



H N P D I S C U S S I O N P A P E R

Economics of Tobacco Control Paper No. 16

# Appetite for Nicotine

## An Economic Analysis of Tobacco Control in Bangladesh

Zulfiqar Ali, Atiur Rahman and Taifur Rahman

November 2003

Tobacco Free Initiative  
World Health Organization





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*An Economic Analysis of Tobacco Control in Bangladesh*

**Zulfiqar Ali, Atiur Rahman and Taifur Rahman**

**NOVEMBER 2003**

## Health, Nutrition and Population (HNP) Discussion Paper

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## Health, Nutrition and Population (HNP) Discussion Paper

### ECONOMICS OF TOBACCO CONTROL PAPER NO. 16

#### APPETITE FOR NICOTINE AN ECONOMIC ANALYSIS OF TOBACCO CONTROL IN BANGLADESH

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Paper prepared for the World Health Organization Regional Office for South-East Asia. Presented at a meeting on the Economics of Tobacco Control in the South-East Asia Region, in Jakarta, Indonesia, December 3-4, 2003

**Abstract:** The study estimates the economic issues related to tobacco. Cigarette and bidi production in Bangladesh have been increasing since 1980. Imports and exports have fluctuated, but there is a persistent negative trade balance in tobacco and tobacco products. Recent prevalence trends are not clear, but remain over 40% among men. National statistics put smoking among women at 4-5%, but tobacco chewing is common among women, and undocumented. Prevalence is much higher for men with lower incomes and education. Policies to reduce tobacco use are summarized, they have been relatively weak, but would be greatly enhanced if proposed legislation is enacted. Money spent on tobacco products by poor people could do much to reduce malnutrition if it were spent on food instead. Real prices of cigarettes have fallen, and incomes have risen, stimulating consumption. Real price increases would help reduce demand, by 3% for every 10 real price increase. Taxes are relatively low (even for the highest priced, most taxed brands, only 55% of the retail price, plus a 15% value-added tax). Higher taxes would increase total revenues, already 7% of total government revenues. Inadequate data exist to estimate the health care costs attributable to tobacco use in Bangladesh.

**Keywords:** Bangladesh, tobacco, tobacco revenue, tobacco tax, tobacco industry, cigarette, price, price elasticity, health cost, tobacco control policy.

**Disclaimer:** The findings, interpretations and conclusions expressed in this paper are entirely those of the authors, and do not represent the views of the World Bank or the World Health Organization, their executive directors, or the countries they represent.

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## **NOTE FROM REGIONAL DIRECTOR, OFFICE FOR SOUTH-EAST ASIA, WORLD HEALTH ORGANIZATION**

The trend in tobacco consumption in many developing countries is worrying. This is not only because of the millions of deaths and related suffering that it involves, but also due to its negative impact on economic development. Experiences from many countries have shown that cost effective tobacco control measures can be taken that could bring net economic gains for the country. Proven, cost-effective measures include: public education and information; a ban on tobacco advertising; tobacco smuggling deterrence and increased tobacco taxes. All these measures can be incorporated in national anti-tobacco legislation. Studies and research from countries around the world have revealed that an increase in tax on tobacco products is perhaps the most effective tool for tobacco control, and is especially effective in reducing tobacco use among young people and people with low incomes. Higher tobacco taxes can help a country in a number of ways – by generating additional revenue, reducing tobacco use leading to less tobacco-related morbidity and mortality and reduced expenditure on treatment of tobacco-related diseases.

Effective collaboration between health and finance ministries is essential to address appropriately the economic and fiscal aspects of tobacco control. Such collaboration could ensure improved health for millions of people by protecting them and their families from the harmful effects of tobacco use.

I am confident that the findings of the study initiated by World Health Organization and World Bank will encourage the policy makers, in particular, in the health and finance ministries, to take appropriate and coordinated action for tobacco control.

Dr Uton Muchtar Rafei  
Regional Director  
World Health Organization  
Regional Office for South-East Asia

10 October, 2003



## FOREWORD

In 1999, the World Bank published *Curbing the epidemic: governments and the economics of tobacco control*, which summarizes the trends in global tobacco use and the resulting immense and growing burden of disease and premature death. By 1999, there were already 4 million deaths from tobacco each year. This number is projected to grow to 10 million per year by 2030, given present trends in tobacco consumption. Already about half of these deaths are in high-income countries, but recent and continued increases in tobacco use in the developing world is causing the tobacco-related burden to shift increasingly to low- and middle-income countries. By 2030, seven of every ten tobacco-attributable deaths will be in developing countries. *Curbing the epidemic* also summarizes the evidence on the policies and interventions that have proved to be effective and cost-effective in reducing tobacco use in countries around the world.

Raising taxes to increase the price of tobacco products is the most effective way to reduce tobacco use and the single most cost-effective intervention. It is also the most effective way to persuade young people to quit or not take up smoking. This is because young people, like others with low incomes, tend to be highly sensitive to price increases.

Why are these proven cost-effective tobacco control measures not adopted or implemented more strongly by governments? Many governments hesitate to act decisively to reduce tobacco use because they fear that tax increases and other tobacco control measures might harm the economy by reducing the economic benefits their country gains from growing, processing, manufacturing, exporting and taxing tobacco. The argument that tobacco contributes revenues, jobs and incomes is a formidable barrier to tobacco control in many countries. Are these fears supported by the facts?

In fact, these fears turn out to be largely unfounded when the data and evidence on the economics of tobacco and tobacco control are examined. A team of about 30 internationally recognized experts in economics, epidemiology and other relevant disciplines who contributed to the analysis presented in *Curbing the epidemic* reviewed a large body of existing evidence. The team concluded that in most countries tobacco control would not lead to a net loss of jobs and could, in many circumstances actually generate new jobs. Tax increases would increase (not decrease) total tax revenues, even if cigarette smuggling increased to some extent. Furthermore, the evidence shows that cigarette smuggling is caused at least as much by general corruption as by high tobacco product tax and price differentials. The team recommended that governments not forgo the benefits of tobacco tax increases because they feared the possible impact on smuggling. Rather, they should act to deter, detect and punish smuggling.

Much of the evidence presented and summarized in *Curbing the epidemic* was from high-income countries. However, the main battleground against tobacco use is now in low- and middle-income countries. If needless disease and millions of premature deaths are to be prevented, then it is crucial that developing countries raise tobacco taxes, introduce comprehensive bans on advertising and promotion of tobacco products, ban smoking in

public places, inform their citizens about the harm that tobacco causes and the benefits of quitting, and provide advice and support to help people quit.

In talking to policy-makers in developing countries, it became clear there was a great need for country-specific analytic work to provide a basis for policy making within a sound economic framework. The World Bank and WHO's Tobacco Free Initiative (as well as several other organizations, acting in partnership or independently) began to commission and support analysis of the economics of tobacco and tobacco control in many countries around the world.

The report presented in this paper makes a valuable contribution to our understanding of the issues and likely economic impact of tobacco control. Our hope is that the information, analysis and recommendations contained herein will prove helpful to policy-makers and result in stronger policies that will reduce the unnecessary harm caused by tobacco use.

Joy de Beyer

Tobacco Control Coordinator  
Health, Nutrition and Population  
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## SUMMARY

Despite fairly robust recent economic growth and a fall in the poverty rate, Bangladesh remains one of the poorest countries in the world. Nearly half of the population falls below the poverty line, and an estimated 60% of children aged between 6 months and five years are malnourished. Life expectancy at birth has risen, but is still only around 60 years.

About 70% of tobacco consumed in Bangladesh is smoked as cigarettes or *bidis*, 20% is chewed, and the rest used in hookas, pipes, cigars or snuff. Manufactured cigarettes account for 75% of the value but only 25% of the volume of smoking, *bidis* account for the rest. Cigarette production has grown strongly since 1980, and *bidi* production has grown even faster. On the other hand, there are anecdotal reports that as cheaper cigarette brands have come onto the market, they have gained market share, with some people switching from *bidi* to cigarettes.

Bangladesh has a net negative trade balance in tobacco and tobacco products, with import values being 3-4 times greater than export values. Only 0.4% of agricultural land is used for growing tobacco, and this has fallen from 0.46-0.47% since 1990-1995.

Comparable national household surveys conducted in 1995 and 1997 show decreasing smoking prevalence among households in the lower income categories. However, there is still a sharp income gradient – prevalence remains much higher among lower-income families (well over 50% of men) than among families with higher incomes (about one third of men). Another pair of comparable studies in two districts of Bangladesh in 1997 and 2001 show increased prevalence rates for men (from 41% to 48%) and a stark increase in tobacco use prevalence among women (from 4% to 20%).

Government policies and efforts by non-government organisations to discourage smoking and other tobacco use began in the late 1980s. Much remains to be done. Some efforts have been made to inform and educate the public on the harm caused by tobacco use. Health warnings are required on cigarette packages, but they are very small and weak, and inaccessible to half of the population who are illiterate. The national radio and television stations stopped broadcasting advertisements for tobacco products in 1997, but advertising is widespread on other channels and media (billboards, print, etc). Many smoke-free public places have been declared smoke-free. Strong new tobacco control legislation has been presented to Parliament.

It is estimated that about 10.5 million poor men and women smoke in Bangladesh. The opportunity cost of smoking is significant for low-income people. The average amount that male smokers spent on their habit daily in 1997 could have purchased enough rice to provide an additional 1402 calories for the family diet. Similarly, the average amount spent on cigarettes by female smokers could have purchased an additional 770 calories equivalent of rice daily instead. The money used on tobacco products by each tobacco user could potentially make the difference between malnutrition and adequate calorie intake for one child (or other family member). If even some of the money spent on

tobacco products by poor people were to be spent on food instead, it could make a significant difference to malnutrition.

Nominal prices of tobacco products have increased over the past decades, but real cigarette prices (adjusted for inflation) have fallen over the past ten years, fuelling an increase in demand. Moreover, increasing incomes are also associated with rising tobacco product consumption. The positive (and significant) income elasticity of demand for cigarettes implies that if no anti-tobacco measures are taken, economic growth and rising incomes will lead to an increase in cigarette consumption. Surveys show that average daily expenditure on tobacco products increased between 1995 and 1997.

The price elasticity of demand for cigarettes is estimated at  $-0.27$ . Although this result should be considered with caution since it was not found to be statistically significant, it implies that for every 10% real price increase, consumption of cigarettes would fall by almost 3%. As taxes are a fairly small proportion of the final retail price (the proportion varies depending on the cigarette price category) a 10% price increase would require a much larger tax rate increase. Thus much higher taxes would be collected on a slightly reduce volume of sales, and total cigarettes tax revenues would increase.

A significant amount of tax revenue is collected from tobacco products. This has increased over the years, and currently accounts for 7% of all government revenues.

The health care costs and indirect costs associated with lost earnings due to tobacco-related illness and premature death could not be estimated for Bangladesh, because the necessary data were not available. However, existing data on health care expenditures on episodes of diseases for which tobacco use is a risk factor are presented, and the methodology for estimating the costs of the disease burden caused by tobacco use is described.

The study recommends that cigarette and other tobacco product prices be increased each year by at least 5% more than the rate of inflation. Much larger and stronger health warnings need to be required on cigarettes, *bidis* and all other tobacco products, as well as on all tobacco product advertising. In the near future, a comprehensive ban on all tobacco advertising and promotion is recommended, consistent with the provisions of the WHO Framework Convention on Tobacco Control.



# 1. INTRODUCTION

## 1.1 Background and Study Objectives

The adverse health consequences of smoking are well known, and consequently measures have been taken in many countries to control the production and consumption of tobacco and tobacco products. However, policy discussions on tobacco control often raise economic issues such as consumption, employment and government revenues are related to the production and marketing of tobacco products, generating a need for careful economic analysis, so that decision can be based on facts, evidence and analysis. This report examines some of the economic aspects relating to tobacco production, consumption and control in Bangladesh.

Bangladesh is one of the poorest countries in the world. Nearly half of the population of about 130 million people lives below the poverty line. While life expectancy at birth has increased over the past decade, it is still only 60.8 years for women and 60.4 years for men (ERD, 2003).

Together with devastating poverty there is a thriving tobacco industry. The use of chewing tobacco, *bidi* and cigarettes is widespread. About 15 local companies compete for the lower end of the cigarette market using billboards, banners and newspaper and satellite television advertisements. British American Tobacco (BAT), which owns a controlling share of Bangladesh's former tobacco monopoly, reported pre-tax profits of taka 771.4 million (approximately US\$ 15.4 million) in 1998, and spent taka 167 million on brand promoters and development (Efroymsen et al 2000).

The perceived economic benefit of tobacco farming, manufacture and sale is one of the foremost reasons for the lack of political commitment of governments to adopt comprehensive tobacco control measures in Bangladesh. But there is an almost complete lack of independent research on economic aspects of tobacco in the country. Government and other agencies tend to rely on data and estimates provided by the tobacco industry on economic issues related to tobacco. Often these figures are used by the tobacco industry to justify delays in tobacco control measures or to lobby the government to reject them.

The present study attempts to quantify economic issues related to tobacco and to estimate the economic impact of tobacco on the Bangladeshi economy. The results of this study may be used for advocacy for comprehensive tobacco control policies as well as to inform government about the economic aspects related to tobacco.

The objectives of the study are to examine the following:

- trends in tobacco production, consumption and prices
- household expenditure on tobacco
- income and price elasticities of tobacco
- tobacco taxes and government revenue
- direct and indirect medical costs of treatment for tobacco-attributable illness.

## 1.2 Economic and health situation

In Bangladesh, the real gross domestic product (GDP) growth rate improved and the population growth rate declined between the early 1980s and late 1990s and, as a result, the rate of growth in per capita GDP improved considerably during the same period. The rate of inflation also declined. The incidence of poverty went down during the 1990s: from 58.8% in 1991–92 to 49.8% in 2000 (ERD, 2003). The progress in reducing other facets of poverty has been even faster than the reduction in income poverty. However, income inequality has risen during this period and considerable regional variations exist in the country in income poverty and social indicators.

Overall mortality in Bangladesh has improved over the past decades, as in many other developing countries. The infant mortality rate was reported at 62 per 1000 live births in 2000, down from 153 in the mid 1970s. The under-five mortality rate also declined from 250 per 1000 live births in the early 1970s to 83 in 2000 (ERD, 2003). Consequently, life expectancy at birth increased from 49 years in the mid 1980s to 60.6 years in 2000.

However, a high degree of morbidity exists in Bangladesh, as reported in the Health and Demographic Survey of the Bangladesh Bureau of Statistics in 2000. Overall morbidity prevalence is estimated at 188 per 1000 population in 2000. There has been a shift in the pattern of morbidity, with some improvement in diseases such as diarrhoea, malaria, tuberculosis, etc. While morbidity from infectious diseases remains high, lifestyle-related illnesses, such as those caused by smoking, have become significant in Bangladesh. These conditions tend to be very costly to treat.<sup>1</sup> Already, medical care expenditures on diseases related to lifestyle are larger than expenditures on infectious diseases (BBS, 1999b).

## 2. TRENDS IN TOBACCO PRODUCTION AND TRADE

Despite a significant improvement in awareness about the deleterious effects of tobacco use in recent years, tobacco product production and trade have remained largely unchanged, if not increased. Although there has been a lot of campaigning against tobacco, it appears to have been ineffective in reducing demand. This section discusses recent trends in tobacco production and trade. Both agricultural and industrial productions in recent years are analysed. Aspects of imports and exports are also discussed in order to get an idea of recent trends in the tobacco industry.

### 2.1 Tobacco products market shares

The tobacco products available on the domestic market are tobacco leaf and other chewing tobacco, cigarettes and *bidi*. WHO estimates that cigarettes and *bidi* account for

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<sup>1</sup> The average cost of treatment is highest for cardiovascular diseases followed by gastrointestinal illness. Both figures are far above the average cost of treatment across all illnesses.

about 70% of all tobacco used in Bangladesh; chewing tobacco for 20%; and the remaining 10% is consumed in the form of cigars, snuff and pipe tobacco. The smoking market is clearly divided into two categories: machine-made cigarettes and hand-made *bidi*. Although *bidi* outsell cigarettes by about three to one in volume, cigarettes far outstrip *bidi* in total sales value.

Manufactured cigarettes account for an estimated 80% in value, but only 25% in volume of all manufactured tobacco products sold in Bangladesh. Conversely, *bidi* account for 20% in value and 75% in volume. Imported cigarettes account for 9% in value and less than 3% in volume of manufactured tobacco products sold. Some smokers are reported to be switching from *bidi* to cigarettes as cheaper cigarettes become available on the market, however, production data suggest that in volume terms, *bidi* market share is growing (see below). Information on market share is not available for tobacco leaf or other forms of chewing tobacco.

## 2.2 Production of manufactured tobacco products

According to the census of manufacturing industries (CMI) there were 466 tobacco manufacturing companies in 1991–92.<sup>1</sup> Production of cigarettes has increased gradually over the last few years, peaking at nearly 20 billion sticks of cigarettes in 1997–98 (Table 2.1). In 1994-95 *bidi* production was approximately the same in volume as cigarettes, but has subsequently grown much faster to nearly 24.5 billion sticks in 1999-2000.

**Table 2.1. Cigarette and *bidi* production in Bangladesh, 1970–71 to 1999–2000**

Year	Cigarettes (million sticks)	<i>Bidi</i> (million sticks)
1970–71	17 787	–
1980–81	13 830	–
1994–95	17 379	17 934
1995–96	16 222	18 580
1996–97	18 601	19 253
1997–98	19 889	21 091
1998–99	19 558	23 448
1999–2000	19 643	24 486

Source: BBS (2000).

The increase in production is much more marked for *bidi* than cigarettes (Table 2.2). From 1988–89 to 1999–00, production of cigarettes increased by about 40%, while production of *bidi* increased by about 295%. In the case of cigarettes, there was a large increase between 1993 and 1997 then production levelled off. *Bidi* production has increased steadily and sharply since 1988. It is important to note that *bidi* are smoked predominantly by poor people.

<sup>1</sup> More recent statistics are not available.

**Table 2.2. Quantity index for tobacco manufacturing, Bangladesh, 1985–86 to 1999–2000 (1988–89=100)**

<b>Period</b>	<b>Cigarettes</b>	<b>Bidi</b>	<b>All tobacco manufacturing</b>
1985–86	100.04	–	100.04
1986–87	102.81	–	102.81
1987–88	97.73	–	97.73
1988–89	100.00	100.00	100.00
1989–90	87.23	126.24	112.47
1990–91	96.56	177.22	148.75
1991–92	88.89	190.09	154.41
1992–93	81.74	221.91	172.44
1993–94	89.83	247.37	191.77
1994–95	123.36	289.04	230.57
1995–96	115.15	299.36	234.34
1996–97	132.03	310.18	247.03
1997–98	141.17	339.95	269.78
1998–99	138.82	377.94	293.54
1999–2000	139.43	394.68	307.89

Source: Authors' calculation based on BBS (1996b), BBS (1999) and BBS (2000b); the quantity index is based on the total volume of production.

## 2.3 Tobacco agriculture

Tobacco has been cultivated in Bangladesh for years, particularly in the northern area of Rangpur. In recent years, this practice has been spreading to other districts of the country. Although at a macro level, tobacco does not seem to be replacing other food crops, a recent BRAC (a Bangladeshi relief and rehabilitation organization) survey<sup>1</sup> shows its importance at the micro level. The survey, however, points out that if appropriate measures are taken then farmers may be persuaded to quit production of this crop.

### Trends of land use and yields of tobacco

Tobacco is not a major crop in Bangladesh; very little land is devoted to tobacco cultivation. In 1998–99, 0.40% of the agricultural land was devoted to tobacco cultivation, a 15% decline from 1990–91. In absolute terms, the total area under tobacco decreased from 37,600 hectares in 1990–91 to 31,200 hectares in 1998–99. Table 2.3 shows the area cultivated and production of tobacco in the country since 1990.

Even though the area under cultivation fell, agricultural production of tobacco showed a small increasing trend. Total production increased from 33,840 tonnes in 1990–91 to 36,450 metric tons in 1997–98.

<sup>1</sup> *To produce or not to produce: tackling the tobacco dilemma*. BRAC, Dhaka, April 2002.

**Table 2.3. Area cultivated and production of tobacco, Bangladesh, 1990–91 to 1997–98**

<b>Year</b>	<b>Acreage (thousand ha)</b>	<b>Percentage of total agricultural land</b>	<b>Yield per hectare (tonnes)</b>
1990–91	37.6	0.47	0.90
1991–92	36.4	0.46	0.93
1992–93	35.6	0.46	1.03
1993–94	36.4	0.47	1.05
1994–95	35.6	0.47	1.05
1995–96	36.0	0.46	1.10
1996–97	34.4	0.44	1.10
1997–98	32.4	0.41	1.13
1998–99	31.2	0.40	

Source: authors' calculation based on BBS (1998) and BBS (2000).

## 2.4 Tobacco trade

The national balance of trade in tobacco and tobacco products is negative. Bangladesh exports some tobacco leaf, but imports much larger amounts (in value) of tobacco products (particularly cigarettes). Table 2.4 presents recent trends in the real value of exports and imports of tobacco and tobacco products.

**Table 2.4. Tobacco trade (real values), Bangladesh, 1992–93 to 1998–99**

<b>Year</b>	<b>Exports (million taka)</b>	<b>Imports (million taka)</b>	<b>Exports as a percentage of imports</b>
1992–93	40.97	252.09	16.25
1993–94	23.19	292.92	7.92
1994–95	20.74	156.39	13.26
1995–96	43.62	300.63	14.51
1996–97	92.27	484.44	19.05
1997–98	129.37	477.24	27.11
1998–99	56.26	239.67	23.47

Source: Authors' calculation based on BBS (1998).

Note: Figures in real terms have been obtained by deflating nominal figures by consumer price indexes with 1985–86 as the base year.

Tobacco plays a very minor role in the international trade of Bangladesh. Shares of exports and imports of tobacco in total exports and imports are very low. As is evident from the latest available figures for the year 1998–99, tobacco accounts for only 0.06% of exports and 0.17% of imports (Table 2.5). Even at their highest share during the 1990s, tobacco was only 0.12% of all exports and 0.35% of all imports.

**Table 2.5. Share of tobacco in trade, Bangladesh, 1992–93 to 1998–99**

Year	Tobacco exports as a percentage of total exports	Tobacco imports as a percentage of total imports
1992–93	0.07	0.25
1993–94	0.04	0.35
1994–95	0.03	0.13
1995–96	0.06	0.22
1996–97	0.10	0.33
1997–98	0.12	0.31
1998–99	0.06	0.17

Source: calculated from BBS, *Statistical yearbook of Bangladesh 1998*.

### 3. SMOKING PREVALENCE

Smoking prevalence in Bangladesh in 1998 was 40% among male adults and 10% among female adults (Corrao et al 2000, citing the Bangladesh Cancer Society). This is the same as the regional average for men, and more than twice the 4% regional average for women (World Bank 1999). However, these statistics omit chewing tobacco, which is commonly used in Bangladesh, especially among women. Bangladesh Bureau of Statistics (BBS) surveys provide more detailed information on smoking.<sup>1</sup> A 1995 DHS included questions on smoking and health of 282,508 people over the age of 10 in 54,152 households across the country. The BBS conducted another survey in 1997 that covered 56,913 people in 11,127 households. The surveys used the same questions and definitions of smoking.

#### 3.1 Age-specific and sex-specific smoking rates

Age differentials and trends in smoking are evident from the surveys of 1995 and 1997. Table 3.1 and Figure 3.1 illustrate the results.

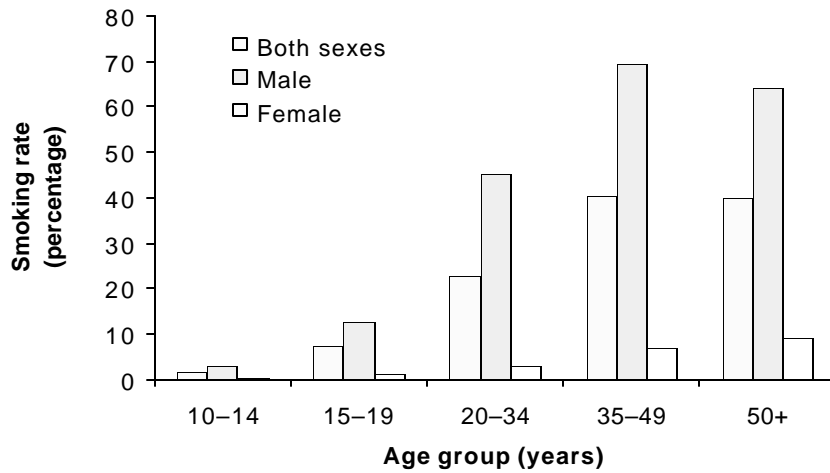
**Table 3.1. Smoking rates by age and sex, Bangladesh, 1997 (percentage)**

Sex	Age					Total 1997 (all ages)	Total in 1995
	10–14	15–19	20–34	35–49	50+		
Both sexes	1.6	7.3	23.0	40.3	40.1	23.1	25.2
Male	2.8	12.5	45.3	69.5	64.0	41.1	43.8
Female	0.3	1.2	3.1	6.9	9.3	4.0	4.6

Source: BBS (1995) and BBS (1997).

<sup>1</sup> The surveys were carried out under a health and demographic survey project funded by UNFPA and the World Bank. In both surveys, the sex ratio for all respondents was around 106.

**Figure 3.1. Smoking prevalence by age and sex, Bangladesh, 1997**



It is clear from the table that as age increases so does prevalence of smoking—both for males and females. The highest rates of smoking are found in people aged 35 years and above. These rates refer to the smoking of both cigarettes and *bidi*.

The BBS surveys show a small fall in smoking rates between 1995 and 1997, for males and females. However, surveys in two districts of Bangladesh in 1997 and 2001 found the opposite—a large increase in smoking prevalence for both males and females (Yunus 2001).<sup>1</sup> Yunus found prevalence rates for males of 41.1% in 1997 and 48.3% in 2001, and for females, 4.0% in 1997, and 20.9% in 2001.

Yunus also found significant differences in smoking prevalence across age groups. Tobacco prevalence was very low for male respondents and virtually nil for female respondents during their teenage years. More than one-third of the male respondents and 16% of females appeared to begin using tobacco products between 20 and 34 years of age. In the 35–49 year age group, tobacco prevalence almost doubled for both sexes and continued to increase thereafter. Around three-quarters of male respondents over the age of 50 and more than half of the female respondents over 50 used tobacco products.

The same study reports differentials between rural and urban respondents, especially for older respondents. Tobacco prevalence reached 80% for older rural male respondents, the highest age-specific rate among urban men was 69% (35-49 age group). Prevalence was systematically lower among urban female respondents than among rural women across all age groups.

<sup>1</sup> Yunus (2001) carried out surveys in only two districts of the country, and therefore figures reported in his report should be taken with due caution. Surveys carried out by the Bangladesh Bureau of Statistics (BBS) are claimed to be more representative of the national situation. Sample size was about 15,000, half from each district. Districts and survey areas within the districts were chosen purposively, because tobacco and tobacco products were easily and cheaply available.

### 3.2 Socio-economic differentials in male smoking

There are significant variations in male smoking among households from different socio-economic groups. Differences are found with respect to educational status, household income and other socioeconomic variables. Table 3.2 presents smoking rates among males by household income groups. The lower the income of the household, the greater the prevalence of smoking of its male members. Smoking prevalence among men appears to have declined between 1995 and 1997 for almost all income groups. The decline is significantly bigger among the lower income groups.

**Table 3.2. Male smoking rates by household income, Bangladesh, 1995 and 1997**

Monthly household income (taka)	Percentage of smokers among males, 1995	Percentage of smokers among males, 1997
<1000	58.2	53.0
1000–1449	56.7	48.1
1500–1999	53.7	47.2
2000–2499	45.6	44.2
2500–2999	46.1	42.4
3000–3999	38.4	38.7
4000–4999	36.3	34.4
5000+	32.3	31.7

Source: BBS (1995) and BBS (1997).

Education is strongly correlated with smoking: the higher the level of education, the lower the rate of smoking (Table 3.3). The BBS surveys show a fall in smoking rates between 1995 and 1997 for all except for the most educated men. The same relationship between education and smoking prevalence is found in India and many other countries.<sup>1</sup>

**Table 3.3. Male smoking rates by education level, Bangladesh, 1995 and 1997**

	Smoking rates in 1995	Smoking rates in 1997
No education	61.4	59.5
Class I–V	40.7	34.9
Class VI–IX	31.3	28.5
SSC and above	25.0	31.6

Source: BBS (1995) and BBS (1997).

Note: SSC is Secondary School Certificate.

Land ownership is also inversely related to smoking prevalence (Table 3.4). Smoking rates are much higher among men with less than half acre of land than among men who own more land. This is another indicator of the link between socio-economic status and smoking prevalence—smoking is more prevalent among the poor.

<sup>1</sup> World Bank. *Curbing the epidemic: government and the economics of tobacco control*. Washington DC, 1999.



**Table 3.4. Rural male smoking rates by land ownership, Bangladesh, 1995 and 1997**

Land owned (acres)	Smoking rates in 1995	Smoking rates in 1997
Rural landless	57.8	46.6
0.01–0.04	52.0	54.0
0.05–0.49	53.0	46.9
0.50–2.49	42.8	39.7
2.50–4.99	27.8	35.4
5.00+	34.2	28.2

Source: BBS (1995) and BBS (1997).

### 3.3 Smoking among poor people

Clearly, smoking rates are highest among the poor. Table 3.5 and 3.6 present an estimate of the number of poor smokers (male and female). The smoking rate among adult males living below the poverty line is 54.8% and the corresponding rate for adult females is 3.6%. It is estimated that 9,872,181 poor adult men (15+) and 612,060 poor adult women smoke, making a total of nearly 10.5 million poor people spending scarce income on cigarettes and *bidi*. (Efroymsen et al 2000). Given the increases in population and 2001 data on smoking, this number has almost certainly been increasing.

**Table 3.5. Estimated number of poor male smokers, Bangladesh, 1996**

Age	Male population (000s)	Number below poverty line (000s)	Smoking rate (%)	Number of poor smokers (000s)
15–19	5 979	2 810	18.1	508
20–34	14 695	6 907	57.3	3 959
35–49	9 620	4 521	72.4	3 274
50+	8 028	3 773	56.5	2 131
Total	38 322	18 011	54.81	9 872

The Bangladesh Bureau of Statistics poverty line is monthly household income below \$70. Smoking prevalence rates are taken from BBS 1996 (the 1995 survey)

Source: Efroymsen et al 2000.

**Table 3.6. Estimated female population by age and smoking rates, Bangladesh, 1996**

Age	Female Population (000s)	Number below poverty line (000s)	Smoking rate (%)	Number of poor smokers (000s)
15–19	5 826	2 738	0.9	25
20–34	14 161	6 656	3.3	220
35–49	8 853	4 161	6.6	275
50+	7 079	3 327	2.8	93
Total 15+	35 919	16 882	3.6	612

Source: Efroymsen et al 2000.

### 3.4 Policies to reduce tobacco use

Bangladesh is essentially a tolerant society and in spite of growing awareness of the health risks among many people, smoking is still generally socially accepted. Anti-smoking regulations came into force for the first time in 1987, the same year that one of the pioneer organisations working to reduce tobacco was founded – ADHUNIK, whose full name translates roughly as “We prevent tobacco”. Other active organisations include the Bangladesh Cancer Society, Madok o Nesho Nirodh Shanshya (MANAS—the Association for Prevention of Drug Abuse), the National Non-smokers’ Forum and Work for a Better Bangladesh. The Consumer Association of Bangladesh is especially active in organizing anti-smoking campaigns on radio and television. World No-Tobacco Day is celebrated annually in Bangladesh. Various government agencies and nongovernmental organizations are working actively to create public awareness of the harm caused by tobacco use through mass media, posters, leaflets, billboards and seminars.

Health warnings are required on cigarette packages and advertisements. However, effectiveness is limited because the warning is small and general in nature, and about half the population is illiterate and so cannot read it. The warning says (in very small type) in Bengali: “Government warning: smoking is deleterious to health”. Although the warning is required on all domestically produced cigarettes and legally imported cigarettes, these account for only about one third of tobacco consumed in the country. No warnings are required on packaging for *bidi* or tobacco leaf, and smuggled cigarettes seldom (never?) carry health warnings in the local language.

Bangladesh Radio and Television banned tobacco advertisements with effect from 1 January 1997. However, on other stations and media, tobacco advertisements are widespread. In 2000, researchers monitored ATN Bangla, a Bengali-language Indian satellite television station from 8pm to 10 pm one Saturday night (Shaha, Dhar and Efroymsen 2000). During the two hours, they counted 38 tobacco advertisements, covering a total of more than 14 minutes. They promoted two different brands of *bidis* and seven cigarette brands, showing smokers as strong, healthy and irresistible to women.

Measures to create smoke-free areas have been implemented in hospitals, public transport, elevators, theatres, cinemas and government premises. Some other workplaces have taken voluntary measures to promote smoke-free areas. Bangladesh Biman, the national airline, banned smoking on all domestic flights with effect from 7 May 1989. Bangabhaban, the official residence of the president of Bangladesh, was declared a non-smoking zone with effect from 4 April 1988. The Prime Minister’s Office was declared a non-smoking zone in 1991. The Bangladesh Secretariat, the offices of the government, was declared a non-smoking zone on 31 May 2000.

High school teachers address the hazards of tobacco. The Ministry of Education has provided articles about the hazards of tobacco use for publication in school textbooks. However, in rural Bangladesh, many children do not attend school and thus do not receive this information. There is no ban on sales to children.

Despite these measures, reducing tobacco use has not been a government priority. For effective tobacco control, governments must act decisively and be consistent. This is questionable in Bangladesh. The country's largest tobacco company was recently given a national award for tree planting. This provides mixed messages and does not help to discourage tobacco use. However, in 2002, strong new legislation was submitted for consideration by Parliament, which may mark a new era of government policy and resolve.

## 4. ECONOMIC ANALYSIS OF TOBACCO USE

Consumption of tobacco products is largely determined by the price of tobacco products (tobacco leaf, cigarettes and *bidi*). Tax and duties on tobacco products play a vital role in this regard. This section examines these economic issues with respect to tobacco. After examining the current scenario of tobacco product prices and taxes the section will proceed with further rigorous economic analyses.

### 4.1 Household economics of tobacco

Though the share of household expenditure on tobacco is fairly small, it deserves to be analysed. Households with higher incomes spend more in absolute terms and a higher percentage of their total expenditure on tobacco (Table 4.1). The table presents this information for the national level and disaggregated for rural and urban Bangladesh. Cigarettes are the most expensive tobacco product, followed by *bidis*, with hukka, pipes and other forms being the cheapest. Note that this table averages tobacco expenditures over all households in the income group, whether or not they spend any money at all of tobacco. If households with zero tobacco expenditures were excluded, the share of households expenditures on tobacco products for households that buy tobacco would be considerably larger.

**Table 4.1. Distribution of monthly expenditure on tobacco and tobacco products by household income group, Bangladesh, 1995**

Monthly household income group (taka)	Percentage of household income spent on tobacco								
	National			Urban			Rural		
	Total	<i>Bidi/cigarette</i>	Other	Total	<i>Bidi/cigarette</i>	Other	Total	<i>Bidi/cigarette</i>	Other
<999	1.74	1.51	0.24	0.29	0.20	0.11	1.83	1.58	0.25
1000–1999	2.46	2.30	0.17	2.72	2.48	0.24	2.44	2.29	0.15
2000–4999	2.45	1.86	0.10	3.26	3.13	0.07	2.33	2.22	0.09
5000–9999	2.81	2.83	0.09	3.97	3.90	0.07	2.54	2.43	0.10
10 000+	3.54	3.52	0.05	3.91	3.88	0.05	3.37	3.29	0.08

Source: calculated from BBS (1996).

## The opportunity cost<sup>1</sup>

Expenditures on tobacco products may seem very small –between 1 and 12 taka per day, depending on the type of product used (1995 and 1997 prices, Table 4.2 and Table 4.3 Inflation was about 4.7% per year). But small amounts add up. Especially for poor families, even very small amounts can have a big opportunity cost—the consequences of *not* having the things that might have been bought instead of cigarettes or *bidis*. Half of Bangladesh’s poor eat between 1805 and 2122 calories per day, and would need just 400 more calories each day to bring them to a sufficient level. The average amounts spent on tobacco each day would generally be enough to make the difference between at least one family member having just enough to eat to keep from being malnourished. These tables show the potential calorie gain if tobacco money were spent on rice instead.

**Table 4.2. Average daily expenditure on tobacco products and rice calorie equivalents, Bangladesh, 1995**

Type of tobacco	Average expenditure on tobacco (taka)		Equivalent in calories of rice	
	Male	Female	Male	Female
Average, all types	3.1	1.8	721	419
<i>Bidi</i>	1.6	1.3	372	302
Cigarettes	7.9	12.2	1837	2837
<i>Hukkah</i> , pipe etc	3.0	1.0	698	233

Source: BBS (1995).

**Table 4.3. Average daily expenditure on tobacco products and rice calorie equivalents, Bangladesh, 1997**

Type of tobacco	Average expenditure on tobacco (taka)		Equivalent in calories of rice	
	Male	Female	Male	Female
Average, all types	5.1	2.8	1402	770
<i>Bidi</i>	2.9	3.3	797	907
Cigarettes	10.7	6.8	2942	1869
<i>Hukkah</i> , pipe etc.	2.6	1.9	715	522

Source: BBS (1998).

The average expenditure on tobacco in 1995 by men (women) could buy 721 (419) calories of rice per day instead. Or a typical male (female) smoker in 1995 could instead have bought an additional 800 (200) calories from a range of foods including lentils, eggs and milk to add to the family diet.

<sup>1</sup> This section draws extensively from Efroymson et al, 2000.

Comparing the 1997 and 1995 figures, it was clear that average daily expenditure on tobacco has risen. The rice price fell between 1995 and 1997, so the “tobacco/rice calorie trade off” was almost twice as high in 1997 than in 1995. The potential additional calories from rice that the average tobacco user could have bought nearly doubled for men and women, from 721 and 419 calories respectively in 1995, to 1402 and 770 in 1997.

The opportunity cost of tobacco expenditures is clear. For each smoker, the potential exists to use the money instead to prevent at least one child or other family member from going hungry. Malnutrition causes more than 700 deaths of children under 5 years old in Bangladesh every day. UNICEF estimates that malnutrition reduces Bangladesh’s GNP by more than 5% each year, through its impact on lost lives, disability and productivity.

Of course, if poor smokers quit, it might be the case that a much smaller share of the savings would be spent on food instead. But given the high rates of tobacco use among the poor, even a small reallocation of spending from tobacco to food could reap considerable benefits in improved nutrition and children’s health. This serious opportunity of the money spent on tobacco products is often overlooked in discussions of the harm that arises from tobacco use. Unlike the impact on health outcomes, the harm caused by the diversion of income is immediate and certain.

## 4.2 Prices of tobacco products

Real prices of chewing tobacco (Motihari is a superior quality tobacco leaf) fell sharply and real prices of *Scissors* cigarettes, a popular local brand rose from 1991 to 1994, then fell to well below the 1991 level by 1999-2000 (Table 4.4).<sup>1</sup> Per capita GDP rose during the decade, so tobacco products became increasingly affordable, stimulating demand.

**Table 4.4. Annual average real retail price of tobacco leaf (Motihari superior quality) and *Scissors* cigarettes, Bangladesh, 1991–92 to 1996–97 (taka)**

Year	Tobacco leaf per kilogram	<i>Scissors</i> cigarettes (10 sticks)
1991–92	37.89	5.28
1992–93	37.52	5.79
1993–94	36.95	6.15
1994–95	33.93	5.66
1995–96	31.31	5.19
1996–97	29.98	5.21
1997–98	27.19	4.93
1998–99	26.23	5.17
1999–2000	27.34	4.09

Source: Authors’ calculation based on BBS, *Statistical yearbook of Bangladesh 2000*.

<sup>1</sup> Real prices were obtained by deflating nominal prices by the consumer price index for food, beverages and tobacco (with 1985–86 as the base year).

### 4.3 Demand elasticities

The consumption (quantity bought) of any commodity is related to its price, price of substitute and complementary commodities, consumer income, taste, etc., at any point in time. Demand functions are derived from an analysis of consumer behaviour. The present study estimates the following demand equation (see Appendix 7.1 for detailed derivation):

$$\ln Q = a + b \ln Y + c \ln P$$

where  $Q$  is the quantity demanded,  $Y$  is real income and  $P$  are relevant prices.

#### Data and estimation

Two empirical models were constructed considering the consumption<sup>1</sup> separately of “tobacco leaf (Motihari super quality)” and “cigarettes” as the dependent variables (following equation 1 in Appendix 7.1). In both equations, real GDP per capita and the price of the product itself (but not the price of substitute products) were included as explanatory variables. Data on the selected variables for 1983–99 were collected from different government departments. The ordinary least squares method was used to estimate the equations.

#### Estimated elasticities

Since the demand functions that have been estimated here are double logarithmic, the estimated coefficients themselves represent the demand elasticities. The estimated coefficients and the elasticities are presented in Table 4.5. As incomes increase, people buy less chewing tobacco and more cigarettes. For each 10% income increase, cigarette consumption increases by 6.2%. However, tax increases that result in increases in cigarette prices could be used to offset the impact of rising incomes on the demand for tobacco products. Increases in the price of cigarettes would reduce demand by 2.7% for each 10% increase in price. Chewing tobacco demand appears to increase with price increases, which is unexpected and deserves further investigation to validate.<sup>2</sup>

**Table 4.5. Estimated coefficients and elasticities**

Dependent variable	Constant	Natural log of real GDP per capita	Natural log of real price of tobacco leaf	Natural log of real price of cigarettes	Adjusted R <sup>2</sup>
Tobacco leaf (Motihari)	10.51** (4.12)	-0.31 (-1.42)	0.58** (2.67)	-	0.62
Cigarettes	3.33 (1.25)	0.62** ( 3.25)	-	-0.27 (-1.42)	0.49

Note: figures in parentheses represent  $t$ -values. \*\* indicates estimates are significant at less than 5% probability level.

<sup>1</sup> Consumption is defined here as proxied by the production of different types of tobacco products domestically.

<sup>2</sup> It was not possible to estimate a demand function for bidi because price and production/consumption data over time were not available.

## 4.4 Tobacco taxes and government revenues

Table 4.6 presents the trends in tax revenue collected from various tobacco products over the past decade or so, showing the significant and increasing amount of revenue collected.

In 2001–02, the government received taka 20,316 million (US\$ 338 million) from value-added tax and supplementary duties on tobacco products. This represents approximately 10% of all tax revenues raised and 7% of all government receipts (both tax and non-tax).

Tobacco products are taxed as follows in Bangladesh:<sup>1</sup>

*Excise taxes.* For handmade cigarettes and *bidi*, excise tax is 10% of the producer price. For manufactured cigarettes (per 10 sticks), excise tax varies as a percent of retail price as follows:

- 35% for cigarettes priced between taka 4.50 and taka 4.99 per 10 sticks
- 50% for cigarettes priced between taka 5.00 and taka 9.99 per 10 sticks
- 55% for cigarettes priced at taka 10.00 and above per 10 sticks.

*Value-added tax.* Value-added tax is imposed at the rate of 15% on all cigarettes.

The single most cost-effective method of reducing demand for tobacco products is to increase the tax rates so that the (real) retail price of tobacco products goes up. WHO and the World Bank recommend that countries use tax policies to increase real prices of tobacco products by at least 5 % each year.

There may be concerns among policy-makers as to the effect that increased taxes might have on government revenues, employment, smuggling and the tax burden on poor people. It is important to consider these issues in making sound decisions about effective tobacco control policies.

In Bangladesh, as in other countries, a cigarette and *bidi* price increase would reduce consumption, but raise total tax revenues. More tax per pack is collected on a slightly reduced volume of sales. People who continue to smoke the same quantity as before will spend more and have an increased tax burden. But people who reduce their consumption or quit in response to the price increase may even spend less on tobacco products as a result (depending on how much they reduce consumption). Those who reduce their health risks and those of other “near and dear” to them who have been exposed to their second-hand smoke, reducing future health costs and income losses resulting from illness or even premature from a tobacco-attributable cause.

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<sup>1</sup> As per the gazette notification of the National Board of Revenue of the Government of Bangladesh on 12 June 2003.

**Table 4.6. Revenue from tobacco products, Bangladesh, 1992–93 to 2000–01 (million real taka)**

	1992–93	1993–94	1994–95	1995–96	1996–97	1997–98	1998–99	1999–00	2000–01	2001–02
Excise tax on <i>bidi</i>	925.5	944.9	1 606.3	1 103.6	1 251.8	1 350.9	1 383.1	1 672.1	1 715.5	1 700.1
VAT on cigarettes	1 588.0	1 548.3	1 764.1	2 045.8	2 312.8	2 645.8	2 573.6	2 561.3	3 135.6	3 945.2
VAT on other tobacco products	–	–	–	–	–	0.1	3.8	4.3	3.3	3.7
Supplementary duty on cigarettes	6 103.7	6 311.0	7 151.9	8 256.8	9 335.6	10 235.8	9 741.0	9 777.0	12 042.3	14 666.8
Total (in nominal terms)	8 617.2	8 804.2	10 522.3	11 406.2	12 900.2	14 232.6	13 701.5	14 014.7	16 896.7	20 315.8
Total (in real terms)	5 430.9	5 372.7	5 898.2	5 994.7	6 613.1	6 819.6	6 028.2	5 934.4	7 042.9	8 093.9

Source: National Board of Revenue, Government of Bangladesh, 2002; values in real terms are obtained by deflating the nominal value by the general consumer price index with 1985–86 as the base year.



## 5. HEALTH CONSEQUENCES AND COSTS OF TOBACCO USE

*“The arrival of cholera and plague from the Orient used to cause great alarm in Britain until these epidemics were brought under control. Now the epidemic of tobacco smoking, which in the past 30 years killed over one million people in the UK alone, is fast spreading to developing countries with the encouragement of tobacco companies based in the UK and the USA. In 1978 a World Health Organization report declared that “In the absence of strong and resolute government action, we face the serious probability that the smoking epidemic will have affected the developing world within a decade and that a major avoidable public health problem will have been inflicted on countries least able to withstand it for the twin reasons of commercial enterprise and government inactivity”. Five years later a new report catalogues the evidence that the smoking diseases have already arrived.”*

This was written in the *Lancet*, 7 January 1984. The statement was supported by facts.

*“High death rates for lung cancer are reported from India, China, Hong Kong, and Cuba, and in the Bantu of Natal. Coronary heart disease associated with cigarette smoking is a major feature in India, Pakistan, and the Philippines. Perinatal mortality rates are doubled in Bangladeshi women who smoke. Even traditional forms such as bidi or hukkah smoking are hazardous and oral cancer is frequent in Asian men and women who chew tobacco. Health for All by the Year 2000 is likely to be a vain hope for the millions in developing countries who succumb to the blandishments of the tobacco companies.”*

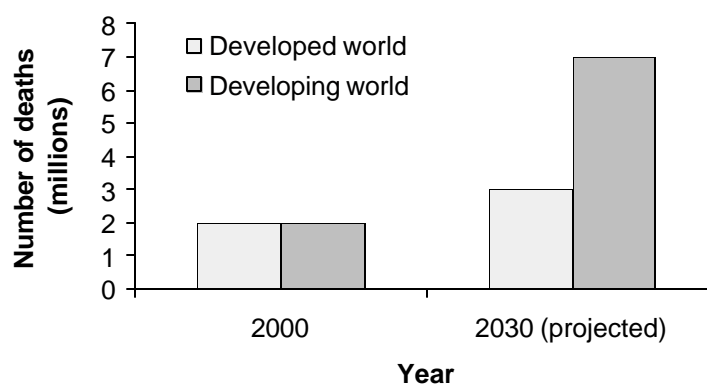
This was nearly 20 years ago. And the worries expressed at that time persist today, as evidence accumulates of the rising epidemic of disease and death caused by tobacco in the developing world. The World Bank predicted in 1999<sup>1</sup> that within the year, tobacco would kill approximately 4 million people worldwide (according to the most recent WHO estimates, this figure was 4.9 million for 2000, much worse than predicted earlier. WHO 2002). In 1999 tobacco was responsible for one in 10 adult deaths; by 2030 the figure was expected to be one in six, or 10 million deaths each year—more than any other cause and more than the projected death tolls from pneumonia, diarrhoeal diseases, tuberculosis and the complications of childbirth for that year combined (Figure 5.1). It was also claimed that if current trends persist, about 500 million people alive today would eventually be killed by tobacco, half of them in productive middle age, losing 20 to 25 years of life.

Thus the impact of tobacco on global health has been extensively documented. This section examines the health effects of tobacco use in Bangladesh. After considering tobacco-related mortality and morbidity, it will focus on medical costs (direct and indirect) of tobacco in Bangladesh.

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<sup>1</sup> The World Bank, *Curbing the epidemic: government and the economics of tobacco control*, Washington, 1999.

**Figure 5.1. Number of deaths due to tobacco-related illnesses, world, 2000 and 2030 (projected)**



Source: World Bank, 1999.

### 5.1 Data on tobacco-related diseases in Bangladesh

Many diseases are attributable to smoking or tobacco use. In Bangladesh there has been no systematic epidemiological work to establish the tobacco-attributable burden of disease. The BBS surveys provide data on the percentages of smokers suffering from various diseases, based on self-reports by smokers (Table 5.1).

**Table 5.1. Smokers reporting current and prior suffering from selected diseases by sex, Bangladesh, November 1995 (percentage)**

Selected variable	Currently suffering			Prior suffering		
	Both sexes	Male	Female	Both sexes	Male	Female
Total	19.8	19.9	18.6	20.7	20.6	21.0
Cancer	0.4	0.4	0.0	0.4	0.5	0.0
Tuberculosis	1.1	1.0	1.6	0.8	0.8	1.6
Ulcer	3.4	3.5	3.2	3.1	3.1	3.2
Kidney problems	0.3	0.3	0.0	0.5	0.5	0.0
Asthma/breathing problems	6.6	6.7	5.7	7.4	7.5	6.5
High blood pressure	1.7	1.7	1.6	1.2	1.2	0.8
Liver problems	1.8	1.8	1.6	2.5	2.6	1.6
Heart disease	1.3	1.3	0.8	0.8	0.8	0.8
Buerger's Disease	0.7	0.7	0.8	0.9	0.8	2.4
Other diseases	2.7	2.6	3.2	3.0	2.9	4.0
Not affected	80.2	80.1	81.5	79.3	79.4	79.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: BBS 1995.

Over 80% of the smokers reported no current suffering from disease and almost 80% of the smokers reported no prior suffering from disease. The most frequently reported current and prior problem (6.6% and 7.4%) was breathing problems including asthma. These self-reports do not necessarily reflect confirmed diagnoses, and are no help in comparing disease prevalence of smokers and non-smokers, which is needed for an estimate of the health risks from smoking. They also provide no information on smoking-attributable mortality. This study could find no other data to indicate the prevalence (percent of population affected) or incidence (new cases each year) of diseases that tobacco users in Bangladesh are at higher risk of contracting. National mortality and morbidity data are needed.

## 5.2 Direct medical costs

This section describes the methodology and data needs for estimating direct medical costs of some smoking-related diseases. Since almost no epidemiological data, and very little cost data are available, an estimate of health care costs related to tobacco use could not be attempted for Bangladesh.

### Treatment costs

Expenditures incurred for some smoking-attributable diseases are presented in Table 5.2. Costs estimates could be made only for five diseases that are related to smoking. Information on average expenditures was not available for other diseases. Average expenditure of about US\$66 equivalent per episode of illness needs to be put into context: in 1994-95, GDP per capita was just over US\$300. So one episode of illness could involve expenditures equal to two or three months of average income, which would be a much higher proportion of the income of a poor person. Moreover, these are self-reported out-of-pocket costs; to the extent that medical care is subsidized or covered by insurance, out-of-pocket costs capture only part of the total cost. Hospital records and budgets and cost data would need to be analysed to estimate the full health care costs.

**Table 5.2. Treatment costs of selected smoking-attributable diseases in Bangladesh: number of episodes, average and total expenditure during 1994-95**

Disease	Number of episodes (million)	Average expenditure per episode (taka)	Total expenditure (million taka)
Ulcer	24.9	318	7 918
Asthma	8.1	317	2 568
High blood pressure	7.0	294	2 058
Heart disease	4.3	343	1 475
Tuberculosis	1.7	392	666
Total	46.0	333	14 685

Source: BBS (1997) and BBS (1999b); taka 55 = US\$ 1.

## Population-attributable risk and the costs

With estimates of costs per episode (or per year) of tobacco-attributable diseases, the next step to estimating the total direct medical costs caused by tobacco use would be to calculate the population-attributable risk (PAR) for each smoking-attributable disease. The PAR is the proportion of disease prevalence that is attributable to tobacco use, and is derived from the difference in risk of contracting the disease between those who use tobacco and those who do not:

$$\text{PAR} = \left( \frac{P(RR - 1)}{1 + P(RR - 1)} \right)$$

where  $P$  = prevalence of smoking and  $RR$  = relative risk for each disease faced by smokers.

Relative risk is calculated by dividing mortality rate from a disease among smokers by that among non-smokers. Unfortunately, data for relative risk are not available for Bangladesh, and without RRs or disease prevalence data, it is not possible to estimate PARs. The next step would be to multiply the PAR by the estimated total health care costs for each disease, to find the tobacco-attributable direct health care cost.

### 5.3 Indirect costs

In addition to the direct medical costs discussed in the previous section, illness and premature death also involves indirect costs, measured by the income lost while sick or as a result of premature death. In order to estimate the indirect costs one would need to have an estimate of the number of sick days and the number of years of working life lost on average due to morbidity and premature mortality from smoking-attributable diseases. In addition, estimates of average GDP per capita or average earnings are required in order to place a value on the productivity/income loss. Data on sick days and working days lost due to smoking-attributable diseases are unavailable in Bangladesh. However, in countries for which estimates of indirect costs have been able to be done, the indirect costs are several times higher than the direct medical costs.

### 5.4 Gross or net costs?

Once total health care costs attributable to tobacco use are calculated for a country, the final step would be to estimate the net increase in health care costs caused by tobacco use. This involves estimating the expected health care costs that smokers would have incurred, had they not smoked. The “counterfactual” expected costs are subtracted from gross tobacco-attributable costs to derive the net addition to health care spending caused by tobacco use. Typically, annual health care costs are higher for tobacco users, but because they die earlier, there is less difference in life-time health care costs. But the opportunity cost of tobacco use, and the indirect costs from lost income if a smoker becomes ill or dies at a young age, still loom large.

## 6. RECOMMENDATIONS

The evidence reviewed in this study notes that consumption of tobacco and tobacco products harms health and threatens lives, and can be held responsible, at least to some extent, for increasing malnutrition in Bangladesh. However, tobacco is an important source of government revenue. Therefore, formulating and implementing tobacco control policies should be done with care.

Policies to reduce the demand for tobacco are recommended. Both price and non-price measures should be applied. Based on the analysis presented in this report, it is evident that an increase in prices through an increase in tax rates will reduce demand. For cigarettes, it is estimated that for each 10% increase in price, demand will fall by almost 3%, while total tax revenues will rise. But tax increase are not as a complete strategy. Non-price measures such as raising awareness about the harm caused by tobacco use and the benefits of quitting, banning all advertising – or requiring prominent and strong health warnings and information to be shown with all advertising, and banning smoking in public places should be used as well.

As mentioned before there are some concerns among Bangladeshi policy-makers with regard to implementing tobacco control policies. Since the analysis presented here reveals that the price elasticity of demand for tobacco in Bangladesh is low, demand for tobacco will show modest (but worthwhile) reductions if prices increase. Without increases in real prices, increasing incomes and rising population numbers will continue to cause increases in total tobacco product consumption in Bangladesh, with serious negative consequences for those who use tobacco and their families. Supply should be left to adjust to changes in demand. In the much longer term, if trends gradually reverse so that demand levels off or even declines, there will be time for all the agents concerned to adjust to changing circumstances such as growing alternative crops, changing enterprises, and looking for alternative jobs. These adjustments will be made much easier by the fact that as consumers switch expenditures away from tobacco products to food and other goods and services, demand for these other products will grow, creating new income-earning and job opportunities across the economy, to replace those that may be lost in the tobacco industry.

In order to tackle the problems of smuggling of tobacco products, the relevant policies of neighbouring countries should also be taken into consideration while implementing tobacco control policies. All the countries of the region should come together in formulating and adopting stronger tobacco control policies.

In concrete terms, the following policy options may be taken into consideration in order to formulate tobacco control policies in Bangladesh.

- Increase prices by at least 5% annually in real terms through raising taxes on tobacco products. Higher prices are likely to have a particularly strong effect in motivating poor tobacco users and young people to quit, or deterring them from starting to use tobacco products.

- Tobacco manufacturing industries should also be made responsible for informing people about the damaging aspects of tobacco use, requiring much larger, stronger and more specific and informative health warnings on all tobacco product packages and advertisements, so long as advertising is still permitted.
- The government should impose a comprehensive ban on all forms of promotion of tobacco products including advertising and sponsorship.
- Government should declare all public places tobacco-free, and educate the public on the benefits and reasons, to increase compliance.
- Nongovernmental organizations and civil associations should be asked to integrate the issue of tobacco control in their activities.

Further research should be undertaken in order to analyse the impact of tobacco control on employment, crop diversification, trade and smuggling. A detailed study estimating the medical costs attributable to smoking is also required.

## APPENDIX: DEMAND ELASTICITIES

Consumer demand relates the consumption of a particular commodity to its price, price of its substitute and complement commodities, consumer income, taste, etc., at any point in time. According to neoclassical microeconomic theory, a demand function relates the choice of the optimum level of a commodity that maximizes consumers' total utility subject to their budget constraint or minimizes consumers' total outlay necessary to obtain some desired level of utility. Demand functions are, therefore, derived from analysis of consumer behaviour that deals either with utility maximization or cost (total outlay) minimization.

### Applied demand model

As pointed out by Barten (1977), there is, in principle, an infinite number of possible functional forms for an empirical demand model. The following is a simple but important one.

### Stone's analysis

Early empirical demand analysis was based mainly on the single equation method and paid less attention to theory. Stone (1954) first used theory to define and modify the equations to be applied to the data.

Stone (1954) used the following logarithmic demand function:

$$\log q_i = \alpha_i + e_i \log y + \sum_k e_{ik} \log p_k \quad (1)$$

where  $e_i$  = expenditure elasticity and  $e_{ik}$  = cross-price elasticities,  $p_k$  are prices of commodities and  $q_i$  are the quantities demanded. Stone decomposes the cross elasticities according to the Slutsky equation:

$$e_{ik} = e_{ik}^* - e_i w_k \quad (2)$$

where  $e_{ik}^*$  = compensated cross price elasticity and  $w_k$  = budget share. Substituting (2) into (1) we obtain:

$$\log q_i = \alpha_i + e_i \log y + \sum_k (e_{ik}^* - e_i w_k) \log p_k$$

or

$$\log q_i = \alpha_i + e_i \left( \log y - \sum_k w_k \log p_k \right) + \sum_k e_{ik}^* \log p_k \quad (3)$$

$\sum_k w_k \log p_k$  can be thought as the logarithm of the price index  $P$ . Hence, equation (3) can be rewritten as:

$$\log q_i = \alpha_i + e_i \log \left( \frac{y}{P} \right) + \sum_k e_{ik}^* \log p_k \quad (4)$$

Equation (4) expresses demand as a function of real expenditure and compensated prices. Stone (1954) then adds a homogeneity restriction. This implies:

$$\sum_k e_{ik}^* = 0 \quad (5)$$

This can then be used to allow deflation of all prices in (4) by the general index  $P$ . Equation (4) can then be written as:

$$\log q_i = \alpha_i + e_i \log \left( \frac{y}{P} \right) + \sum_k e_{ik}^* \log \left( \frac{p_k}{P} \right) \quad (6)$$

This equation is the basis for most of Stone's analysis. Following the above equation, the present study proposes to estimate the following demand equation:

$$\log Q = a + b \log Y + c \log P \quad (7)$$

where  $Q$  represents quantity demanded,  $Y$  represents real income and  $P$  represents real prices.



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