

# Knowledge Behavior Disparity and Determinants of Smoking Among Rural Adults in Gazipur District, Bangladesh

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## ABSTRACT

**Background:** Tobacco smoking is still one of the leading public health problem in Bangladesh, which is even more complicated by socio-economic and behavioral factors in rural population. While more people are smoking due the knowledge of healthy efforts towards this behavior, some individuals still smoke which implies right now there continues to be a space between knowledge and habit. **Objective:** To measure the knowledge–practice gap and determine factors associated with smoking in a rural district of Gazipur District, Bangladesh. **Methods & Materials:** A community-based cross-sectional study was conducted 420 adults aged ≥18 years using multistage sampling. Socio-demographic characteristics, smoking behaviour, knowledge about health risks and factors affecting smoking by data collection as face to face interview using structured questionnaire. Statistical analysis was performed using SPSS version 25, and the associations were analysed by chi-square tests (significance threshold  $p < 0.05$ ). **Results:** High smoking prevalence especially among younger adults, (78.6% in 18–27 years). Smoking was significantly associated with education ( $p = 0.001$ ), occupation ( $p = 0.014$ ) and income ( $p < 0.001$ ). Peer influence was the most common cause of smoking initiation (93.3%). More than two-thirds (68.3%) of smokers made quit attempts but only a small number established brands as continuing users. **Conclusions:** Socio-economic and social contexts play an important role in smoking among rural adults, even when knowledge is accounted for. Sectoral and economic-led interventions to generate behavioral changes, peer-based approaches, and socio-economic support would seem to be most effective for the less wealthy in order to tackle tobacco use.

**Keywords:** Smoking, Knowledge–behavior gap, Rural adults, Determinants, Bangladesh

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## INTRODUCTION

Tobacco smoking remains an important public health problem and the second leading cause of disease and mortality worldwide. Tobacco consumption is ultimately estimated to account for millions of deaths globally each year, largely due to its positive relationship with cardiovascular disease and chronic respiratory diseases and multiple cancers [1]. The tobacco use burden lies heaviest on low- and middle-income countries, where population growth rates drive steady or increasing prevalence against a backdrop of weak regulatory enforcement, societal inequities. Tobacco control continues to be a multi-level challenge in these instances, with structural, behavioural and cultural drivers at play. Tobacco use is common in many parts of the world and Bangladesh ranks highly with respect to tobacco use, especially among adult males living in rural locations. Nationally representative surveys have revealed that rural populations are more predisposed to smoking than their urban counterparts [2]. Rural communities experience a number of challenges, including less education attainment, less access to health information and fewer opportunities for exposure to public health interventions. Additionally, tobacco products are easily available and not too expensive, so consumers from all income ranges can access them [3]. Indeed, these are some of the factors that help keep smoking as a socially accepted, economically entrenched activity. Although there is more public awareness than ever of the risks associated with

smoking, many people still smoke or use tobacco. This paradox is characteristic of the knowledge–behavior gap, in which merely having information about health-related risks does not suffice to motivate behavioral changes. Though studies have shown that people who are aware of the health risks associated with smoking still repeat their habits because of addiction, social influence and psychological dependence [4]. This suggests that not all the determinants of smoking behavior are obvious and should emphasize the need to seek additional understanding beyond only knowledge acquisition that inform cessation. Social determinants and environmental exposure are key factors for smoking behaviours, especially in rural settings. Peer influence is considered one of the most powerful predictors of smoking initiation, especially among young adults who are more vulnerable to peer pressure and group norms [5]. In linked rural societies, behaviours can become engrained in social networks such that it is unusually hard for one individual to quit or resist smoking. Family rules and community acceptance of tobacco consumption also helps in normalizing the behavior and lowers any perceived risks, discouraging quitting efforts. Socio-economic status is the second main driver of smoking behavior. Credentials in the Body of Work Poor and less educated people smoke at higher levels, and are more likely to fail attempts to quit smoking [6]. This results in increased tobacco consumption among marginalized groups because of; economic deprivation, work-related stress and lack of smoking cessation services. Work

directly related to physical work (involvement in farming and day labor) has also been associated with a higher incidence of smoking, potentially because tobacco is being used as a coping method for tiredness and strain. Education offers some protection from poor health behavior, including smoking. In fact, higher levels of education correlate to better health literacy, greater awareness of risks and better preventive behavior [7]. Nonetheless, within a population with sufficient knowledge, behavior modification is less likely to rate without supportive social and environmental conditions. This again underscores the complicated nature of smoking behavior, and why awareness alone is a poor tool for intervention. Though Bangladesh has also instituted a range of tobacco control measures, including advertising bans and smoking in public spaces in the form of restrictions; enforcement is poor or non-existent particularly with respect to rural communities [8]. And, the vast majority of studies have examined either prevalence or knowledge but not both, and few studies have looked at the gap between awareness and behavior. Understanding this gap is critical to informing the design of interventions not only targeting informational deficits, but also the wider socio-economic and behavioral determinants of smoking. With this purpose, the present study analyses the knowledge-behavior gap using as study population adults eighteen plus in rural Gazipur District, Bangladesh and identifies major predictors of their smoking. This study aims to provide evidence on awareness and practice that can be used to inform targeted, context-specific tobacco control interventions among terrestrial localities.

## METHODS & MATERIALS

To evaluate the knowledge practice gap and determinants of smoking among rural adults, using a community-based cross-sectional study. The experiment was conducted in a one-year duration from October 2025 to March 2026. This study included a total of 420 participants. The study settings were in rural areas of Gazipur District, Bangladesh. The target population was adults aged 18 years and over, residing in the selected for at least six months before the study. Smokers and non-smokers were included in order to be able to categorize behavioral differences.

## Inclusion and Exclusion Criteria

Inclusion criteria were aged  $\geq 18$  years, lived in the study area for more than six months and willing to sign an informed consent form. Patients screened out of the study were those

who were also severely ill, incompetent to consent to participate in the survey or otherwise unable to respond.

## Data Collection Procedure

A structured, pre-tested questionnaire was employed through face-to-face interviews. The questionnaire was developed from standard tobacco survey tools and consisted of sections on socio-demographic characteristics, smoking behaviour, knowledge of hazards and factors affecting experimentation with smoking and continued. To arrange for consistent Rigidities, Data collectors were found in the training before the Rigidities. All participants provided verbal informed consent prior to the collection of data.

## Operational Definitions

Accordingly, a smoker was defined as someone who stated using tobacco in smoked form on an everyday or non-everyday basis. A "non-smoker" was defined as someone who had never smoked or who had quit smoking by the time of the survey. We defined "Knowledge of smoking hazards" as the awareness of at least one powerful adverse health effect associated with tobacco consumption. The "knowledge-behavior gap" meant that smoking behavior existed despite sufficient knowledge about its harmful consequences.

## Statistical Analysis

Data were entered, cleaned and analyses with Statistical Package for Social Sciences (SPSS) version 25. All variables were summarized using descriptive statistics, which included frequency and percentage. For inferential analysis, Pearson's chi-square ( $\chi^2$ ) test was used to evaluate association between categorical variables. Statistical significance was defined as a p-value  $< 0.05$ . The results are presented in tables and figures to show the main findings.

## RESULT

Statistically significant association between age and smoking status ( $\chi^2 = 8.72$ ,  $p = 0.033$ ). The highest proportion of smokers was observed among the 18–27 years' age group (78.6%), followed by 28–37 years (73.3%) and 38–47 years (69.2%). In contrast, individuals aged  $\geq 48$  years had a comparatively lower smoking prevalence (60.0%). These findings suggest that smoking is more prevalent among younger adults, indicating early initiation and higher vulnerability in this age group (Table I).

**Table I: Association Between Age Group and Smoking Status ( $n = 420$ )**

| Age Group (years) | Smokers n (%) | Non-smokers n (%) | $\chi^2$ | p-value |
|-------------------|---------------|-------------------|----------|---------|
| 18–27             | 110 (78.6)    | 30 (21.4)         | 8.72     | 0.033   |
| 28–37             | 55 (73.3)     | 20 (26.7)         |          |         |
| 38–47             | 90 (69.2)     | 40 (30.8)         |          |         |
| $\geq 48$         | 45 (60.0)     | 30 (40.0)         |          |         |

A strong and statistically significant relationship was found between education level and smoking behavior ( $\chi^2 = 15.64$ ,  $p = 0.001$ ). Smoking prevalence was highest among respondents with no formal education (88.0%) and primary education

(83.3%), while it decreased progressively with higher education levels, reaching 60.8% among those with SSC and above. This inverse relationship highlights the protective role of education against smoking (Table II).

**Table II: Educational Status and Smoking Behavior ( $n = 420$ )**

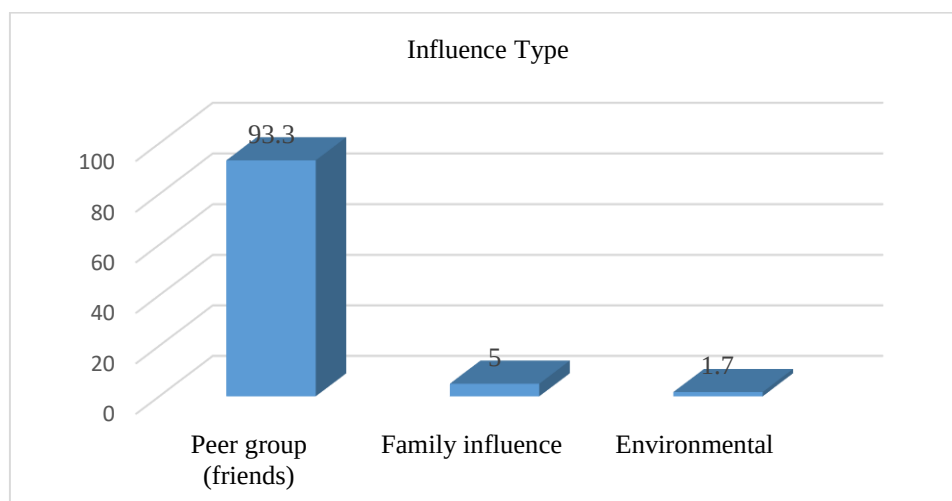
| Education Level | Smokers n (%) | Non-smokers n (%) | $\chi^2$ | p-value |
|-----------------|---------------|-------------------|----------|---------|
| No formal       | 22 (88.0)     | 3 (12.0)          | 15.64    | 0.001   |
| Primary         | 75 (83.3)     | 15 (16.7)         |          |         |
| Secondary       | 90 (75.0)     | 30 (25.0)         |          |         |
| SSC+            | 113 (60.8)    | 72 (39.2)         |          |         |

Despite high levels of awareness, no statistically significant association was observed between knowledge variables and smoking status. Awareness that smoking is harmful ( $p = 0.312$ ), knowledge that nicotine causes cancer ( $p = 0.348$ ), and

understanding of cardiovascular and respiratory risks ( $p = 0.329$ ) were all non-significant. These findings clearly demonstrate a knowledge-behavior gap, where awareness does not translate into reduced smoking behavior.

**Table III: Knowledge of Smoking Hazards and Smoking Status ( $n = 420$ )**

| Knowledge Variable           | Smokers n (%) | Non-smokers n (%) | $\chi^2$ | p-value |
|------------------------------|---------------|-------------------|----------|---------|
| Aware smoking harmful        | 300 (71.4)    | 120 (28.6)        | 1.02     | 0.312   |
| Knows nicotine causes cancer | 270 (69.2)    | 120 (30.8)        | 0.88     | 0.348   |
| Aware CVD/respiratory risk   | 250 (69.4)    | 110 (30.6)        | 0.95     | 0.329   |



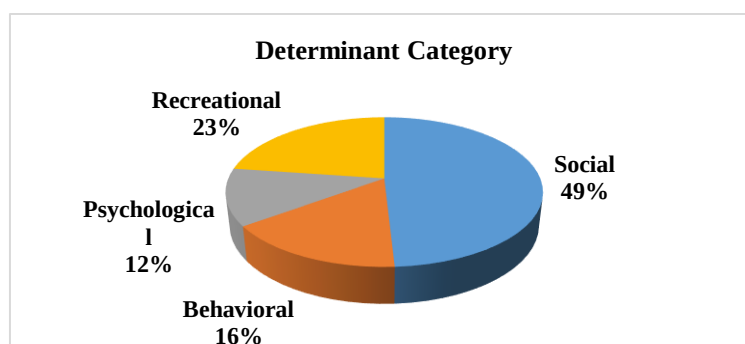
**Figure 1: Peer Influence and Smoking Initiation ( $n = 300$ )**

That peer influence is the predominant factor in smoking initiation, with 93.3% of respondents reporting friends as the primary influence. Family influence accounted for only 5.0%, while environmental exposure was minimal (1.7%). This underscores the dominant role of social networks in shaping smoking behavior (Figure 1).

Among smokers, 76.7% reported daily smoking, while 23.3% smoked occasionally, indicating a high level of habitual tobacco use. Notably, 68.3% of respondents had attempted to quit smoking, whereas 31.7% had never tried. This suggests a considerable willingness to quit, although sustained cessation remains limited (Table IV).

**Table IV: Smoking Behavior and Quit Attempts ( $n = 300$ )**

| Variable        | Category   | Frequency | Percentage (%) |
|-----------------|------------|-----------|----------------|
| Smoking pattern | Daily      | 230       | 76.7           |
|                 | Occasional | 70        | 23.3           |
| Quit attempt    | Yes        | 205       | 68.3           |
|                 | No         | 95        | 31.7           |



**Figure 2: Multidimensional Determinants of Smoking Behavior ( $n = 300$ )**

Smoking behavior was influenced by multiple overlapping factors. Social determinants were the most prominent (93.3%), followed by recreational motives (43.3%), behavioral dependence (30.0%), and psychological factors such as stress and depression (23.3%). These findings indicate that smoking is not driven by a single cause but rather a complex interplay of social, behavioral, and psychological influences (Figure 2).

A statistically significant association was observed between occupation and smoking status ( $\chi^2 = 12.48$ ,  $p = 0.014$ ). Farmers (80.0%) and day laborers (79.2%) had the highest smoking prevalence, while service holders showed comparatively lower rates (58.3%). This suggests that physically demanding and lower-income occupations are associated with higher tobacco use (Table V).

**Table V: Occupational Status and Smoking Behavior ( $n = 420$ )**

| Occupation     | Smokers n (%) | Non-smokers n (%) | $\chi^2$ | p-value |
|----------------|---------------|-------------------|----------|---------|
| Farmer         | 120 (80.0)    | 30 (20.0)         | 12.48    | 0.014   |
| Day laborer    | 95 (79.2)     | 25 (20.8)         |          |         |
| Business       | 50 (66.7)     | 25 (33.3)         |          |         |
| Service holder | 35 (58.3)     | 25 (41.7)         |          |         |
| Unemployed     | 20 (66.7)     | 10 (33.3)         |          |         |

Income level showed a highly significant association with smoking ( $\chi^2 = 18.92$ ,  $p < 0.001$ ). Respondents earning less than 10,000 BDT had the highest smoking prevalence (81.3%), which decreased with increasing income, reaching

40.0% among those earning above 30,000 BDT. This indicates that lower socioeconomic status is strongly linked to higher smoking behavior (Table VI).

**Table VI: Monthly Income and Smoking Status ( $n = 420$ )**

| Monthly Income (BDT) | Smokers n (%) | Non-smokers n (%) | $\chi^2$ | p-value |
|----------------------|---------------|-------------------|----------|---------|
| <10,000              | 130 (81.3)    | 30 (18.7)         | 18.92    | <0.001* |
| 10,000–20,000        | 110 (73.3)    | 40 (26.7)         |          |         |
| 20,001–30,000        | 40 (66.7)     | 20 (33.3)         |          |         |
| >30,000              | 20 (40.0)     | 30 (60.0)         |          |         |

Although awareness levels were high, no statistically significant relationship was found between awareness variables and smoking status. Awareness of lung disease risk ( $p = 0.294$ ), heart disease risk ( $p = 0.327$ ), and addiction ( $p =$

0.118) did not significantly influence smoking behavior. This further reinforces the presence of a substantial awareness–practice gap, where knowledge alone is insufficient to change behavior (Table VII).

**Table VII: Awareness–Practice Gap in Smoking Behavior ( $n = 420$ )**

| Variable                     | Smokers n (%) | Non-smokers n (%) | $\chi^2$ | p-value |
|------------------------------|---------------|-------------------|----------|---------|
| Aware lung disease risk      | 310 (73.8)    | 110 (26.2)        | 1.10     | 0.294   |
| Aware heart disease risk     | 290 (72.5)    | 110 (27.5)        | 0.96     | 0.327   |
| Believe smoking is addictive | 320 (76.2)    | 100 (23.8)        | 2.45     | 0.118   |

## DISCUSSION

This study investigates the knowledge behavior gap and the determinants of smoking in the rural adult males of Gazipur District, Bangladesh. Results showed high smoking rates, especially amongst younger adults, while socio-economic and social determinants proved a more powerful influence on smoking behavior than knowledge. Such findings offer valuable insight into the persistence of tobacco use within rural environments, despite growing emphasis on health awareness. There was a strong association with older age and less smoking. g 2 years This has been observed in previous studies reporting the likely initiation period of any smoking event at an adolescent or young adult age, driven by experimentation and peer [9,10]. The consistent decline in smoking prevalence with increasing age documented in the current study is also consistent with other worldwide data, where older adults' cessation is partly driven by health concerns or reduced social influence [11]. This pattern underscores the necessity of early adulthood in tobacco prevention efforts. In terms of education, smoking behavior was one of the strongest predictors so that people without any education (88.0%) and those with 4 years of primary school (83.3%) were significantly more likely to smoke, than those graduate or postgraduate respondents. Such a negative association between education and smoking is extensively observed in literature [12,13]. We know low education often correlates to low health literacy, less knowledge about long-

term impact and less access to preventive healthcare. Yet, a complication arises from the current study: whilst smoking prevalence is still high among those with higher education (60.8%), this indicates that education in itself might not be enough for behavior change. Key finding from our study for knowledge variables and smoking behavior (no statistically significant). Despite widespread awareness of the dangers of smoking, including cancer, cardiovascular disease and respiratory illness, most respondents remained smokers. Here we have strong evidence of a significant knowledge–behavior gap. Such results have also been observed in other low-resource settings, whereby awareness does not necessarily lead to corresponding cessation [4,14]. Such a gap might be attributed to nicotine dependence, social normalization of smoking, and insufficient behavioral support systems. Of the respondents who started smoking, 93.3% identified peers as the main factor for their initiation to smoking tobacco as a PAH, and peer influence was determined as the leading driver of neonatal cigarette smoking. Such evidence is consistent with previous research demonstrating the importance of social networks in shaping health behaviors [5,15]. Appropriate behaviors for smoking can be reinforced by peer effect and are particularly strong in rural communities where social cohesiveness is high. The low role of family and environmental factors in the decision to smoke indicates that these interventions should focus on peer- and community-level factors such as smoking initiation. Occupational status

was also strongly correlated with smoking; the odds of farmers (80.0%) and day laborers (79.2%) being smokers were significantly higher than that of service workers (47.7%). Such findings corroborate previous work indicating higher rates of smoking among disadvantaged workers employed in labor-intensive, lower-income occupations [16,17]. In groups such as these, tobacco use may serve as a coping mechanism against occupational stress, fatigue and economic hardship. In contrast, smoking rates among service holders was relatively low (58.3%), probably attributable to the higher education and stress as well as a better access to health information. For example, the lowest income bracket (less than 10,000 BDT/ month) was the strongest predictor of smoking. b) Other work (e.g. daily wage farmer); this group had extremely high smoking behaviour (81.3%) but nearly half of respondents who earned more than 30,000 BDT did not use (> 40.0%). This inverse relationship is in line with international data, which show that tobacco use prevalence disproportionately affects lower socioeconomically status individuals [6,18]. Data on reasons smoking rates may be more prevalent in low socioeconomic groups (financial pressure, reduced access to cessation support and targeted marketing practices of tobacco companies). Smoking addiction pattern Those who smoke daily are highly dependent on nicotine, and 76.7% of the smokers (n=163) were found to be of this type. Nevertheless, 68.3% of them reported that they had attempted quitting previously, suggesting readiness to change behavior. This is an encouraging finding that supports research indicating that although many smokers want to quit, most encounter barriers (absence of assistance, withdrawal and social effects) to do so [19]. High reliance on nicotine combined with repeated quit attempts suggests need for accessible cessation interventions. The multidimensional nature of smoking determinants in this study strengthens the notions that tobacco use is not a unidimensional construct. Overall, smoking behavior is determined jointly by social influences (93.3%), recreational motives (43.3%), behavioral dependence (30.0%) and psychological factors (23.3%). Other studies have reported similar multifactorial patterns of individual, social and environmental factors [20,21]. This study has several limitations. This is cross-sectional data and therefore, no causal inference can be made with regard to the variables. Self-report data can be influenced by recall bias and social desirability bias. Finally, the research was done in a single rural এলাকায় that may not represent the entire population. This study still provides important data related to the smoking determinants as well as the knowledge-behaviour gap among rural Bangladeshi communities, despite these limitations. The results indicate that tobacco control legislation should go beyond education campaigns and focus on behavioural interventions with peer supportive model, continuous socio-economic support tools.

## CONCLUSION

The study showed that the prevalence of smoking among rural adults in Gazipur District was high and there were significant associations between age, education, occupation, income and ever smoked. Knowledge-Behaviour Gap: While knowledge about health risks is high, the absence of a significant relationship with smoking habit confirmed it as largely complacent. Peer pressure and socio-economic vulnerability were the main drivers of tobacco use because it is a social disease. These results indicate that awareness alone cannot lead to a decline in smoking.

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