic status, family bonding factors, family smoking, peer bonding, school influences, social learning, and the easy availability of tobacco products are significantly associated with tobacco initiation among children living in slums. Furthermore, it is also found that rebelliousness, risk-taking attitude, submissiveness, or shy behavior are some personality factors of children who begin to use tobacco[7]. Additionally, children play a very important role in a country's future, especially those who lack proper guidance. Moreover, they are more vulnerable to addiction than adults, who typically begin using tobacco later in life, and starting tobacco use itself is a risk factor for developing tobacco addiction[8].

Therefore, the present study aimed to examine how sociodemographic characteristics influence the type of tobacco used and the initial initiation of tobacco use among children living in urban slums of Dhaka, Bangladesh.

METHODS

Study design

This study was descriptive cross-sectional following a quantitative approach. For reporting observational research, this cross-sectional study adhered to the guidelines of the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) statement (Supplementary file Material 1).

Study participants, sample size, and sampling

This study included a total of 288 tobacco using children living in a slum area located in Mirpur Thana of Dhaka district, Bangladesh. The respondents indicated that the children aged 10–17 years, residing in the selected slum of Dhaka city, provided consent to participate in this study.

Considering the highest number of people in Bangladesh living in slum settlements of Dhaka city, slum children of Dhaka were taken into account as the study population[9]. In addition, the slum of Mirpur Thana was chosen as the study site due to its overpopulation compared to other areas within Dhaka city[10].

A potential standard sample size was assumed to be 312, calculated using the formula:

$$n=Z^2pq/d^2$$

where Z (standard normal deviate) was taken as 1.96, p is the proportion of smoker adolescent boys in Dhaka city, q=1-p, and d is the desired margin of error. The proportion of smoker adolescent boys in Dhaka city was 35.33%[11]; among them, the proportion living in slums was 80%[11]. Therefore, the proportion of smoker slum adolescent boys in Dhaka city was estimated at 28.26% or 0.28, with a margin of error of 0.05. However, the final sample size was adjusted downward to account for a 5% non-response rate, as these individuals tend to be transient and hard to reach. After data cleaning and initial processing, the final sample size was set at 288. Since youth who use tobacco in urban slum areas are a hidden or hard-to-reach population, a non-discriminative snowball sampling technique was used to select participants. Due to their high mobility, lack of registration, and stigma, these individuals are often difficult to access using traditional probability sampling techniques. Researchers were able to find participants through peer referrals by using snowball sampling, which is a useful method for reaching underrepresented or socially connected groups. The study's goal of examining behaviors within a particular, underrepresented group justifies this approach, even though it restricts the findings' applicability to the general population.

Data collection

A pre-tested, semi-structured questionnaire was used to collect quantitative data from the slum children through interviewer-administered interviews. Respondents were interviewed between July and December 2022 at their convenience. The survey took only 10 to 15 minutes to complete. All authors had access to the data collection process and to safeguarding participants' information during and after data collection. The survey was conducted in Bengali with the full support and cooperation of the slum residents.

Ethical considerations

This study was approved by the Ethical Review Committee of the Department of Public Health at Northern University Bangladesh (NUB/DPH/EC/2022/21) and adhered to the Declaration of Helsinki. Participants' anonymity and voluntary participation were maintained. Verbal informed consent was obtained from the respondents at the start of the survey; they could withdraw at any time, and their autonomy was protected.

Questionnaire design

The questionnaire (Supplementary file Material 2) was pre-validated by two independent reviewers and pre-tested with 10 respondents. Expert review was used to assess content validity, ensuring that the items were relevant to the study's goals and appropriate. The questionnaire was updated based on feedback from pre-test participants, focusing on clarity and relevance, although formal statistical reliability measures were not calculated due to the small pre-test sample. The key components of the questionnaire included: 1) Sociodemographic information such as age of tobacco user, gender, education level, respondent's occupation, parental occupation; 2) Types of tobacco use such as cigarette

smoking, other tobacco products such as bidi, gul, jarda, etc.; 3) Age at first tobacco use including before teenage years, during teenage years, or after.

Data analysis

Study characteristics were summarized with descriptive statistics (frequency and percentage). Age (≤15 years and >15 years) of the respondents and the first initiation age of tobacco use (<13 years and ≥13 years) were categorized based on their respective mean values as cutoff points. Odds ratios with 95% confidence intervals were calculated to examine the associations between sociodemographic characteristics (independent variables) and the first initiation of tobacco use (dependent variable). A multiple logistic regression analysis was performed, followed by a modeling process using backward elimination, including pre-specified covariates such as age of tobacco use, gender, education level, respondent's occupation, and parental occupation. To ensure statistical significance, gender ($p>0.05$) was excluded. The collected data were checked and analyzed using the Statistical Package for the Social Sciences (SPSS) software.

RESULTS

Among 288 respondents, a larger portion (n=201; 69.8%) reported smoking cigarettes. In contrast, less than one-third

Table 1. Distribution of sociodemographic characteristics by type of tobacco used and first initiation of tobacco among children living in urban slums of Dhaka city, Bangladesh, July–December 2022 (N=288)

Characteristics	Participants n (%)	Type of tobacco use			Age of first initiation of tobacco use (years)		
		Cigarette smoking n (%)	Other tobacco§ n (%)	p	<13 n (%)	≥13 n (%)	p
Age (years)							
≤15	192 (66.7)	123 (64.1)	69 (35.9)	0.00*			
>15	96 (33.3)	78 (81.2)	18 (18.8)				
Gender							
Male	276 (95.8)	199 (72.1)	77 (27.9)	0.01*	154 (55.8)	122 (44.2)	0.06
Female	12 (4.2)	2 (16.7)	10 (83.3)		10 (83.3)	2 (16.7)	
Education level							
Non-formal	81(28.1)	38 (46.9)	43 (53.1)	0.00*	56 (69.1)	25 (30.9)	0.01*
Primary	99 (34.4)	68 (68.7)	31 (31.3)		68 (68.7)	31 (31.3)	
Secondary/higher secondary	108 (37.5)	95 (88.0)	13 (12.0)		40 (37.0)	68 (63.0)	
Respondent's occupation							
Business	36 (12.5)	31 (86.1)	5 (13.9)	0.01*	18 (50.0)	18 (50.0)	0.01*
Service	33 (11.5)	27 (81.8)	6 (18.2)		9 (27.3)	24 (72.7)	
Day wager	46 (16)	34 (73.9)	12 (26.1)		16 (34.8)	30 (65.2)	
Unemployed	173 (60.1)	109 (63.0)	64 (37.0)		121 (69.9)	52 (30.1)	
Father's occupation							
Business	45 (15.6)	31 (68.9)	14 (31.1)	0.98	25 (55.6)	20 (44.4)	0.04*
Service	53 (18.4)	37 (69.8)	16 (30.2)		31 (58.5)	22 (41.5)	
Day wager	164 (56.9)	114 (69.5)	50 (30.5)		100 (61.0)	64 (39.0)	
Unemployed	26 (9)	19 (73.1)	7 (26.9)		8 (30.8)	18 (69.2)	
Mother's occupation							
Business	18 (6.3)	12 (66.7)	6 (33.3)	0.47	13 (72.2)	5 (27.8)	0.01*
Service	98 (34)	71 (72.4)	27 (27.6)		56 (57.1)	42 (42.9)	
Day wager	31 (10.8)	18 (58.1)	13 (41.9)		25 (80.6)	6 (19.4)	
Housewife	141 (49)	100 (70.9)	41 (29.1)		70 (49.6)	71 (50.4)	

§Other tobacco includes bidi, gul, jarda. *Statistical significance at p≤0.05. The Pearson chi-squared test was used to observe the association.

(n=87; 30.2%) used other tobacco products (bidi, gul, jarda). Among the cigarette smokers, almost half (n=90; 44.80%) started using tobacco before the age of 13 years. Similarly, among the respondents who used other tobacco products, the majority (n=74; 85.10%) began before the age of 13 years (Supplementary file Figure 1).

Distribution of respondents' general characteristics by type of tobacco used and first initiation of tobacco use

The analysis uncovered several key findings about tobacco users. Most notably, 66.7% of respondents (192 out of 288) started using tobacco at the age of ≤15 years. Regarding gender, the vast majority were male (95.8%), showing a significant gender gap in tobacco use. Education level indicated that 65.6% had only non-formal or primary education. Occupational data showed that 60.1% of respondents were unemployed, while 56.9% of fathers were day laborers. Additionally, nearly half of the mothers (49%) were housewives.

The analysis also revealed several statistically significant associations between participant characteristics and both the type and initiation of tobacco use. Among those who started using tobacco before the age of 15 years, 64.1% used cigarettes, while among those who initiated after 15 years, 81.2% used cigarettes and only 18.8% used other forms (p=0.00*). Males significantly reported the use of cigarettes (72.1%), while females predominantly used other tobacco forms (83.3%) (p=0.01*). Additionally, 83.3% of females initiated tobacco use before the age of 13 years compared to 55.8% of males, though this difference did not reach significance (p=0.06). Education level showed a strong influence: 88.0% of participants with secondary or higher education used cigarettes, whereas 53.1% of those with non-formal education used other tobacco (p=0.00*). First initiation was also more common among the non-formally educated (69.1%) compared to those with higher education

Table 2. Predictors of first initiation of tobacco use among children living in urban slums of Dhaka city, Bangladesh, July–December 2022 (N=288)

Variables	Age of first initiation of tobacco use (years)			
	<13 vs ≥ 13			
	OR (95% CI)	p	AOR (95% CI)	p
Gender				
Male	0.25 (0.05–1.17)	0.08		
Female ®	1			
Education level				
Non-formal	3.81 (2.06–7.02)	0.01*	3.84 (1.94–7.62)	0.01*
Primary	3.73 (2.09–6.64)	0.01*	3.67 (1.91–7.06)	0.01*
Secondary/higher secondary ®	1		1	
Occupation				
Business	0.43 (0.21–0.89)	0.02*	0.45 (0.20–1.02)	0.06
Service	0.16 (0.07–0.37)	0.01*	0.23 (0.09–0.57)	0.01*
Day wager	0.23 (0.12–0.46)	0.01*	0.17 (0.08–0.36)	0.01*
Unemployed ®	1		1	
Father's occupation				
Business	2.81 (1.02–7.79)	0.05*	2.73 (0.82–9.10)	0.10
Service	3.17 (1.17–8.58)	0.02*	3.01 (0.93–9.78)	0.07
Day wager	3.52 (1.44– 8.56)	0.01*	3.47 (1.17–10.24)	0.03*
Unemployed ®	1		1	
Mother's occupation				
Business	2.64 (0.89–7.79)	0.08	3.86 (1.12–13.36)	0.03*
Service	1.35 (0.81–2.27)	0.25	1.33 (0.73–2.43)	0.35
Day wager	4.23 (1.63–10.93)	0.01*	3.22(1.11–9.32)	0.03*
Housewife ®	1		1	

Logistic regression analysis was used to identify the predictors. *Statistical significance at p≤0.05. AOR: adjusted odds ratio. ® Reference categories.

(37.0%) (p=0.01*). Regarding occupation, unemployed individuals were more likely to use cigarettes (63.0%) and to initiate tobacco use before the age of 13 years (69.9%). These associations were significant (p=0.01*). While father's occupation was not significantly related to the type of tobacco used (p=0.984), it was linked to the first initiation of tobacco (p=0.04*). Mother's occupation, particularly being a day wager, was significantly associated with first initiation of tobacco (p=0.01*) (Table 1).

Predictors associated with the first initiation of tobacco use

The study's regression analysis identified key factors linked to respondents' first tobacco use. Those with no formal education had nearly four times higher odds (AOR=3.84; 95% CI: 1.94–7.62) of initiating tobacco before the age of 13 years compared to those with secondary or higher education. The study also showed that respondents who were unemployed had a greater likelihood of starting tobacco use before the age of 13 years than those in other occupations. Additionally, respondents whose fathers were day workers had more than three times the odds (AOR=3.47; 95% CI: 1.17–10.24) of initiating tobacco before the age of 13 years. Similarly, those with mothers who were business women had over three times the odds (AOR=3.86; 95% CI: 1.12–13.36) of first using tobacco before the age of 13 years compared to those whose mothers were housewives (Table 2).

DISCUSSION

The period of life between childhood and adulthood (aged 10–19 years), known as adolescence[12], and according to the global prevalence of tobacco, the frequency of tobacco use among participants aged 13–15 years is significant worldwide[13]. This study explored tobacco consumption status among children living in urban slums of Dhaka city, Bangladesh. This study determined that among the 288 participating children, 192 (66.7%) started tobacco use before the age of 15 years, underscoring a serious early exposure to tobacco during adolescence (age 10–19 years). The robust scenario of this prevalence was found in another study of Bangladesh (40.3%), which strengthened the reliability of the study outcome[14]. Besides, 85.10% of the respondents smoked cigarettes, and 44.8% of them used other tobacco before the age of 13 years. In line with another study, which showed 13.2% started smoking at an early stage (age 10–13 years) in Indonesia, 10% of smokers had started when aged 10–14 years, revealing that the initiation age of smoking occurs during the teenage years[11]. Habits such as early initiation of tobacco can be the result of several interrelated factors, such as affordability, ease of access, and peer pressure[15]. According to the general characteristics of this study, most (96%) of the children living in slums who used tobacco were male, indicating a significant gender disparity in tobacco use. Moreover, in terms of types of tobacco use, this study determined that cigarette consumption was highest among male respondents (72.1%). Similarly, a study in Dhaka showed that among the boys who live in slums, 80% were smokers, and among the school-going boys, 15% were smokers[11]. Male prevalence is higher than female prevalence, according to another study conducted in India[16]. One possible explanation for this large gender disparity is that tobacco use is socially taboo among Bangladeshi women[17].

Additionally, about two-thirds of the respondents were under 15 years old with primary or non-formal education, which indicates a possible link between lower education level and tobacco use. This study also showed that different types of tobacco consumption were significantly related to the respondents' age, gender, education level, and occupation. Furthermore, fathers were daily wagers, and their mothers were unemployed, which in urban poverty settings contributed to increased tobacco use. The closeness of the mother–teen relationship is one example of how exposure to family modeling may contribute to these correlations[18]. The determinants of cigarette/bidi smoking among youth males were found as age, occupation, monthly income, family's monthly income, cigarette/bidi smoking status of the father, brother, and close friends, and knowledge about the harmfulness of smoking in another study in rural Mymensingh[14]. These variables show socio-economic susceptibility, which may be a factor in tobacco usage.

Furthermore, in our study, we observed a higher rate of smoking among those who were unemployed. This finding contradicts other studies, which generally showed more smoking behavior among individuals with personal income and specific jobs where tobacco use is less commonly restricted, such as daily wager[19-21]. On the other hand, the first initiation of tobacco use among the respondents was significantly associated with demographic characteristics like education, the respondent's occupation, and the mother's occupation. Additionally, the father's occupation was also significantly associated with the first initiation of tobacco use. Other studies did not observe any significant portrayal of the smoking initiation with their father's occupation, while our study found a greater smoking rate among those subjects whose fathers were daily wagers and whose mothers were housewives. However, in other studies, paternal smoking, specifically the smoking habit of the father, was reported to increase the risk of youth smoking[14,15]. In a low-resource environment, community-based interventions can effectively stop adolescents from starting to use tobacco[22]. Additionally, it could be beneficial to use peers as mentors when offering services to populations that are difficult to reach[22].

Limitations

The current study has some limitations. Being cross-sectional, this study does not permit a causal association of the explanatory variables with the outcome variable. Moreover, as all respondents were living in slum areas, and this limits the generalizability of the current findings among

the youth of residential or other settlements in Bangladesh. Additionally, the study's external validity may be impacted by the single-area sampling and comparatively small sample size. Potential sources of bias include measurement inaccuracy from self-reported tobacco use, which may be impacted by recall or social desirability bias, and sampling bias brought on by purposive slum area selection. Despite the limitations, as a pilot study, it demonstrated a detailed analysis of the various determinants of smoking among children living in slums, especially parents' occupations, which are unique determinants identified by our study.

CONCLUSIONS

Our study found that over two-thirds of the respondents used cigarettes, and almost half of them started smoking before they were teenagers. Additionally, the majority of other tobacco users also started before they reached their teenage years. By demonstrating the strong impact of particular sociodemographic characteristics, such as gender, respondents' job status, and parental occupation, on the early onset of tobacco smoking among children living in urban slums, this study added new information. In particular, the study shows that boys who have minimal parental supervision and are unemployed are more likely to start smoking at an early age. These findings suggested that family and economic circumstances play a significant role in this process. In order to implement multi-level interventions that offer tobacco education in informal and slum-based schools, launch parent-focused awareness campaigns regarding their role in their children's tobacco use, and incorporate tobacco prevention messages into job training or youth employment initiatives. To guarantee cultural relevance and program efficacy, these measures need to be tailored for the urban slum setting.

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CONFLICTS OF INTEREST
The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none was reported.

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DATA AVAILABILITY
The data supporting this research are available from the authors on reasonable request.

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