



Research Article

Determinants of Smoking Intensity among Adult Male in Bangladesh: Evidence from Multiple Linear Regression Analysis

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**Abstract**

This research illustrates which factors influence the level of smoking among adult men in Bangladesh, depending on different social and ecological perspectives. Data were collected from 738 male smoker respondents using a semi-structured questionnaire. The study areas covered: Industrial-Urban (Gazipur and Natore), Agro-Rural (Dinajpur, Patuakhali, and Sunamganj), and Eco-Fragile or Remote (Bagerhat and Bandarban). A multiple linear regression model was applied to find out the main factors related to daily tobacco consumption. The model was statistically significant ($F = 4.603$, $p < 0.001$) and accounted for nearly 10% of the variation in smoking intensity (Adjusted $R^2 = 0.096$). Among the tested variables, two stood out as significant predictors: the price per stick ($\beta = -0.20$, $p < 0.001$), suggesting that higher prices lead to reduced smoking, and the type of tobacco smoked (bidi or cigarette; $\beta = 0.18$, $p < 0.001$), which indicates greater consumption among bidi or cigarette users. Other socio-demographic and occupational characteristics did not show meaningful associations. Overall, the findings point to economic and product-related aspects as stronger drivers of smoking behavior than factors such as age or education. Therefore, policy initiatives should combine tax-based price increases with measures addressing specific tobacco types—for example, tighter regulation of low-cost bidis and cessation support for groups at higher risk. Emphasizing the intensity of smoking rather than only its prevalence may offer a more accurate understanding of nicotine dependency and help Bangladesh move closer to its goal of becoming a tobacco-free country by 2040.

Keywords

Tobacco Use, Smoking Intensity, Price Elasticity, Bidi Smoking, Tobacco Control Policy, Bangladesh.

1. Introduction

Tobacco use remains a significant health concern in Bangladesh, where both smoking and smokeless tobacco use are deeply intertwined with social habit and economic practice. Almost 36% of men in adults are smoking for more than a

decade. According to the Global Adult Tobacco Survey, nearly 36% of men in Bangladesh currently smoke (BBS & NTCC, 2019). The World Health Organization (WHO, 2023) estimated that tobacco use leads to approximately 126,000 annual deaths in the country. While the government has passed the Tobacco Control Act of 2013 with the aim to make Bangladesh "tobacco-free by 2040," progress to this end remains mixed. One important issue that has not received adequate attention is the intensity of smoking-the number of cigarettes smoked each day-which helps show how addicted smokers are and what health risks they face. A number of studies (Rahman & Tareque, 2020; Chen, et. Al., 2023; Islam, et. al., 2023; Hasan, et. al., 2024; GATS, 2017) and tobacco control efforts in Bangladesh tend to focus on the number of people who smoke. They look at quitting attempts or when folks start the habit. But hardly any dig into how much tobacco people actually smoke each day. In tobacco control program and policy, smoking intensity and amount are important issues. It points to nicotine dependence levels and potential health damage someone might face (Rahman & Tareque, 2020). Getting a handle on smoking intensity lets experts gauge disease risks better. It also helps in setting up smarter tax plans or awareness drives aimed at heavy users (Kim et al., 2022).

Tobacco habits in Bangladesh come in all sorts of forms. Smoked options like bidis, those cheap hand-rolled ones, and factory cigarettes dominate. There are smokeless types such as *jorda*, *gul*, and *sadapata* that people use too. Studies point out that poorer rural crowds stick mostly to bidis. Younger urban types with more money lean toward cigarettes (Hasan et al., 2024). This split shows how social status and money shape tobacco choices. Dual use is another rising worry. That means mixing smoked and smokeless products (Zaman et al., 2014). Research indicates users swap based on cost and what is around (Chen et al., 2023). Smoking patterns shift by region and surroundings too. Places like coastal Patuakhali, wetland Sunamganj, and Bagerhat deal with poverty and floods a lot. Industrial spots such as Gazipur and Natore pack in crowds with tobacco shops everywhere. Hilly Bandarban or northern Dinajpur bring their own ways of life and jobs. Income, schooling, and work all mix with these area factors to drive smoking behavior. Still, just a handful of Bangladesh studies tackle tobacco from this regional angle.

Around the world, research finds (Yu, et. Al., 2025; Huque, e.al., 2024; Hossain, et. Al., 2023 & Otsuku, et. Al., 2024) that smoking intensity responds to policies in ways different from overall smoking rates. The International Tobacco Control Project data shows higher taxes cut down smoker numbers. But they do not hit as hard on how much steady smokers puff away (International Tobacco Control Policy Evaluation Project, 2002). Developing nations see this too. Cheaper swaps like bidis or single sticks weaken tax impacts (Hu et al., 2010). In Bangladesh, the big price jump from bidis to cigarettes lets users jump products easily. Therefore, looking at how costs and choices tie into total tobacco intake makes sense. Research on intensity of smoking get plenty of global attention. Yet Bangladesh research barely treats smoking intensity as an ongoing measure. Most work just sorts folks into smokers or not. It skips over varying amounts smoked (Islam et al., 2023). Product lines and smoking years seldom pair up with social or area details in analysis. This study steps in with a multiple linear regression model. It checks factors shaping smoking intensity for adult male smokers in Bangladesh. Drawing from data across three ecological zones, it looks at age, marriage status, education, earnings, jobs, tobacco kinds, and stick prices. All that against daily cigarette or bidi counts.

Shifting focus to intensity over mere prevalence builds on worldwide tobacco control, pricing and behavior. The findings are expected to help relevant policymakers and respective officials toward imposing substantive taxes, targeted education programs, community-based awareness strategies and warnings. That could cut consumption and push Bangladesh toward a Tobacco-free Nation in future.

2. Methodology

2.1. Study Design

This study followed a cross-sectional quantitative survey design aimed to examine the socio-demographic and behavioral factors of smoking intensity among adult male smokers in Bangladesh. The analysis particularly intended to identify how diversities of the area typology, occupational status, education, and tobacco-use behavior influence the quantity or number of tobacco (Bidi/Cigarette) sticks consumed per day. We have employed a multiple linear regression (MLR) model to estimate the relative contributions of these factors to daily smoking intensity, controlling for income and price effects.

2.2. Study Area and Sampling

This research was conducted in three different regional typologies that represent diversified socio-economic and environmental contexts in Bangladesh which were selected purposively. They are: (1) Industrial-Urban areas (Gazipur and Natore districts) which are characterized by concentration of manufacturing activities, diversified livelihood options and

migrant labor. (2) Agro-Rural regions (Dinajpur, Patuakhali, and Sunamganj districts), reflects agro-based livelihoods, and seasonal mobility. And (3) Eco-Fragile/Remote or Remote zones (Bagerhat and Bandarban district) which are defined by environmental challenges, poor infrastructure, and limited access to market. Such typologies were identified and selected to capture the intersection among socioeconomic, demographic, environmental setting and tobacco exposure.

2.3. Sample Size Determination

The sample size was determined using the following standard formula for single-population proportion estimates (Yamane, 1967; Cochran, 1977):

$$n = \frac{Z^2 p (1 - p)}{d^2}$$

where:

n = required sample size

Z = z-score that corresponds to the desired confidence level (1.96 for 95% CI)

p = prevalence rate (0.36) (GATS 2019)¹ proportion of adult male smokers in Bangladesh)

d = acceptable error margin (0.035 i.e., 3.5%)

Using the values of the above parameters in the above formula, the calculation is:

$$n = \frac{(1.96)^2 \times 0.36 (1 - 0.36)}{(0.035)^2} \approx 728$$

We considered possible non-response and data cleaning losses roughly 1.5% and thus the final target sample was 738 respondents who are male adults and smokers. The sample size provides adequate power ($\beta = 0.80$) for multivariate regression analysis with up to 15 predictor variables.

2.4. Sample Distribution and Respondents

The sample was distributed based on approximate demographic weight. Thus, number of industrial-urban respondents were 286 (39%), Agro-Rural respondents were 170 (23%), and 282 respondents in Eco-Fragile/Remote area (38%).

All the respondents were adult male who smokes and they were recruited randomly from public places such as roadside tea stalls, bus stands, Auto rickshaw and van stands, markets, on the streets and recreational spaces where smokers regularly gather. In every spot of each district, data collectors followed a systematic random approach i.e., they used to invite every second smoker encountered to participate in the interview. Rarely, smokers were found ineligible or declining and replacement was taken accordingly. This design broadened the heterogeneity in terms of age, livelihoods, environment, and education that enabled the robust multivariate modeling.

2.5. Survey Instrument and Key Variables

The survey questionnaire was structured and open-ended and aligned with the Global Adult Tobacco Survey (GATS) conceptual framework but adapted for locally-tailored terminology and product diversity. The questionnaire covered four major domains:

- Socio-demographic: age, marital status, education, occupation, household members.
- Economic information: price of tobacco sticks, income, rural-urban classification, and regional typology.
- Characteristics of Tobacco consumption: types of smoking and smokeless tobacco products, duration, frequency.
- Contextual elements: health risks awareness level, available and exposure to tobacco advertising, cultural norms.

¹ 36% of Bangladeshi adult male are smoker (GATS 2019)

The dependent variable ‘number of sticks smoked per day’ was scale/continuous in measure. Independent variables included age, education, occupation, household size and composition, price of tobacco stick, income, rural-urban classification, and regional typology and some other factors that were suitable for multiple-regression modeling.

2.6. Data Collection and Quality Control

Data were collected through a structured and pre-coded survey questionnaire by 15 trained enumerators with close supervision of three regional supervisors between January and February 2025. Each enumerator completed a three-day training on interview techniques, research ethics, and data quality control. Android-based Kobo Collect program was used for data entry. Before collecting final data from respective fields, a rigorous field-based piloting (n=50) was conducted out of the study area to understand the competency of data collectors in terms of delivering questions and clarity to respondents, time management, and functionality of device and data entry program. Duration of each interview was 15-20 minutes. Data were stored immediately to a secure central server. Supervisors would perform back-check 5-10% of accomplished interviews in the evening. Some built-in logic checks options were there in the program for validity and GPS tagging to minimize bias and duplication.

2.7. Data Analysis

All data were analyzed using SPSS version 27. Summary of demographic information was generated using descriptive statistics. Correlation tests were performed to explore the associations among key variables followed by the multiple linear regression to identify the significant predictors of smoking intensity.

We used the following regression model:

$$Y = \beta_0 + \beta_1(\text{Price per stick}) + \beta_2(\text{Product type}) + \beta_3(\text{Education}) + \beta_4(\text{Occupation}) + \beta_5(\text{Age}) + \beta_6(\text{Marital status}) + \beta_7(\text{Duration of tobacco use}) + \epsilon$$

In this model, Y represents daily smoking, β_0 denotes the intercept, β_1 to β_7 are the estimated coefficients, and ϵ is the error term.

Normality, linearity, and multicollinearity were checked through residual plots, tolerance values, and variance inflation factors (VIF). Besides, the adjusted R^2 assessed the model fit and significance level was set at 5% i.e., $p < 0.05$. In addition to that, the partial regression plots were used to visualize the adjusted relationships between independent variables and intensity of smoking.

The model was run using the Enter method. The dependent variable which is ‘consumption of sticks per day’ was regressed on socio-demographic, occupational, regional, and behavioral predictors. Key diagnostic statistics including standardized residuals, Cook’s Distance, leverage values, and studentized residuals were examined to model assumptions assurance and potential outliers’ detection. The analyses were run using 95% confidence level.

2.8. Ethical Considerations

Ethical approval for this research was obtained from the [Pundra University of Science and Technology, Bogra, Bangladesh](#) (Reference No. PUST/ERC/2024/12/16). Written informed consent was obtained from each participant before conducting the interview. Data collectors declared the details of study purpose, voluntary participation, confidentiality of information, and their choice to refuse answering any particular question or withdraw the interview session at any stage. No personal identifying information was collected in this research.

3. Results

3.1. Descriptive Overview

Descriptive analysis indicates that among the total 738 (male smokers) respondents of this study, number of industrial-urban respondents were 286 (39%), Agro-Rural respondents were 170 (23%) and 282 respondents in Eco-Fragile/Remote area (38%). The average age of study respondents was 38.6 years (SD = 11.2) and the mean duration of tobacco consumption was found 16.4 years (SD = 8.7). Most of the respondents (62%) were married and less than/nearly half (48%) had completed primary education or below.

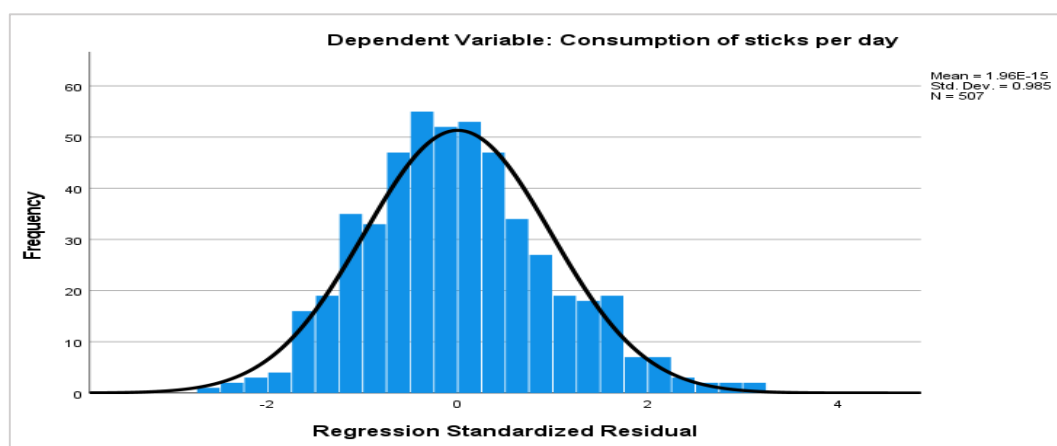
A substantive portion of respondents (36%) was found working in the informal sectors such as day-labor jobs. Besides, 27% respondents were in agriculture, 22% in formal job sectors and the rest (15%) were self-employed or unemployed. Bidi was found the most common smoking form of tobacco (56%), followed by manufactured cigarettes (44%). Among the 738 smokers, on an average, every smoker consumes 13.7 sticks per day ($SD = 6.1$), though bidi smokers reported higher daily use than cigarette smokers.

3.2. Multiple Linear Regression

The multiple-linear-regression model looked into the socio-demographic, occupational, economic, and tobacco consumption factors regarding intensity of smoking among current smokers living in the study areas. The outcome variable, 'consumption of sticks per day', was measured by the self-reported number of *bidi* or cigarette sticks smoked per day by the respondents. On the other hand, fifteen predictors were included in the model using the Enter method.

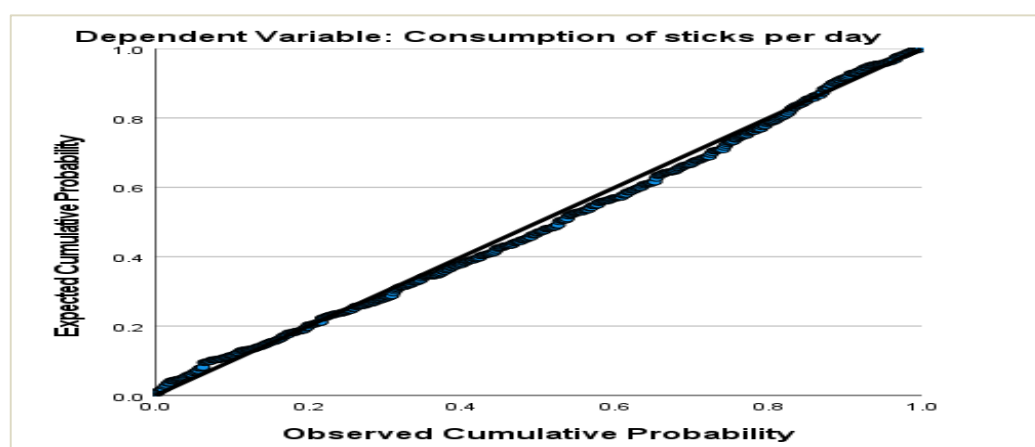
The following histogram (Figure 1.) of standardized residuals for the regression model predicting 'consumption of sticks per day' is looking roughly bell-shaped and centered around zero (mean ~ 0.00 , $SD \sim 0.985$). This denotes minimal skewness and negligible outliers—suggesting that the model meets the normality and fit assumptions well.

Figure 1: Histogram of Standardized Residuals



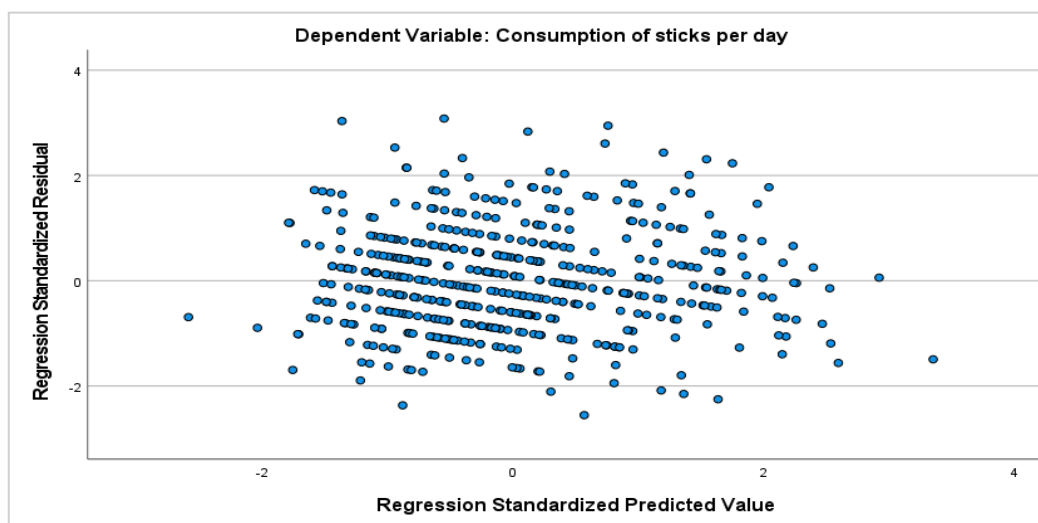
The Normal P-P Plot (Figure 2.) of standardized residuals for the multiple linear regression model predicting 'consumption of sticks per day' shows points perfectly aligned with the diagonal line—indicating the residuals follow the approximately normal distribution with only minor end deviations. Therefore, the plot confirms that the regression model fits the data appropriately as well as satisfies the assumption of normality and reliability as there are no major deviations or curvature.

Figure 2: Normal P-P Plot of Regression Standardized Residual



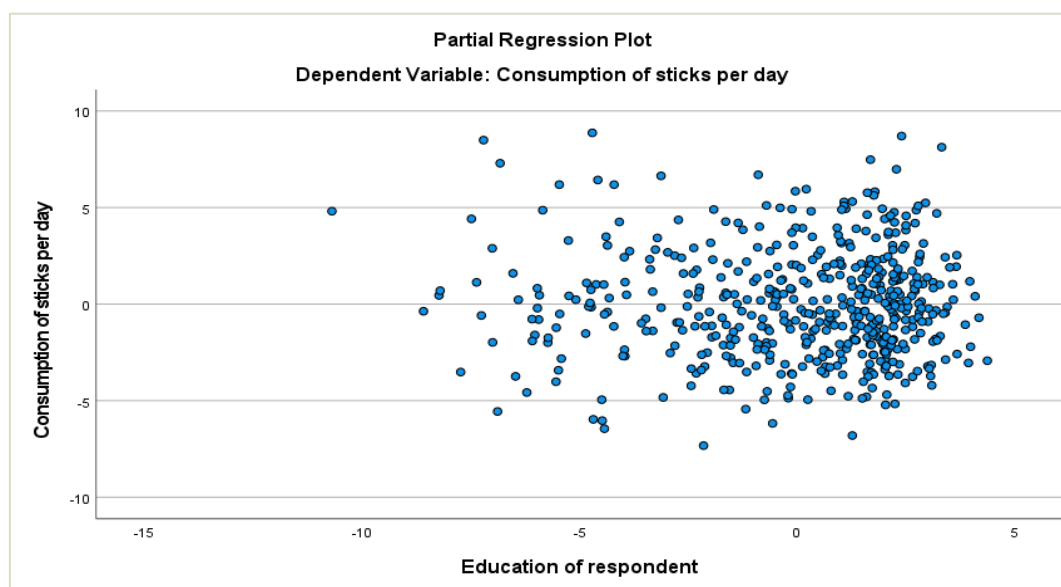
The scatterplot of standardized residuals (Figure 3.) versus predicted values shows a random, evenly spread cloud of points without any pattern or funnel shape. Therefore, such scatterplot confirms that the linearity and homoscedasticity assumptions are satisfied along with no major outliers which also indicating that this regression model can provide unbiased and consistent predictions using the data.

Figure 3: Scatterplot of Standardized Residuals vs Predicted Values

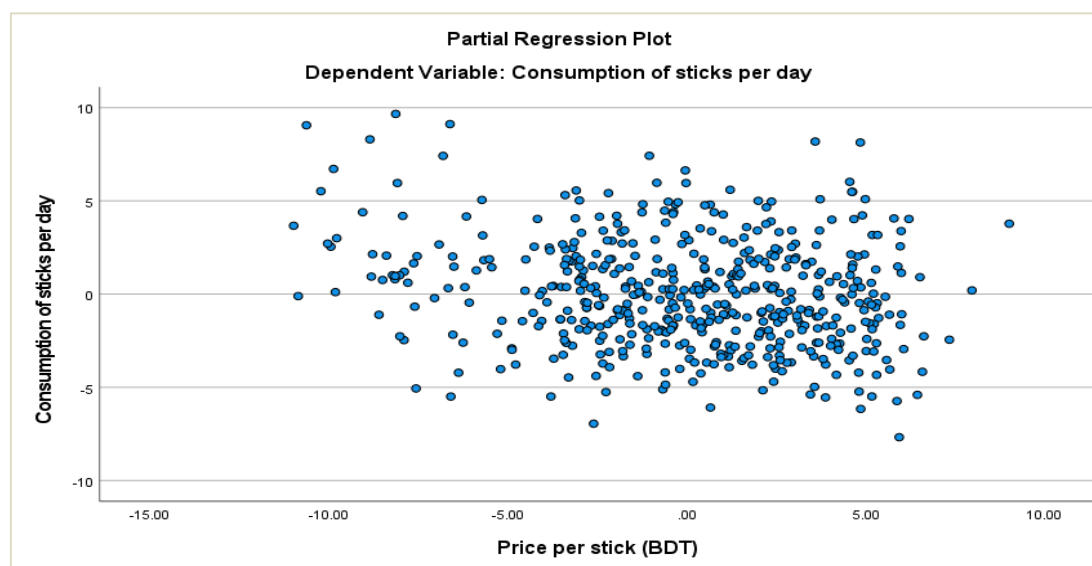


The partial regression plot (Figure 4.) reveals a slight negative relationship between education level of respondents and consumption of sticks (*Bidi*/Cigarettes) per day, after adjusting for other independent variables/predictors. Therefore, this plot indicates that if education increases, cigarette consumption tends to decrease moderately among the population. This suggests that higher education helps in reducing tobacco consumption among people, though its independent effect remains relatively modest amidst other influencing factors.

Figure 4: Partial Regression Plot for Education Level



Through the following Figure 5: the partial regression plot shows a slight negative relationship between price per stick and daily cigarette consumption after controlling for other predictors. When prices increase, consumption of tobacco modestly declines, and this finding confirming price sensitivity. However, the effect is weak, suggesting that there are other socioeconomic and behavioral factors which also influence smoking intensity among the respondents/smokers.

Figure 5: Partial Regression Plot for Price Per Stick

Model Summary

As shown in the following Tables 1. and 2., the overall model was statistically significant with $F(15, 491) = 4.603$, $p < .001$, with $R = .351$ and $R^2 = .123$ (Adjusted $R^2 = .096$). This indicates that about 9.6 % of the variance in daily sticks (*Bidi*/Cigarettes) consumed was explained jointly by the predictors. On the other hand, the Durbin–Watson value (2.097) indicates that residuals were independent that means that the value is meeting the assumption of uncorrelated errors. The model explains approximately 9.6 % of the variance in daily sticks smoked by the smokers/respondents. The findings indicate that behavioral intensity in tobacco use is shaped by complex psychological and social drivers, many of which fall outside the measurable economic and demographic factors captured by this empirical data.

Key Predictors

According to Table 3. below, Price per Stick ($B = -0.148$, $\beta = -0.200$, $t = -4.47$, $p < .001$) shows a negative relationship, meaning that as the price of a stick increases, people smoke fewer sticks per day. Quantitatively, on an average, a 1-BDT increase in price is associated with about 0.15 fewer sticks smoked per day, when other factors remain constant. However, *Bidi*/Cigarette use ($B = 3.895$, $\beta = 0.178$, $t = 3.99$, $p < .001$) shows a positive relationship: meaning that tobacco users of manufactured *bidi* or cigarette products smoke significantly more sticks per day than those using other tobacco forms such as smokeless tobacco. Other predictors/factors such as place of residence, type of area (agro-rural or industrial), age, education, marital status, number of children, occupation, duration of tobacco use, and smokeless tobacco use—were found statistically insignificant ($p > .05$). This finding suggests that those predictors/factors had little or no effect on daily stick (*Bidi*/Cigarettes) consumption when price and product type were taken into consideration.

In summary, only two variables: price per stick and product type (*bidi*/cigarette use) showed significant effects on daily tobacco consumption ($p < .05$).

Table 1: Model Summary for Multiple Linear Regression

Model	R	R ²	Adjusted R ²	Std. Error of Estimate	Durbin–Watson
1	.351	.123	.096	2.872	2.097

Table 2: ANOVA Summary

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	569.624	15	37.975	4.603	.000
Residual	4050.814	491	8.250		
Total	4620.438	506			

Overall model significant at $p < .001$.

Table 3: Coefficients for Predictors of Daily Sticks

Predictor	B	SE	β	t	Sig.	95% CI
(Constant)	10.237	1.740		5.884	.000	(6.82, 13.66)
Urban Area	-0.378	0.273	-0.059	-1.383	.167	(-0.92, 0.16)
Agro-Rural	0.236	0.347	0.033	0.680	.497	(-0.45, 0.92)
Industrial—Urban	0.271	0.298	0.044	0.910	.363	(-0.31, 0.86)
Age	0.045	0.078	0.143	0.574	.566	(-0.11, 0.20)
Education	-0.004	0.046	-0.005	-0.091	.927	(-0.10, 0.09)
Household education	-0.086	0.060	-0.077	-1.430	.153	(-0.21, 0.03)
Never married	-0.612	0.388	-0.080	-1.577	.115	(-1.37, 0.15)
Children yes vs no	-0.042	0.321	-0.007	-0.131	.896	(-0.67, 0.59)
Formal Occupation	-0.426	0.379	-0.053	-1.123	.262	(-1.17, 0.32)
Farmer & Day Laborer	0.164	0.313	0.026	0.522	.602	(-0.45, 0.78)
Unemployed or students	-0.142	0.410	-0.016	-0.345	.730	(-0.95, 0.66)
Duration of smoking (Years)	-0.037	0.076	-0.121	-0.488	.626	(-0.19, 0.11)
Price per Stick (BDT)	-0.148	0.033	-0.200	-4.470	.000***	(-0.21, -0.08)
Use of smoking tobacco (Bidi/Cig)	3.895	0.977	0.178	3.989	.000***	(1.98, 5.81)
Use of smokeless tobacco (Jorda)	-0.976	0.738	-0.057	-1.323	.187	(-2.43, 0.47)

Significant predictors ($p < .05$): Price/Stick and Use of smoking tobacco (Bidi/Cig).

Note. B = unstandardized coefficient; SE = standard error; β = standardized coefficient; CI = confidence interval, p values based on two-tailed tests. *** $p < .001$; ** $p < .01$; $p < .05$.

Model Diagnostics

The histogram and P-P plot of standardized residuals (Figure 2.) showed approximate normality, while the residual-versus-predicted scatterplot (Figure 3.) exhibited a random cloud of points, confirming homoscedasticity and linearity. No influential outliers were detected: Cook's D ranged 0.000–0.027 ($M = 0.002$), far below the 1.0 threshold, and centered leverage values averaged 0.03. Standardized residuals fell between -2.55 and 3.08 (mean ~ 0), within acceptable bounds.

Table 4: Residual Statistics

Statistic	Min	Max	Mean	SD	N
Predicted Value	6.98	13.29	9.73	1.06	507
Residual	-7.33	8.85	0.00	2.83	507
Std. Residual	-2.55	3.08	0.00	0.99	507
Cook's Distance	0.000	0.027	0.002	0.003	507

The regression results show that economic and product-related factors mainly determine how much people smoke rather than social or demographic background. Higher cigarette prices are linked to lower daily consumption, while a preference for manufactured bidis or cigarettes is linked to higher consumption compared to other forms of tobacco products.

Therefore, we can conclude that this model explaining a low to medium amount of variation which is typically linked with behavioral studies since some influences such as personal or cultural factors could be measured in this research. In summary, by overall diagnostic tests we can confirm that the model's assumptions were met and therefore the results are reliable and valid for interpretation and prediction.

4. Discussions

Price per stick and types of tobacco product are the two significant determinants of smoking intensity among Bangladeshi men as per identified through the analysis. This result is supported by classical economic theory—higher price determines tobacco consumption. Quantitatively, the negative coefficient $\beta = -0.20$ means that higher prices reduce daily tobacco consumption. However, the relatively small effect size indicates that there are many other habitual forces that drive smokers continue to buy even when prices of tobacco products rise. [Nargis et al. \(2021\)](#) also confirms that heavy smokers in Bangladesh react less to increases in price compared to occasional users, implying relatively inelastic demand among long-term smokers.

In addition to higher price of tobacco, type of tobacco product was identified as another central factor which have positive association with smoking intensity. *Bidis* are cheaper and many of them are hand-rolled locally made and available which allows smokers to intake more frequently along with higher concentrations of nicotine ([Rahman et al., 2000](#)). In contrast, manufactured cigarettes, although costlier and often linked with higher social status, are typically consumed in lower amounts. Since a significant proportion of the respondents in this study were bidi users, the positive coefficient reflects their higher daily consumption levels. Evidence from existing studies conducted by [Hasan et al. \(2024\)](#) and [Islam et al. \(2023\)](#) show that even after factoring in socioeconomic elements such as income and education, *bidi* users smoke more frequently.

In this study, most of the socio-demographic factors such as age, respondent education, education level of the household other members, occupation, do not have significant independent effects when product type and price are considered into account. This finding also suggests that the economic and behavioral factors outweigh demographic influences in shaping tobacco-use patterns. This is consonant with similar findings by [Mondol et al. \(2020\)](#), indicating that although education influences the decision to start or quit smoking, among established smokers, it has minimal influence on smoking intensity. Similarly, minimal variability has been identified in age and duration of use. These results are supported by ITC-Bangladesh findings on smoking frequency, which tend to stabilize with time ([Shimul et al., 2024](#)).

Although this study identifies the price and product type as the leading determinants of smoking intensity, future analyses can go beyond this by investigating interactions between these factors. For example, the impact of price might differ between bidi and cigarette smokers. Occupation and education may also combine with the aspect of affordability in influencing consumption patterns. Such an interaction would give a better insight into which groups would be most responsive to changes in prices and help in the formulation of equitable and efficient tobacco-control policies.

Price sensitivity is a complex issue. A recent study conducted in Bangladesh ([Shimu et al., 2023](#)) mentioned that though higher taxes reduce the number of tobacco smokers, they have very little effect on how many sticks people smoke each day. Similar trend also appears in our research findings that suggesting that imposing taxes alone has very limited impact on changing strong smoking habits. This calls for narrowing the price gap between *bidis* and cigarettes, but substantial reductions in consumption intensity will probably require a combination of fiscal and behavioral interventions ([World Bank, 2023](#)).

Moreover, the results emphasize product-specific approaches. Since Bidi smoking is still more prevalent among the poor and rural populations in Bangladesh, targeted strategies such as strong pictorial warning enforcement, banning the sale of single sticks tobacco products, and promoting community-based cessation programs would likely function better than merely relying on imposing tax ([Aishi et al., 2025](#)). Evidence from pilot projects by BRAC and icddr,b ([Jubayer et al., 2018](#)) suggests that combining taxation awareness with counseling by community health workers can increase quit attempts without adding financial burdens. With an adjusted R^2 of 0.096, the moderate explanatory power of the model suggests that psychological and social influences such as stress, peer norms, and cultural acceptance are also important factors that the study did not capture.

Future research could adopt combination of quantitative modeling with qualitative methods such as focus group, in-depth and key informant interviews to understand the social meaning of smoking and the barriers to quitting tobacco. Longitudinal studies could further investigate how changes in economic shocks, policy reforms, or awareness campaigns influence consumption behaviors over time. These results, therefore, confirm that smoking intensity in Bangladesh is highly influenced by both economic incentives and behavioral factors. The price of cigarettes increases, daily consumption decreases, and higher Bidi preference leads to increased intensity. After controlling these factors, demographic variables become less relevant. To move closer to the goal of a Tobacco-Free Bangladesh by 2040, policymakers should incorporate tax reforms with social programs targeted at communities and stricter controls on the production and sales of Bidis. Whether people smoke, is not enough to tracking smoking intensity, rather there should be a picture of progress and helps to develop and implement a stronger, data-driven tobacco control policies.

5. Conclusions

This study demonstrates that smoking intensity among adult men in Bangladesh is shaped more by economic and product factors than by demographics. Higher price increase led to less daily smoking, however Bidi smoker specially those are hand-rolled and locally made—tend to smoke more. After accounting for tobacco price and type, factors such as age, education, and occupation have little influence. This shows that affordability and product preference are the main influences on smoking habits. To ensure tobacco-free Bangladesh by 2040, policies need to focus on both tobacco prices and product availability. Raising and standardizing excise taxes can definitely make smoking less affordable but these measures should be backed by Bidi sales restrictions as well as effective and culturally adaptive behavior-change programs. Tracking smoking intensity—not just the number of smokers, rather it provides a clearer picture and better sense of real progress. It shows how dependent people are on nicotine and whether they are truly cutting back or switching higher priced tobacco products to cheaper products. Inclusion of these measures in national health monitoring can strengthen policy planning and accountability in light of WHO's MPOWER goals. Cutting down the daily number of Bidi or cigarette smoked is both an economic as well as a public health priority. By linking tax, regulation, and behavioral programs, Bangladesh can turn economic pressure into real reductions in tobacco use, improving public health and moving closer to a smoke-free nation.

5.1. Policy Implications

The results clearly show that tobacco control in Bangladesh requires a well-balanced approach that integrates taxation, regulation, and behavioral initiatives rather than depending solely on fiscal measures. While higher tobacco prices do help curb daily smoking, their overall impact remains modest, as many smokers adapt by turning to cheaper options such as Bidi.

To develop a more effective pricing policy, the government should apply a uniform tax rate on all types of tobacco products as well as adjust excise duties with inflation in order to keep a stable real price. It is also necessary to reduce the price gap between cigarettes and Bidi to discourage and prevent low-income smokers from switching to cheaper and less expensive alternatives and help reducing overall tobacco use.

At the same time, interventions targeting vulnerable groups are essential. Since bidi smoking is concentrated among poorer and rural populations, stronger oversight of production, packaging, and retail sales is crucial. Enforcing large pictorial warnings, banning single-stick sales, and regulating informal markets could meaningfully limit access in these areas.

However, taxation and regulation will be most effective when combined with community-based awareness and cessation programs. Educational campaigns, school-based initiatives, and affordable cessation services can help change social attitudes toward smoking. Evidence from BRAC and icddr pilot projects (Jubayer et al., 2018) shows that combining tax messages with personal counseling substantially increases quit attempts. When tax information is paired with personalized counseling, quit attempts rise significantly. All together, these financial, policy/regulatory and behavioral approaches can make tobacco smoking progressively less affordable, less available, less accessible, and less socially accepted—conditions that have been shown in reducing tobacco use in communities.

5.2. Future Research

Although this study used a strong, careful sampling and solid analytical methods, several limitations should be noted. First, because the data are cross-sectional, the findings show merely associations or relationships, not cause and effect. Therefore, longitudinal data should be used in future studies to track how smokers change their behavior in course of time. Second, smoking intensity was self-reported—potentially include recall errors such as over or underreporting. Future research could utilize biochemical tests for example: cotinine for accurate measurement. Third, the model explains only about 10 percent of the variation in daily smoking, suggesting that other unmeasured factors like stress, peer pressure, or social norms—also matter. Behavioral models such as Health Belief Model or the Theory of Planned Behavior could help capture these effects more accurately. Fourth, the study did not directly assess tobacco availability, exposure to advertising, knowledge and implementation status of law enforcement. Therefore, future research could integrate field observations with survey could clarify how these community determinants affect smoking behavior of smokers. In addition to the above, future research should also examine variations between two sub-groups—for example: how Bidi and cigarette users respond in changing price.

In summary, this study offers solid evidence for understanding smoking intensity in different regions in Bangladesh. Future work that links economic, psychological, and policy dimensions will be essential to designing comprehensive interventions and monitoring progress toward a Tobacco-Free Bangladesh by 2040.

Declarations

Author(s) Contributions

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Conflict of Interest

There is no conflict of interest.

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