Tobacco Consumption in Bangladesh: An Analysis on Multiple Variables

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Abstract:- The World Health Organization [1] has estimated that more than eight million people died worldwide every year from tobacco consumption. Most importantly, fifty percent of users died due to tobacco-borne diseases and eighty percent of total users are from lower-income countries. As part of fiscal policy, tax, as well as price increasing method, is considered the most effective way to reduce cigarette consumption in any nation. The Government of Bangladesh has tried to reduce tobacco consumption without hampering revenue collection from tobacco tax. Consequently, the strategic decision had been taken to balance between those two factions over the years. In this paper, all the data had been collected from secondary sources. A regression analysis had been conducted in the research to find out the relation between tobacco consumption with tobacco tax and education rate. It had been found that a higher tax rate and increased education rate had a negative impact on tobacco consumption tendency in the context of Bangladesh.

Keywords:- Tobacco Consumption; Tobacco Tax in Bangladesh; Education Rate; Tobacco Items; Health Hazards.

I. INTRODUCTION

The tobacco industry in Bangladesh has passed its glorious period since 1971 when the production of tobacco has increased gradually. Between the years 1971 and 2010, the total production of cigarettes has increased by 2.2 times while per capita availability of cigarettes has increased by 25 percent. The share of GDP value of tobacco manufacturing compared to other sectors has increased from 5.44 percent in 1997 to 6.39 percent in 2010. Trends of the last three decades show that the share of gross value added by tobacco manufacturing has increased by 30 percent [2].

Bangladesh has been ranked as one of the top countries around the world in terms of inflation rate which ranges between 7 to 9 percent. But compared to tobacco with our necessity goods, tobacco is more expensive than many other necessity goods. Even cheap cigarette is expensive when compared to the many basic food items. The reality is that the price of a Gold leaf (most popular and well-branded) cigarette is higher than the price of an egg. A pack of the Gold leaf is quite good enough that would be paid for two dozen eggs, for three dozen small bananas, or for a liter of soybean oil (an essential item for cooking).

Smoking cigarettes and bidis are really very common habits of all aged populations in Bangladesh. Not only that, a few hewing tobaccos like Zarda with betel quid or Gul are also commonly sold in Bangladeshi local markets, both in rural and urban areas [3][4][5]. The World Health Organization analyzed the cost of tobacco consumption at the national level and found it to be associated with increased healthcare costs, loss of productivity due to illnesses and early deaths, and environmental pollution [6].

The cheap and availability of tobacco products at any place are the main cause of a huge number of consumers in Bangladesh. Nonetheless, the lack of strong tobacco control regulations and weak enforcement of the existing regulations made the situation worse. The Global Adult Tobacco Survey conducted by WHO had reported that Bangladesh is one of the top ten countries in the world with high tobacco use (both smoking and smokeless forms) with a prevalence of 43.3 percent among adults where 1.5 percent of women engaged in smoking [7].

Tobacco is not only a harmful consumption item for human health but also a financial burden for a nation. A lot of people die from tobacco-related illnesses every year around the globe [8]. Both smoking tobacco (popular at a young age) and smokeless tobacco (popular in middle age) create various serious types of health hazards and environmental pollution.

The government of Bangladesh has imposed a high level of taxes on tobacco products with an aim to reduce the consumption tendency. As the education rate is increasing, the habit of tobacco consumption would be reduced. An educated person bewares of the bad impact of tobacco use on health which may lead to a negative impression of tobacco consumption. However, this paper has attempted to analyze the relationship between tobacco consumption rate with education rate and tax rate.

II. LITERATURE REVIEW

[9] It had been observed that a decline in bidi (low-grade cigarette) consumption can potentially contribute to the growth in cigarette consumption through migration bidi to cigarette smoking habits by the new smokers. A sizable number of smokers use both cigarettes and bidi which has led to exclusive cigarette smokers numbers. Based on this research, it had been revealed that the number of exclusive cigarette smokers increased by 2.7 million between 2009 and 2017 [10].

The researchers had discovered that tax earnings from cigarettes is high but achievement in the healthcare sector is negligible that might be gained from reduction in cigarette consumption in Bangladesh. The research had observed the change in overall tax structure and changes in cigarette taxes and prices. It studied the consumption of different tobacco products between the years 2009 and 2017 after examining both the demand and supply-side factors in the cigarette market in Bangladesh.

Tax structure in Bangladesh had been studied [11] and found multi-tiered complex excise. The research had found that the complexity of the cigarette market is different and the widening price differential among brands is mainly responsible for this. Demand for cigarettes has been increasing in the last few years due to this market structure with respect to price, quality, and branding.

British American Tobacco recognized the role of volume growth in spurring higher portability, alongside the contributions of the better brand mix, price increases by government order, cost savings, and productivity growth. British American Tobacco from cigarette sales 121% higher compared between 2009 and 2016, from 3.84 to 8.47 billion BDT in between 2009 and 2018 prices [12]. Research had been associated and from there it had been suggested that an increase in the affaffordability of cigarettes relative to bidis has driven this migration of bidi smokers to cigarettes [13].

Tobacco is one of the leading causes of disability and death around the globe. Over a million pounds of toxic chemicals are released by tobacco products. [14] It had been studied to explore the effects of tobacco toxicants on human health and environmental pollution. The study had assessed the knowledge about toxicant content in tobacco and the health and environmental hazards of tobacco use.

A few researches have been found on the tobacco industry that discussed consumption rate with its related other factors. Mostly are about the consumer categories, user preference, market share, probability of the firms, brand available in the market, etc. This paper has found this gap and conducted a regression analysis of tobacco consumption rate with education rate and tobacco tax rate settled by the government.

III. METHODOLOGY

A. Data Source
The researchers used secondary data related to this study and data for the fiscal year 2007-08 to 2019-2020.

B. Data Analysis Techniques
The secondary data has been analyzed in SPSS 16.00 version and descriptive statistics and multiple linear regression was used to analyze the effect of the variables.

C. Dependent variable
Smoking rate (15+) was used as dependent variable for this study.

D. Independent Variable
Education rate and tax on tobacco were used as independent variables.

E. Multiple Linear Regression
The multiple linear regression model is applied to determine the relationship between a dependent variable and one or more independent variables. The general form of the regression model is

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \ldots + \beta_k x_k + \varepsilon \quad (1)$$

Where y the dependent is variable, β_0 is the intercept, x_1 to x_k are the independent variables, β_1 to β_k is the change in y for each one increment change in the independent variables, and ε is the disturbances. Therefore, the ordinary least square fitted model from (1) is given by

$$\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x_1 + \hat{\beta}_2 x_2$$

$\hat{y}$ is the predicted value of the dependent variable y, $\hat{\beta}_0$ is the intercept, x_1 to x_2 are the independent variables, $\hat{\beta}_1 \, to \, \hat{\beta}_2$ is the estimated value of β_1 to β_2.

Since the variables are measured in different units, so we used standardized partial regression coefficients which is measured by

$$\hat{\beta}_k = \frac{s_k}{s_y}$$

Where, s_k is the standard deviation of the k'th independent variable and s_y is the standard deviation of the dependent variable.

IV. RESULTS AND DISCUSSION

There are numerous macroeconomic variables that affect Smoking rate. Here, we used some selected variables which are given in table 1. Where it is observed that with the passes of the year smoking rate is declining, on the contrary, tax rate on tobacco increasing and education rate is increasing day by day.

A. Graphical Analysis
Figure 1 clearly demonstrate that throughout the considered period smoking rate curve has been declining, on the other hand, tax rate curve and education rate curve are in upward move, implying that there exists a negative relation between dependent and independent variables.

Year	Smoking Rate (15+)	Tax Rate on Tobacco	Education Rate
2007-08	45.50	49.00	46.66
2008-09	45.00*	49.00	49.00*
2009-10	44.00*	49.00	52.00*
2010-11	43.50	50.00	56.00*
2011-12	43.00*	52.25	58.77
2012-13	42.30	53.75	57.86
2013-14	41.70*	53.75	61.02
2014-15	41.10	56.25	61.09
2015-16	40.60*	58.75	65.14
2016-17	40.10	60.00	72.76
2017-18	39.60*	61.25	72.89
2018-19	39.10	62.50	73.91
2019-20	38.00*	62.50	74.68

Table 1: Smoking Rate (15+), tax rate on tobacco and education rate in Bangladesh from 2007-08 to 2019-20
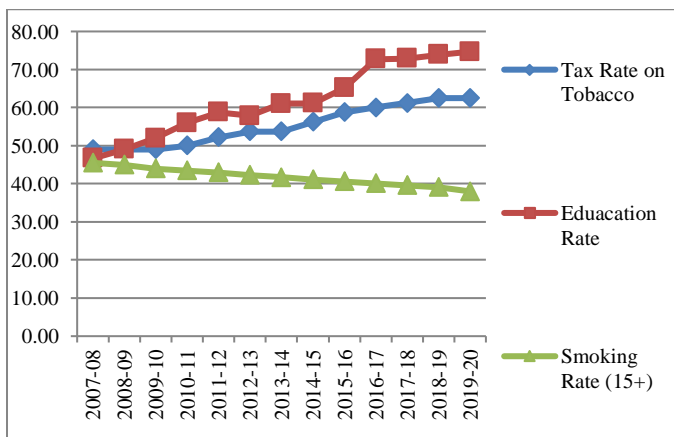Source: [15] & [16]   * used simple forecasting method

Fig 1: Scatter plot of smoking Rate (15+), tax rate on tobacco and education rate in Bangladesh from 2007-08 to 2019-20
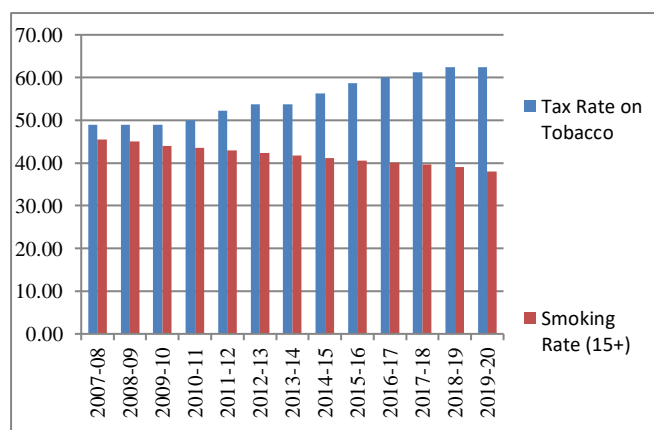*Source: Authors calculation from collected data*

Fig 2: Scatter plot of smoking Rate (15+) and tax rate on tobacco in Bangladesh from 2007-08 to 2019-20
Source: Authors calculation from collected data

In figure 2, it is observed that day by day tax rate is increasing and smoking rate in decreasing.
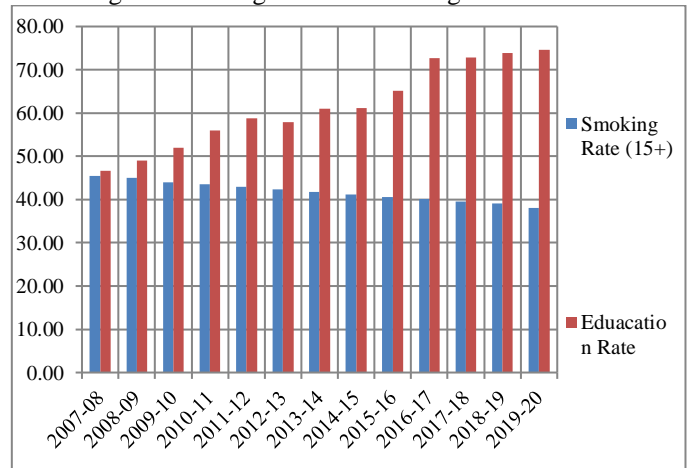

Fig 3: Scatter plot of smoking Rate (15+) and education rate in Bangladesh from 2007-08 to 2019-20
Source: Authors calculation from collected data

Figure 3 indicates that smoking rate gradually decreased with increasing education rate.

C. Correlation Analysis

Factors	Pearson r
Tax rate on tobacco	-0.973
Education rate	-0.975

Table 2: Correlation of tax rate on tobacco and education rate with smoking Rate (15+)
Source: Authors calculation from collected data

Table 2 reveals that both tax rate on tobacco and education rate are very close to perfect negatively correlated with the dependent variable smoking rate. That is, with the increasing of the tax rate on tobacco and education rate smoking rate decreases.

D. Multiple Linear Regression Model For Smoking Rate

Sources of Variation	DF	SS	MS	F value	P value
Regression	2	62.365	31.183	130.794	.000
Residual	10	2.384	.238		
Total	12	64.749			

Table 3: Testing overall significance of the regression model
Source: Authors calculation from collected data

Table 3 explains that tax rate on tobacco and education rate are jointly significant with smoking rate at 5% level of significance.

Sources of Variation	Coefficients	Std. Error	t value	P value	95% CI	
					Lower	Upper
Intercept	60.732	2.635	23.049	.000	54.861	66.603
Education Rate	-.130	.060	-2.150	.057	-.265	.005
Tax rate on tobacco	-.198	.110	-1.792	.103	-.443	.048

Table 4: Testing individual significance of the regression model

$R = 0.981, R^2 = 0.963$ and $R^2_{adj} = 0.956$

Source: Authors calculation from collected data

From the table 4, the estimated model for Smoking Rate is,

$$\widehat{Smoking}\ Rate = 60.732 - .130 Education\ Rate - 0.198 Tax\ Rate\ on\ Tobacco$$

Education rate is negatively associated with Smoking rate and the coefficient -.130 indicates that one standard deviation increase in education rate would lead to .130 standard deviation decrease in smoking rate.

Tax rate on tobacco is also negatively associated with Smoking rate and the coefficient -0.198 indicates that one standard deviation (increase) change in tax rate on tobacco would lead to 0.198 standard deviation decrease in Smoking rate.

All the independent variables (Education rate and tax rate on tobacco) are statistically significant at 5% level of significance. That means, Education rate and tax rate on tobacco jointly influence on smoking rate but individually they are not significant at 5% level of significance.

Adjusted R-square value 0.956 indicates that 95.6%% of the total variation of smoking rate is explained by the education rate and tax rate on tobacco, i.e., this model is very good enough in predicting the dependent variable smoking rate.

Conclusively, both the independent variables (tax rate on tobacco and education rate) show joint negative effect on the dependent variable (smoking rate), that means with increasing tax rate on tobacco and education rate, the smoking rate is decreasing. But individually single variable (none of those two variables) is not being significant enough to influence on smoking rate. Therefore, from the study it may be concluded that to minimize the smoking rate, both tax rate on tobacco and education rate are to be increased day by day up to the optimal level.

V. CONCLUSION

Tobacco consumption is highly dependent on the tax rate and education. The research has found that a tax on tobacco may control the market. The government is responsible to introduce laws and regulations and for taking measures to enforce the laws regarding any harmful issues. In the context of Bangladesh, the government wants to control the use of tobacco but without hampering one of the largest sources of revenue from this sector. Rules have been established for two decades to reduce smoking in public places, especially on public vehicles. However, still, there is an option to increase the tax rate on tobacco products, for both importation and purchase. As education builds the nation by creating awareness. It is also found that a higher education rate has led to having a reduction in tobacco consumption in the context of the Bangladeshi tobacco market. Threfore, we should be more tactful in setting policy to increase education rate as well as Cigarette tax rates should have been set at an optimal level to help limit tobacco consumption.

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