

Smoking-attributable mortality in Bangladesh: proportional mortality study

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Objective To directly estimate how much smoking contributes to cause-specific mortality in Bangladesh.

Methods A case-control study was conducted with surveillance data from Matlab, a rural subdistrict. Cases ($n = 2213$) and controls ($n = 261$) were men aged 25 to 69 years who had died between 2003 and 2010 from smoking-related and non-smoking-related causes, respectively. Cause-specific odds ratios (ORs) were calculated for "ever-smokers" versus "never-smokers", with adjustment for education, tobacco chewing status and age. Smoking-attributable deaths among cases, national attributable fractions and cumulative probability of surviving from 25 to 69 years of age among ever-smokers and never-smokers were also calculated.

Findings The fraction of ever-smokers was about 84% among cases and 73% among controls (OR: 1.7; 99% confidence interval, CI: 1.1–2.5). ORs were highest for cancers and lower for respiratory, vascular and other diseases. A dose-response relationship was noted between age at smoking initiation and daily number of cigarettes or bidis smoked and the risk of death. Among 25-year-old Bangladeshi men, 32% of ever-smokers will die before reaching 70 years of age, compared with 19% of never-smokers. In 2010, about 25% of all deaths observed in Bangladeshi men aged 25 to 69 years (i.e. 42 000 deaths) were attributable to smoking.

Conclusion Smoking causes about 25% of all deaths in Bangladeshi men aged 25 to 69 years and an average loss of seven years of life per smoker. Without a substantial increase in smoking cessation rates, which are low among Bangladeshi men, smoking-attributable deaths in Bangladesh are likely to increase.

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Introduction

Deaths attributable to smoking are projected to increase substantially throughout the 21st century and much of the increase will occur in low- and middle-income countries¹ such as Bangladesh, whose population of 150 million makes it the seventh most populous country in the world. More than half of Bangladeshi men over the age of 25 years smoke cigarettes or bidis, small handmade cigarettes containing about one fourth the amount of tobacco found in cigarettes.² A nationally representative case-control study in neighbouring India showed that in 2010 smoking caused about 20% of all deaths among males aged 30 to 69 years.³ Smoking cessation rates are relatively low in Bangladesh and India,² but Bangladeshi men are, on average, younger than Indian men when they start smoking and they smoke more cigarettes or bidis daily than Indian men.^{2,4} Bidis account for most of the tobacco smoked in India, but in Bangladesh cigarettes represent about half of all the tobacco smoked.

According to recent studies in high-income countries, men and women who start smoking as young adults and do not quit have a threefold risk of dying relative to those who have never smoked.^{5,6} Prospective studies are required to determine whether the same extreme risks hold true for Bangladesh and other low- and middle-income countries. Of the estimated 21.9 million smokers in Bangladesh, 21.2 million are males and only 0.7 million are females. Thus, only the effects of smoking among men can be reliably studied at present.

The objective of this study was to assess the effects of smoking on cause-specific mortality among Bangladeshi men between the ages of 25 and 69 years. We conducted a retrospective case-control study using data on cause of death and smoking status for all men in this age group who died in the subdistrict of Matlab in rural Bangladesh between 2003 and 2010. Although tobacco chewing is common in Bangladesh, its effects will be reported in a separate paper since chewing causes fewer diseases than smoking, most notably oral cancer.⁷

Methods

Study design

As part of the INDEPTH Network, the International Centre for Diarrhoeal Disease Research, Bangladesh (icddr), has maintained a comprehensive Health and Demographic Surveillance System (HDSS) in Matlab, in the district (*zilla*) of Chandpur, since 1966.^{8,9} Matlab is a rural area (*upazila*) located about 55 km south-east of Dhaka, the capital city. It covers 184 km² and has 142 villages, each with about 1500 people. The total population of Matlab is about 225 000. To track fatal events as part of the HDSS, trained field research assistants visit households where a death has occurred from 6 to 12 weeks after the death and administer a structured verbal autopsy questionnaire to any relative who lived with the deceased. The purpose is to obtain from these respondents information on the symptoms, signs and medical details surrounding the

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death. Field staff are instructed not to try to arrive at a diagnosis of the cause of death. Instead, causes of death are assigned by two trained physicians at icddr, in accordance with the *International statistical classification of diseases and related health problems, tenth revision* (ICD-10) and using standardized disease coding guidelines developed for other INDEPTH sites.^{8,10}

Subjects

Cases were men aged 25 to 69 years of age who had died from causes strongly associated with tobacco smoking:^{1,7,11} cancers of the lung, mouth and larynx (ICD-10 codes: C00–14, C32–34); cancers of the digestive organs (C16–26, C48, D01, D12–13); all other cancers (rest of C00–D48, excluding C60–63 and C69–72); chronic lower respiratory diseases (J40–47); pulmonary tuberculosis (A15–19); all other respiratory diseases (rest of J00–99); stroke (I60–64); ischaemic heart disease (I20–25); all other vascular diseases (rest of I00–99); cirrhosis (K70–77); and other medical causes (rest of A00–R99, excluding the diseases not associated with tobacco smoking, which were the causes of death among controls). Controls were men who had died of causes not associated with tobacco, such as intestinal infections (A00–09); other bacterial diseases (A30–99); viral infections (B01–77); cancers of the male genital organs (C60–63); cancers of the brain and eye (C69–72); endocrine, nutritional and metabolic diseases (E00–07, E25–35, E40–46, E50–64, E70–90); mental and behavioural disorders (F00–99); diseases of the nervous system (G00–99), diseases of the eye and adnexa (H00–95); diseases of the appendix and hernias (K35–40); diseases of the skin (L00–99); diseases of the musculoskeletal system (M00–99); diseases of the genitourinary system (N00–99), and injuries (T00–Y99).

We excluded women from the analyses because the smoking prevalence among Bangladeshi women is very low. According to the nationally representative Global Adult Tobacco Survey, or GATS, in 2009 smoking prevalence among living Bangladeshi women 15 years of age or older was only about 1.5%.² It was somewhat higher, at 5.7%, among deceased women aged 20 years of age or older in our study.

The field questionnaire contained questions on the smoking and alcohol

consumption history of the deceased individual. Smoking history included the type of tobacco smoked (e.g. cigarette or bidi tobacco [combined into a single question]; tobacco for pipe or hookah) or chewed (e.g. betel leaf with or without tobacco, tobacco powder, rolled tobacco); the amount smoked; the age (in years) at initiation and cessation of smoking; and the duration of tobacco smoking or chewing. The field questionnaire did not separate the number of cigarettes from the number of bidis smoked, so we treated them together in the analysis. We excluded 156 men from the analysis because 34 of them drank alcohol, 11 smoked only pipe and the remainder had missing information on smoking status, education or cause of death. We compared “ever-smokers” – i.e. people who smoked at the time of the survey (“current smokers”) or who had smoked in the past (“former smokers”) – with “never-smokers”. This was appropriate because most former smokers (214/324) had smoked for more than 10 years. Moreover, excess hazard depends strongly not only on recent smoking habits but also on smoking habits in early adult life.^{1,7,11}

Statistical methods

We used proportional mortality to relate bidi or cigarette smoking to various specific and general medical causes of death.^{12,13} The assumption behind proportional mortality is that the smoking patterns among the deceased in the control group are similar to those observed in the general population. However, in reality smoking prevalence was lower among the general population of men surveyed in 2009,² than among our deceased controls, perhaps because smoking caused some excess deaths among controls. Thus, the net effect would be an underestimation of the differences between ever-smokers and never-smokers. Other reporting biases should equally affect the cases and controls.¹²

We calculated cause-specific odds ratios (ORs) (as approximations of relative risks [RRs]) for ever-smokers versus never-smokers using logistic regression, with adjustment for educational status (illiterate, below secondary school, secondary school or above), history of tobacco chewing (yes, no) and age (in continuous years). We calculated the smoking-attributable deaths among cases by multiplying the number of ever-smokers among the cases by:

$$1 - \frac{1}{RR} \quad (1)$$

where RR represents the ratio of the odds of death in ever-smokers to the odds of death in never-smokers adjusted for age, education and chewing tobacco status. To calculate the national attributable fractions we used the following standard formula:

$$\frac{p(RR - 1)}{1 + p(RR - 1)} \quad (2)$$

with the RRs derived from the Matlab results and smoking prevalence (p) from the GATS survey in 2009.² About 80% of the Bangladeshi population lives in rural areas similar to Matlab, so the use of the RRs estimated in this study does not introduce a major bias in the calculation of overall national attributable fractions. In Bangladesh, national cause-of-death statistics are based on self-reporting, which can be unreliable.¹⁴ For this reason, to generate national cause-of-death estimates we applied, to the total deaths reported by the United Nations for Bangladesh, the proportions of the major causes of death found in Matlab.¹⁵ In Chandpur *zilla*, the rates of all-cause mortality among adult males are comparable to the rates observed in the whole of Bangladesh, but child mortality rates are lower.¹⁴ We calculated the cumulative probability of surviving from 25 until 69 years of age for ever-smokers and never-smokers, with adjustment for any differences in age, education and use of chewing tobacco. To do so, we combined the RRs estimated from Matlab with national smoking prevalence¹ and age-specific Bangladeshi death rates as reported by the United Nations,¹⁵ following methods described in previous studies.^{3,6}

Results

The Matlab HDSS recorded a total of 9708 deaths among individuals aged 20 years or older (5296 males, 4412 females). Of these deaths, 2474 occurred in men aged 25 to 69 years. **Table 1** presents data for the 2213 cases and 261 controls. Cases were older than controls on average, whereas both groups had similar educational levels and similar rates of use of chewing tobacco. Among

Table 1. **Demographic characteristics of cases and controls in study on the effects of smoking on cause-specific mortality, Matlab, Bangladesh**

Characteristic	No. (%) of cases ^a (n = 2213)	No. (%) of controls ^a (n = 261)
Age at death (years)		
25–29	27 (1.2)	11 (4.2)
30–39	110 (5.0)	39 (14.9)
40–49	330 (14.9)	46 (17.6)
50–59	580 (26.2)	66 (25.3)
60–69	1166 (52.7)	99 (37.9)
Education		
Illiterate	1082 (48.9)	134 (51.3)
Below secondary	1031 (46.6)	117 (44.8)
Secondary or higher	100 (4.5)	10 (3.8)
Tobacco chewing		
Yes ^b	1071 (48.4)	108 (41.4)
No	1142 (51.6)	153 (58.6)
Smoking status		
Current smoker ^c	1557 (70.4)	165 (63.2)
Former smoker	298 (13.5)	26 (10.0)
Never-smoker	358 (16.2)	70 (26.8)

^a Cases and controls were men aged 25 to 69 years who had died between 2003 and 2010 from smoking-related and non-smoking-related causes, respectively.

^b Includes current and former users of chewing tobacco.

^c "Current smoker" applies to those who quit smoking within 5 years of their death. Current and former smokers combined represent ever-smokers.

the deceased, smoking prevalence was highest among those who had been illiterate or between the ages of 40 and 60 years when they died (data not shown).

About 84% (1855/2213) of the cases were ever-smokers (Table 1), as compared with 73% (191/261 data not shown) of the controls. The OR for all causes of death, representing the odds in ever-smokers versus the odds in never-smokers, was 1.7 (99% confidence interval, CI: 1.1–2.5) after adjusting for any differences in age, education and use of chewing tobacco (Table 2). This corresponds to 31% of all 2213 deaths among the cases, equivalent to an excess of 692 deaths among smokers between the ages of 25 and 69 years in Matlab. About 94% of the men who died from cancers of the lung, oral cavity or larynx were ever-smokers (162/172); 103 men died from lung cancer and of these men, 97 were ever-smokers. The ORs were notably lower for digestive organ cancers than for other cancers. The ORs and the proportions of deaths due to smoking were highest for cancers; they were lower or similar for respiratory

Table 2. **Deaths among ever-smokers and odds of dying among ever-smokers versus never-smokers, by cause, and smoking-associated deaths among men aged 25 to 69 years, Matlab, Bangladesh, 2003–2010**

Cause of death	No. of deaths in 2003–2010	No. (%) of ever-smokers among the deceased ^a	OR ^b (99% CI)	No. (%) of excess deaths due to smoking
Cancer of lung, oral cavity or larynx	172	162 (94.2)	5.17 (2.0–13.4)	131 (76)
Cancers of digestive organs	182	141 (77.5)	1.19 (0.6–2.2)	23 (12)
Other cancers	75	64 (85.3)	1.85 (0.7–4.8)	29 (39)
All cancers ^c	429	367 (85.5)	1.94 (1.1–3.3)	183 (43)
Chronic lower respiratory diseases	172	146 (84.9)	1.44 (0.7–2.9)	45 (26)
Pulmonary tuberculosis	78	67 (85.9)	1.82 (0.7–4.7)	30 (39)
Other respiratory diseases	61	52 (85.2)	1.62 (0.6–4.7)	20 (33)
All respiratory diseases	311	265 (85.2)	1.58 (0.9–2.8)	95 (30)
Stroke	193	157 (81.3)	1.42 (0.8–2.6)	46 (24)
Ischaemic heart disease	368	311 (84.5)	1.94 (1.1–3.3)	151 (41)
Other vascular diseases	465	387 (83.2)	1.48 (0.9–2.5)	126 (27)
All vascular diseases	1026	855 (83.3)	1.66 (1.1–2.6)	323 (31)
Cirrhosis	121	100 (82.6)	1.67 (0.8–3.6)	0 (0)
Other medical causes ^d	233	189 (81.1)	1.46 (0.8–2.6)	60 (26)
Ill-defined medical causes	93	79 (84.9)	1.66 (0.7–3.9)	31 (34)
All medical causes ^e	2213	1855 (83.8)	1.68 (1.1–2.5)	692 (31)

CI, confidence interval; OR, odds ratio.

^a Former and current smokers make up the category of "ever-smokers".

^b ORs represent odds of death from specific cause among ever-smokers versus never-smokers, adjusted for age, education and tobacco chewing status.

^c Except those of the male genital organs, brain and eye.

^d All other medical deaths excluding cancer, respiratory, vascular and some deaths from causes not associated with tobacco considered as controls in this study.

^e Deaths from all causes except injury and others not associated with tobacco smoking.

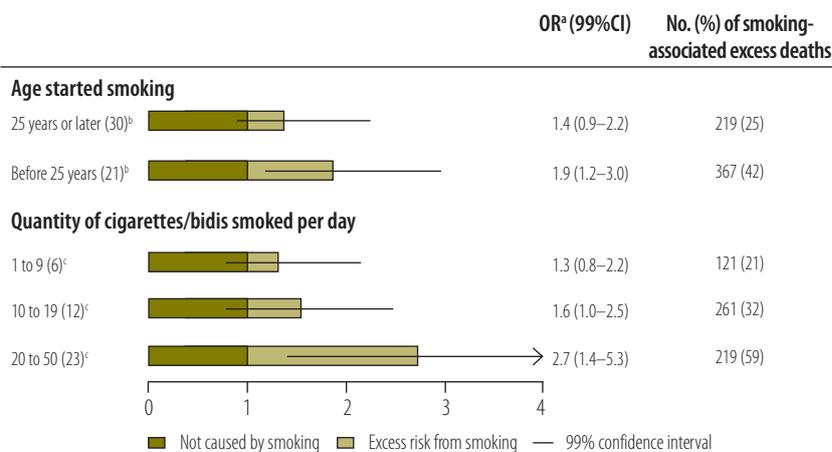
Note: See methods for ICD 10 codes used to define the cases. The 261 controls include all injury deaths and deaths that are not attributable to tobacco smoking (see methods for ICD-10 codes).

diseases, vascular diseases and other medical causes of death.

In Bangladesh, men aged 25 to 69 years initiate smoking at an average age of 18.6 years (Appendix A, available at: www.cghr.org/tobacco) and nearly all smokers report having initiated smoking before the age of 25 years.² As shown in Fig. 1, in our study, those who started smoking before this age had greater odds of dying than never-smokers (OR: 1.9) and than those who started smoking after the age of 25 years (OR: 1.4; χ^2 test for trend 12.1; $P < 0.0001$). The mean daily number of cigarettes or bidis smoked by males who died was 11. A dose-response analysis (comparing 1757 ever-smokers with 438 never-smokers for whom information on smoking amount was available) showed that those smokers who consumed from 20 to 50 (mean: 23) cigarettes or bidis per day had a much higher odds of dying (OR: 2.7) when compared with never-smokers, than those who consumed 10 to 19 cigarettes or bidis (mean: 12) daily (OR: 1.6) or than those who smoked 1 to 9 (mean: 6) cigarettes or bidis a day (OR: 1.3; χ^2 test for trend 16.3; $P < 0.001$).

Applying the Matlab relative risk to the national death totals suggests that about 42 800 Bangladeshi men aged 25 to 69 years died in 2010 from smoking-attributable diseases. This was equivalent to about 25% of the 172 200 deaths from all diseases in men in this age group in 2010 (Table 3). We did not

Fig. 1. Odds ratios (ORs) and excess deaths due to smoking, by age of smoking initiation and daily number of cigarettes or bidis smoked by men aged 25 to 69 years, Bangladesh, 2003–2010



^a ORs represent the odds of dying among ever-smokers relative to the odds among never-smokers, adjusted for age, education and tobacco chewing status.

^b The figure in parentheses is the median age of smoking initiation.

^c The figure in parentheses is the mean number of cigarettes or bidis smoked.

attribute to smoking any deaths from cirrhosis, ill-defined conditions or injury. Of the smoking-attributable deaths, about 50% (21 700/42 800) were caused by vascular disease and about 26% by cancer (11 400).

The cumulative probability of dying between the ages of 25 and 69 years was much higher for ever-smokers than for never-smokers (Fig. 2). At this death rate, 32% of 25-year-old Bangladeshi male ever-smokers would die before the age of 70 years, versus only 19% of 25-year-old never-smokers. Marked

differences in the risk of death between ever-smokers and never-smokers were seen among those as young as 60 years – 14% dead by that age among smokers; only 8% dead among never-smokers. These data suggest that the average 25-year-old Bangladeshi male smoker currently loses an average of seven years of life because of smoking.

Discussion

Bangladeshi men between the ages of 25 and 69 years who have smoked at some

Table 3. Estimated smoking-attributable deaths, by cause, among men aged 25 to 69 years and population-attributable fraction, Bangladesh, 2010

Cause of death	No. of deaths in 2003–2010	All Bangladesh, 2010		
		Smoking-attributable deaths (thousands) ^a	Total deaths (thousands) ^b	Population-attributable fraction (%)
All vascular diseases	1026	21.7	71.4	30.3
All cancers ^c	429	11.4	29.9	38.3
Respiratory diseases except tuberculosis	233	4.0	16.2	24.4
Other medical causes ^d	233	3.8	16.2	23.3
Pulmonary tuberculosis	78	1.9	5.4	35.1
Cirrhosis	121	0.0	8.4	0.0
Ill-defined cause	93	0.0	6.5	0.0
Injury/other cause not associated with tobacco	261	0.0	18.2	0.0
Total	2474	42.8	172.2	24.8

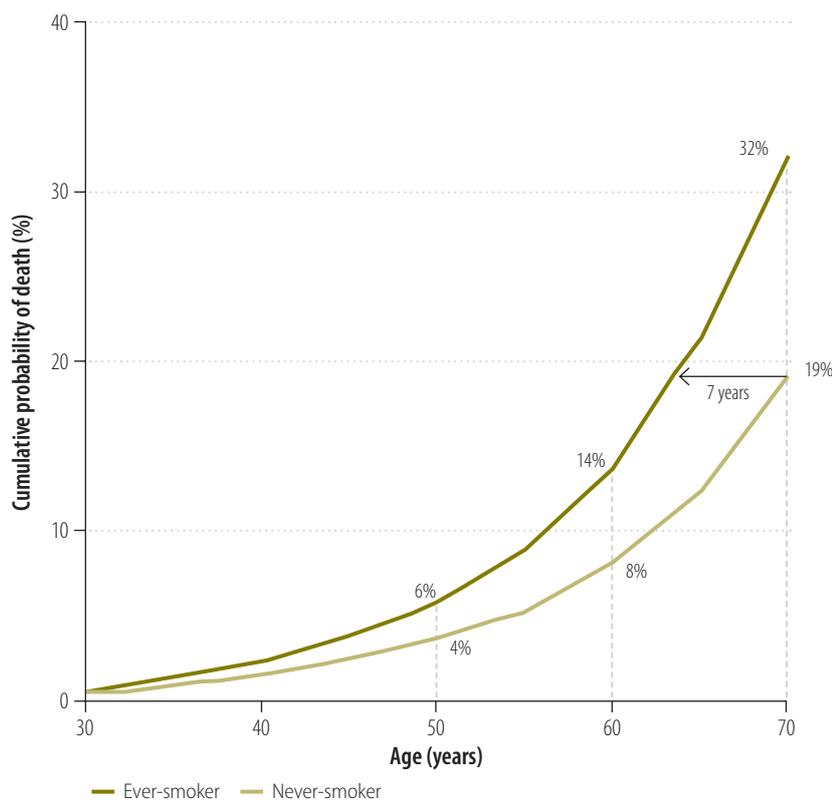
^a Smoking prevalence of 66% noted in the GATS² was used to calculate smoking attributable deaths.

^b Cause-specific total deaths were estimated by multiplying total deaths as reported by the United Nations by proportions of cause-specific deaths in study.

^c Except those of the male genital organs, brain and eye.

^d All other deaths from medical causes except cancer, respiratory diseases, vascular diseases and deaths not associated with tobacco smoking (considered as controls in this study).

Fig. 2. Cumulative probability of dying between the ages of 25 and 69 years among male ever-smokers and never-smokers in Bangladesh, at 2010 death rates



Note: The horizontal arrow shows that the death rates experienced by never-smokers at the age of 70 years are experienced seven years earlier by ever-smokers. Thus, smokers lose seven years of life on average. This combines a loss of zero years among smokers not killed by smoking with a loss of far more than seven years among those killed by smoking.

point have a risk of dying of a tobacco-related disease that is 70% higher than the risk among never-smokers of similar age, educational level and tobacco chewing status. Our cases were men who had died from diseases that have been causally associated with smoking in other studies^{1,3,5-7,11-12} and we observed a well-defined dose-response relationship between age at smoking initiation and the number of cigarettes or bidis smoked and the risk of dying. Admittedly, however, not all smokers died of diseases associated with tobacco-attributable diseases and not all such diseases occurred among smokers. Thus, smoking is an important cause of most, but not all, of the excess deaths among smokers in Bangladesh. Cumulative survival analysis revealed that a typical Bangladeshi smoker currently loses about seven years of life because of smoking. This combines an average loss of zero years of life for some smokers not killed by smoking with a loss far in excess of seven years in some smokers who were killed by smoking.

The ORs for ever-smokers versus never-smokers are slightly higher among Bangladeshi men than among Indian men (OR: 1.6).³ The proportion of all deaths in men aged 25 to 69 years that is due to smoking is also higher in Bangladesh (25%) than in India (20%). Subtle but potentially important differences in smoking patterns between the two countries might have an influence on the risk of specific diseases. Bangladeshi bidis are wrapped in cigarette paper rather than the *tendu* leaf commonly used to wrap Indian bidis. Cigarette smoking is much more common among Bangladeshi males than Indian males.^{2,4} In our study, lung cancer caused more than 10% of the deaths among smokers in Bangladesh (5300/42 800) but a much smaller proportion of the deaths among smokers in India.³ By contrast, pulmonary tuberculosis accounted for only 4% (2000) of the deaths among smokers in our study but for a much higher proportion of the deaths in Indian smokers.³ This may be because

prompt short-course tuberculosis treatment is available in Matlab.¹⁶

Bangladeshi men have higher smoking cessation rates than Indian men but initiate smoking at a younger age and smoke more sticks on a given day.^{2,4} Smoking may well have caused some of the deaths we defined as our controls, such as deaths from diabetes. Thus, we may be underestimating the true risk of death from smoking in Bangladeshi men. Moreover, there was a higher proportion of ever-smokers among our controls (73%) than among the males of the same age in the GATS (66%).²

One of the strengths of the proportional mortality method is that most biases, such as recall bias, would apply to cases and controls equally.¹² Indeed, we observed few differences between cases and controls in terms of education and tobacco chewing. Few Bangladeshis report drinking alcohol¹⁷ and we excluded any self-reported drinkers. However, the 121 deaths from cirrhosis suggest that in Bangladesh drinking is underreported for cultural reasons. The elevated risk of dying from cirrhosis observed in ever-smokers relative to never-smokers suggests that most of the heavy alcohol drinkers also smoked and vice versa. The combination of drinking and smoking should also exist among controls, many of whom died of injuries. Thus, we might be slightly underestimating the risks of smoking. However, the exclusion of men who drank alcohol does not explain the marked differences in mortality observed between ever-smokers and never-smokers. Deaths in the control group ($n = 261$) were fewer than ideal. Consequently, the ORs associated with specific diseases had wide CIs. However, the cause-specific ORs in our study are consistent with those seen in India^{3,18,19} and other Asian countries.¹² Similarly, some deaths may have been assigned to the wrong cause on verbal autopsy.^{20,21} This would tend to raise the ratio of the risk in smokers to the risk in non-smokers in the case of some diseases and to lower this ratio in the case of others. The proportion of vascular deaths among all deaths in men in Matlab (about 41%) is higher than the proportion seen in crude national cause-of-death patterns in Bangladesh or the proportion seen in India in men of comparable age.^{3,14} Thus, we might be overestimating the absolute number of smoking-attributable deaths from vascular disease (but not the odds).

However, the computed ORs and the absolute number of smoking-attributable deaths from any cause are affected less, if at all, by the misclassification of specific diseases. Most of the misclassification on verbal autopsy is confined to people who die in old age.²⁰ Our study focused on men aged 25 to 69 years and fewer than 4% of the deaths among these men were assigned to ill-defined causes.

Bangladesh already has about 20 million male smokers and it is likely that they will experience a loss in lifespan of more than the seven years that we estimated in this study. Bangladeshi men still smoke fewer cigarettes per day and initiate smoking at a later age than men in most high-income countries. Urban male smokers in Bangladesh consume more cigarettes than bidis and smoke more per day than rural smokers.² Recent increases in income in Bangladesh have also made smoking relatively more affordable.²² For cultural reasons, few women smoke in Bangladesh, but there is no guarantee that this will hold in the future. Recent prospective studies in high-income countries have shown that male or female lifelong smokers who start smoking as young adults and do not quit have an excess risk of dying 200% as high – corresponding to an RR three

times as high – as ever-smokers and live, on average, one decade less than never-smokers.^{5,6} Indeed, Indian men who smoke cigarettes in these large quantities already appear to be losing a decade of life.³ Of Bangladeshi men aged 45 to 64 years, only 15% are former smokers and 63% are current smokers.² By contrast, in the United States of America, where smoking cessation has become common, former smokers are about three times more numerous than current smokers among men this same age.⁶

About one quarter of the deaths in Bangladeshi men between the ages of 25 and 69 years are due to smoking. Tobacco control in Bangladesh is still at an early stage; the Smoking and Tobacco Products Usage (Control) Act, which was passed in 2005, has been implemented only partially.²² Efforts to accelerate tobacco control in Bangladesh are warranted. Cigarette prices in the country are among the lowest in the world; bidis are even cheaper than cigarettes.²² Hence, the most effective way to encourage smoking cessation in Bangladesh would probably be to impose a substantial excise tax on tobacco products. Prominent warning labels using graphic images, bans on smoking in public places, strict restrictions

on tobacco advertising and promotion, and expanded access to smoking cessation services are other interventions that can be implemented in Bangladesh to encourage men to stop smoking and deter women and youth from taking up smoking.^{1,23} ■

Acknowledgements

This paper is dedicated to the late Sir Richard Doll (1912–2005), who would have turned 100 on 28 October 2012. The opinions expressed here are those of the authors and do not necessarily represent those of the institutions where the authors are employed.

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Competing interests: None declared.

ملخص

معدل الوفيات بسبب التدخين في بنغلاديش: دراسة معدل الوفيات التناسلي

الغرض التقدير المباشر لمدى مساهمة التدخين في التسبب في الوفيات في بنغلاديش. الطريقة أجريت دراسة حالة مقارنة مع بيانات ترصد من ماتلاب، وهي منطقة فرعية ريفية. وكانت الحالات (العدد = 2213) والضوابط (العدد = 261) لرجال تتراوح أعمارهم من 25 إلى 69 عاماً لقوا حتفهم بين عامي 2003 و2010 لأسباب تتعلق بالتدخين وأسباب لا تتعلق بالتدخين على التوالي. وتم حساب نسب الأرجحية محددة الأسباب (ORs) لدى "المدخنين الدائمين" مقابل "غير المدخنين مطلقاً"، مع إدخال تعديلات خاصة بالتعليم وحالة مضغ التبغ والسن. كما تم أيضاً حساب الوفيات بسبب التدخين بين الحالات، والكسور التي تنسب لأسباب على الصعيد الوطني، والاحتمال التراكمي للبقاء على قيد الحياة من سن 25 إلى 69 عاماً بين المدخنين الدائمين وغير المدخنين مطلقاً. النتائج كانت نسب الكسور لدى المدخنين الدائمين حوالي 84٪ بين الحالات و73٪ بين الضوابط (نسبة الأرجحية: 1.7: 0.99). فاصل ثقة، فاصل الثقة: 1.1 - 2.5). وبلغت نسب

الأرجحية أعلى معدلاتها لأمراض السرطان والجهاز التنفسي السفلي وأمراض الأوعية الدموية وغيرها. ولوحظ وجود علاقة بين الاستجابة للجرعة والعمر عند بدء التدخين والعدد اليومي للسجائر أو سجاير البيدي التي يتم تدخينها وخطر الموت. وبين الرجال البنغلاديشيين البالغين من العمر 25 عاماً، نجد أن 32٪ من المدخنين الدائمين سوف يموتون قبل بلوغهم سن 70 عاماً من العمر، مقارنة بنسبة 19٪ من الذين لا يدخنون مطلقاً. وفي عام 2010، كانت نسبة 25٪ من كل الوفيات التي تمت ملاحظتها في الرجال البنغلاديشيين الذين تتراوح أعمارهم من 25 إلى 69 عاماً (أي 42000 حالة وفاة) ترجع إلى التدخين. الاستنتاج يتسبب التدخين في حوالي 25٪ من حالات الوفيات في الرجال في بنغلاديش الذين تتراوح أعمارهم من 25 إلى 69 عاماً، وإلى خسارة ما متوسطه سبع سنوات من حياة كل مدخن. وبدون زيادة كبيرة في معدلات الإقلاع عن التدخين، المنخفضة بين الرجال في بنغلاديش، من المرجح أن تزداد الوفيات بسبب التدخين في بنغلاديش.

摘要**孟加拉国归因于吸烟的死亡率：比例死亡率研究**

目的 直接估算吸烟对孟加拉国死因别死亡率有多大的贡献。

方法 使用来自农村小区 Matlab 的监测数据进行病例对照研究。病例组 ($n=2213$) 和对照组 ($n=261$) 分别是 2003 年到 2010 年间因吸烟相关和非吸烟相关原因死亡的 25 岁到 69 岁的男性。计算“曾经吸烟者”和“非吸烟者”的死因别优势比 (OR), 计算中针对教育程度、嚼烟草状态和年龄进行调整。还计算了病例中的吸烟归因死亡、全国可归因分数以及 25 岁到 69 岁曾经吸烟者和非吸烟者中的累计生存概率。

结果 曾经吸烟者的分数在病例组中约为 84%, 在对照组中为 73% (OR : 1.7 ; 99% 置信区间, CI : 1.1 – 2.5)。

OR 对于癌症来说最高, 对于呼吸道、血管和其他疾病来说较低。在开始吸烟年龄以及每日吸食香烟或比迪烟数与死亡风险之间有明显的剂量 - 反应关系。在 25 岁孟加拉国男性中, 32% 的曾经吸烟者将活不到 70 岁, 非吸烟者的这个比例则是 19%。在 2010 年孟加拉国有案可查的 25 岁到 69 岁男性的全部死亡 (即 4.2 万例死亡) 中, 大约 25% 可归因于吸烟。

结论 在孟加拉国 25 岁到 69 岁男性的全部死亡中, 吸烟造成的死亡约占 25%, 每名吸烟者平均损失七年的寿命。如果没有戒烟率的显著提高 (这个比例在孟加拉国男性中很低), 可归因于吸烟的死亡很可能还会增加。

Résumé**Mortalité attribuable au tabagisme au Bangladesh: une étude proportionnelle de la mortalité**

Objectif Estimer la contribution directe du tabagisme à la mortalité par cause au Bangladesh.

Méthodes Une étude cas-témoins a été menée avec les données de surveillance de Matlab, un sous-district rural. Les cas ($n=2213$) et les contrôles ($n=261$) étaient des hommes âgés de 25 à 69 ans décédés entre 2003 et 2010 des suites ou non du tabagisme, respectivement. Les rapports des cotes (RC) par cause ont été calculés pour les « fumeurs depuis toujours » par rapport aux « non-fumeurs », avec un ajustement pour l'éducation, la consommation de tabac à mâcher et l'âge. On a également calculé les décès attribuables au tabagisme parmi les cas, les fractions attribuables à la population nationale et la probabilité de survie de 25 à 69 ans chez les fumeurs depuis toujours et chez les non-fumeurs.

Résultats La fraction des fumeurs depuis toujours était d'environ 84% chez les cas et de 73% chez les contrôles (RC: 1,7; intervalle de confiance de 99%, IC: 1,1–2,5). Les rapports de cotes étaient les plus élevés pour

les cancers et plus bas pour les maladies respiratoires, vasculaires et autres. Une relation dose-réponse a été notée entre l'âge de l'initiation au tabagisme et le nombre de cigarettes ou de « bidi » fumées chaque jour et le risque de mortalité. Chez les hommes du Bangladesh de 25 ans, 32% des fumeurs depuis toujours mourront avant l'âge de 70 ans, par rapport à 19% pour les non-fumeurs. En 2010, environ 25% de tous les décès observés chez les hommes du Bangladesh âgés de 25 à 69 ans (c'est-à-dire 42 000 décès) étaient attribuables au tabagisme.

Conclusion Le tabagisme est à l'origine de 25% de tous les décès chez les hommes du Bangladesh âgés de 25 à 69 ans, et d'une perte moyenne de 7 années de vie pour les fumeurs. Sans une augmentation importante des taux d'abandon du tabac, qui sont faibles chez les hommes du Bangladesh, les décès attribuables au tabagisme augmenteront probablement dans ce pays.

Резюме**Сопряженная с курением смертность в Бангладеш: пропорциональное исследование смертности**

Цель Напрямую оценить влияние курения на показатели причинно-обусловленной смертности в Бангладеш.

Методы Исследование методом «случай-контроль» проводилось по данным наблюдений в аграрном подокруге Матлаб. Популяцию исследования ($n=2213$) и контрольную группу ($n=261$) составили мужчины в возрасте 25-69 лет, умершие в период между 2003 и 2010 годом в силу связанных и не связанных с курением причин. Были рассчитаны отношения рисков (ОР) по конкретным причинам смерти для «постоянно куривших» и «никогда не куривших» лиц, с поправками на уровень полученного образования, отношение к жеванию табака и возраст. Также были вычислены доля связанных с курением смертей среди включенных в исследование случаев смерти, национальные коэффициенты и интегральная вероятность выживания лиц в возрасте 25-69 лет для постоянно курящего и никогда не курившего населения.

Результаты Доля постоянно куривших составила 84% среди исследованных случаев и 73% в контрольной группе (ОР: 1,7;

доверительный интервал (ДИ) 99%: 1,1–2,5). Наиболее высокие риски были отмечены для онкологических заболеваний, наименее высокие — для респираторных, сердечно-сосудистых и других заболеваний. Была установлена связь «доза-эффект» возраста начала курения и количества ежедневно выкуриваемых сигарет или биди с риском смерти. 32% постоянно курящих 25-летних бангладешских мужчин не доживут до 70-летнего возраста, тогда как среди некурящих эта доля составит 19%. В 2010 году около 25% всех смертей бангладешских мужчин в возрасте 25-69 лет (т. е. 42 000 смертей) были связаны с курением.

Вывод Курение является причиной примерно 25% смертей у бангладешских мужчин в возрасте 25-69 лет и снижает продолжительность жизни курильщиков в среднем на семь лет. Весьма вероятно, что в отсутствие существенного увеличения темпов отказа от курения (весьма низких среди бангладешских мужчин) сопряженная с курением смертность в Бангладеш продолжит расти.

Resumen

Mortalidad atribuible al tabaquismo en Bangladesh: estudio de mortalidad proporcional

Objetivo Estimar directamente la medida en la que el tabaquismo contribuye a la mortalidad por causa específica en Bangladesh.

Métodos Se realizó un estudio de casos y controles con datos de vigilancia de Matlab, un subdistrito rural. Los casos ($n=2213$) y los controles ($n=261$) se trataron de hombres de edades entre 25 y 69 años que habían fallecido entre 2003 y 2010 por causas relacionadas y no relacionadas con el tabaquismo, respectivamente. Las razones de posibilidades por causa específica se calcularon para los «fumadores de siempre» frente a los «nunca fumadores», ajustando la educación, el consumo de tabaco de mascar y la edad. También se calcularon las muertes atribuibles al tabaquismo entre los casos, las fracciones nacionales atribuibles y la probabilidad acumulada de sobrevivir de los 25 a los 69 años de edad entre los fumadores de siempre y los nunca fumadores.

Resultados La fracción de fumadores de siempre fue de aproximadamente el 84% entre los casos y el 73% entre los controles (razón de posibilidades: 1,7; intervalo de confianza 99%: 1,1–2,5). Las

razones de posibilidades fueron las mayores en casos de cánceres y menores en casos de enfermedades vasculares, respiratorias y de otros tipos. Se señaló una relación dosis-respuesta entre la edad de la iniciación en el tabaquismo y el número diario de cigarrillos o *bidis* fumados y el riesgo de muerte. Entre los hombres de Bangladesh de 25 años, el 32% de los fumadores de siempre fallecerán antes de alcanzar los 70 años, comparado con el 19% de los nunca fumadores. En 2010, aproximadamente el 25% de las muertes observadas en los hombres de Bangladesh de entre 25 y 69 años (42 000 muertes) fueron atribuibles al tabaquismo.

Conclusión El tabaquismo causa aproximadamente el 25% de todas las muertes en los hombres de Bangladesh de entre 25 y 69 años y una pérdida media de siete años de vida en cada fumador. Sin un aumento significativo en las tasas de abandono del tabaquismo, que son bajas entre los hombres de Bangladesh, es probable que aumenten las muertes atribuibles al tabaquismo en Bangladesh.

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