

## Selected Summaries

### Smoking and mortality: Data from India

Jha P, Jacob B, Gajalakshmi V, Gupta PC, Dhingra N, Kumar R, Sinha DN, Dikshit RP, Parida DK, Kamadod R, Boreham J, Peto R. (Centre for Global Health Research, Toronto; the Epidemiological Research Centre, Chennai; Healis-Sekhsaria Institute for Public Health, Mumbai; the Rural Health Training Centre, Najafgarh, New Delhi; the School of Public Health, Post Graduate Institute of Medical Education and Research, Chandigarh; the School of Preventative Oncology, Patna; Tata Memorial Hospital, Mumbai; and North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences, Shillong, India; and the Clinical Trial Service Unit and Epidemiological Studies Unit, University of Oxford, Oxford, United Kingdom.) A nationally representative case-control study of smoking and death in India. *N Engl J Med* 2008;**358**:1137-47.

#### SUMMARY

This article has estimated the number of tobacco-related deaths in India. Data from the Sample Registration System of the Registrar General of India were used to locate 33 069 women and 41 054 men. These deaths were recorded between 2001 and 2003. The cases were distributed in 1.1 million homes in 6671 small (about 1000 persons per area) areas chosen randomly from all parts of India. The prevalence of smoking among the case subjects was compared with 34 857 living women and 43 078 living men. The control subjects were the same persons who answered questions about the deceased subjects. Controls were not matched with the cases. Each home was visited by a non-medical field worker to collect information about the cause of death, history of tobacco and alcohol use, and educational status. History of smoking in the previous 5 years was recorded for each case and control. The underlying causes of all deaths were sought by verbal autopsy. Two trained physicians independently assigned a 3-digit code from the International Classification of Diseases, 10th Revision. Women and men were analysed separately. Logistic regression analysis was used to adjust for age, educational level, and use or non-use of alcohol. The main emphasis of the researchers was on the age-group of 30-69 years as deaths during these ages involve substantially more years of productive life lost than do deaths at older ages. Also, the assignment of underlying causes of death is more reliable for persons in this age range. The authors found that persons who died were older, less educated and had a higher prevalence of smoking, tobacco chewing and alcohol use than did living control subjects. About 5% of female control subjects and 37% of male control subjects between the ages of 30 and 69 years were smokers. In this age group, smoking was associated with an increased risk of death from any medical cause among both women (risk ratio 2.0; 99% confidence interval [CI] 1.8-2.3) and men (risk ratio 1.7; 99% CI 1.6-1.8). Tuberculosis was the main cause of excess deaths among smokers, as compared with non-smokers among both women (risk ratio 3.0; 99% CI 2.4-3.9) and men (risk ratio 2.3; 99% CI 2.1-2.6). The other causes were respiratory, vascular or neoplastic diseases. Dose-response relationship was evident between smoking and mortality among men. Among those who smoked 1-7 cigarettes per day (mean: 4 per day), smoking-associated excess deaths accounted for almost half of deaths from any medical cause (risk ratio 1.8). Smoking

was associated with a reduction in median survival of 8 years for women (99% CI 5-11) and 6 years for men (99% CI 5-7). Smoking in persons in the age group of 30-69 years was responsible for about 1 in 20 deaths of women and 1 in 5 deaths of men. The authors concluded that in 2010, smoking would cause about 930 000 adult deaths in India. Of these deaths, about 70% will be in the productive age group of 30-69 years.

#### COMMENT

It is known that tobacco kills in many forms, but accurate estimates of the number of people actually dying due to this were not available. Jha *et al.* have put a number on the toll taken by smoking tobacco in India where more and younger people are adopting tobacco.<sup>1</sup>

A systematic review of articles on the prevalence of adult smoking found that more than 1.1 billion people worldwide smoke, with about 82% of smokers residing in low- and middle-income countries.<sup>2</sup> Secondary data analysis of the National Family Health Survey-2 (1998-99) showed that 47% of men and 14% of women  $\geq 15$  years of age either smoked or chewed tobacco, which translates to almost 195 million people in India. Tobacco consumption is higher among the poor, less educated, scheduled castes and scheduled tribe populations.<sup>3</sup>

The risk of death associated with smoking is high and about half to two-thirds of long term smokers eventually die because of their addiction. About half of all tobacco deaths occur between 35 and 69 years of age, resulting in the loss of 20-25 years of life, compared with the life expectancy of non-smokers.<sup>4</sup> It is estimated that about 5 million people die annually worldwide due to tobacco use, accounting for 1 in every 5 male deaths and 1 in 20 female deaths of those  $>30$  years of age. Tobacco causes a huge economic loss to India. The cost of tobacco-attributed burden of 3 groups of diseases—cancer, heart and lung—was estimated to be Rs 308.333 billion in 2002-03.<sup>6</sup>

There are many ways to prevent the untimely deaths of millions of people worldwide due to tobacco products. Studies have shown that cessation of smoking reduces the risk of many smoking-related morbidities. A study among men in 4 European countries has shown that for men who quit smoking at the age of 40 years, the excess lung cancer risk avoided was 85%, 91% and 80% in the United Kingdom, Germany and Italy, respectively.<sup>7</sup> There are many ways by which the demand for tobacco may be reduced. In high-income countries taxes on tobacco products are high, whereas these are low in low- and middle-income countries such as India. Many studies from high-income countries show that an increase in taxes on cigarettes and other tobacco products led to a significant reduction in cigarette smoking and other tobacco use.<sup>8</sup> Legislation restricting smoking in a variety of public places and private worksites reduces the opportunities for smokers to smoke as well as exposure to passive smokers. The other but little controversial area of intervention is a ban on all form of advertising of tobacco products.<sup>9</sup> Last but an equally important intervention is tobacco cessation treatment. Pharmacological treatments significantly improve the likelihood of quitting, with success rates 2-3 times those when pharmacological treatments are not used. However, tobacco cessation is in the nascent stage in India.

Verbal autopsy was done for 1 million people in China who died during 1986-88 to know the exact cause of death and causes

attributed to tobacco.<sup>10</sup> Among male smokers 35–69 years of age there was a 51% excess of neoplastic deaths, a 31% excess of respiratory deaths, and a 15% excess of vascular deaths. Of all deaths attributed to tobacco, 45% were due to chronic obstructive pulmonary disease and 15% to lung cancer. Oesophageal cancer, stomach cancer, liver cancer, tuberculosis, stroke and ischaemic heart disease each caused 5%–8% of deaths. Tobacco caused about 0.6 million deaths in China in 1990 (0.5 million men).

The authors have shown that of all the causes of death, tuberculosis was the cause most related to smoking. This makes one wonder whether smoking is a risk factor for the occurrence of tuberculosis infection and disease. A meta-analysis to quantify the relationship between active tobacco smoking and tuberculosis infection, pulmonary disease and mortality included 24 studies. For tuberculosis infection, the summary relative risk (RR) estimate was 1.73 (95% CI 1.46–2.04); for tuberculosis disease, estimates ranged from 2.33 (95% CI 1.97–2.75) to 2.66 (95% CI 2.15–3.28). This suggests an RR of 1.4–1.6 for development of disease in an infected population. The RRs for mortality due to tuberculosis were mostly below the RRs for tuberculosis disease, suggesting no additional mortality risk from smoking in those with active tuberculosis.<sup>11</sup> The researchers have not provided data on smokeless and other forms of tobacco products, which are the main forms of tobacco consumption in rural India. The inclusion of this information may have provided further insight into this problem. Some deceased subjects could have been classified wrongly as non-smokers as there was no way to prove the respondents' version of the story. If this is taken into account the RR of dying from tobacco would only have increased.

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## Financial incentives for a smoke-free workplace

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## SUMMARY

This article reports the results of a randomized trial of a smoking cessation programme for self-reported smokers among employees of a large multinational company based in the USA. The aim was to find out whether offering strong financial incentives for abstinence that are increased substantially after the final 9–12 months of participation would result in higher 9-month to 1-year abstinence rates than reported by earlier studies. The concept behind paying people to stop smoking was to offer a tangible reward for doing something (quitting smoking) that is in their long term interest but requires a sacrifice of an immediate source of gratification.<sup>1</sup>

A systematic review of earlier programmes with financial incentives referred to by the authors of this paper had found that none demonstrated significantly higher quit rates for the incentive group than for the control group beyond the 6-month assessment.<sup>2</sup>

The researchers at the University of Pennsylvania took care to ensure that the sizes of the intervention and control groups were large enough to confer sufficient power (at least 80%) to the study and show a difference in quit rates between the two groups. The expected quit rates were 3% in the control group and 9.4% in the intervention group.

The researchers elicited the participation of company employees