

between 1992 and 1993 ($P < 0.05$) in the north of England, where Reg was prominent, and remained stable at 7% in the south, where he did not appear. This change could, of course, be due to other factors, but it is not unlikely that the Regal campaign made a substantial contribution to this apparent increase. In view of these findings the Advertising Standards Authority's decision to withdraw the Reg campaign would seem appropriate.

We thank the respondents and schools for their cooperation,

all the researchers for their hard work, and the Health Education Authority for its support and encouragement.

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Smoking and death: the past 40 years and the next 40

Richard Peto

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Smoking already kills about two million people a year in developed countries, half in middle age (35-69) and half in old age.^{1,2} This number is still increasing as the death rate among women increases and populations grow larger and older (fig 1). Already smoking accounts for one sixth of the 11 million adult deaths each year in these populations. There are 1.2 billion people living in developed countries. If one sixth of their deaths continue to be caused by tobacco about 200 million of the adults and children now living in developed countries will eventually be killed by tobacco, and about 100 million of these will die while still in middle age.²

In developing countries there has recently been a large increase in the number of young men smoking. People in China, for example, now smoke about 30% of the world's cigarettes. This will have catastrophic effects next century as most other causes of death are likely to continue to decrease and the effects of tobacco to increase. If current smoking patterns persist—that is, if the smoking uptake rate among young adults continues to be substantial and the rate of stopping smoking at older ages continues to be low—by the time the children of today reach middle age smoking will be one of the largest causes of premature death in the world.

Over the next 40 years the annual number of deaths from tobacco will increase from about three million to more than 10 million (table I),² yet 40 years ago the hazards were only just beginning to be recognised. The United Kingdom's Medical Research Council (MRC) supported much of the early research, and in 1957 it was the first national institution in the world to accept

TABLE I—Annual deaths attributed to tobacco in 1995 and in about 2025²

	Estimated annual No of deaths (millions)	
	1995	2025*
Developed countries	2	3
Developing countries	1	7
World total	3	10

*These numbers are inevitably approximate, but if present smoking patterns persist the chief uncertainty is merely when some such total will be seen: perhaps in about the mid-2020s, perhaps in the next decade.²

formally the evidence that tobacco is a major cause of death.

Evidence against smoking

In 1947 the MRC had called a conference to discuss the rapid increase in deaths in the United Kingdom attributed to lung cancer. Part of the increase was known to be an artefact of the improvements in the accuracy of death certificates that had resulted from better diagnostic methods. But since the increase was much steeper in men than in women changes in the real disease rates must also have occurred. Austin Bradford Hill had recently taken over as director of the MRC's Statistical Research Unit at the London School of Hygiene and Tropical Medicine, and one of his new recruits was Richard Doll. They began a large "case-control" study in 1948 in which the life histories of several hundred patients with lung cancer were compared with those of several hundred people without the disease.

Cigarette smoking was only one of several possible causes being investigated. (Doll himself originally thought the increase in cars and the tarring of the roads were more likely to be to blame.) But the results of this first study proved otherwise. The only big difference between those who had lung cancer and those who did not was that almost all those with lung cancer had been smokers. Doll and Bradford Hill published their results in the *BMJ* in 1950, and in the same year a parallel study by Wynder and Graham in the United States had independently reached similar conclusions.^{3,4} This was the first clear evidence that smoking is a major cause of death.

Once it was shown that smoking was a cause of most deaths from lung cancer, the next step was to establish prospective studies in which people were first asked what they smoked and then followed for several years to monitor deaths not only from lung cancer but also from other causes. Parallel studies were again established independently in Britain and the United States.^{5,6} The British study evolved into the first major

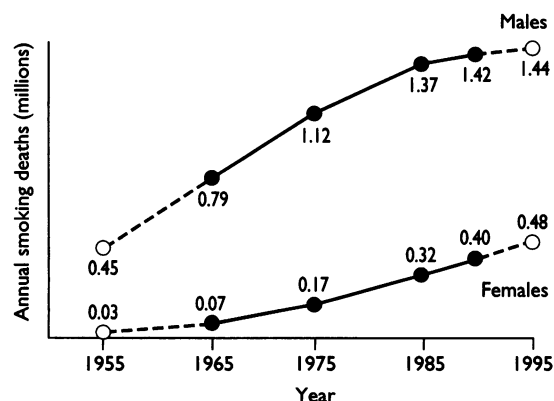


FIG 1—Annual number of deaths attributed to tobacco in developed countries. If current smoking patterns continue, when the children of today reach middle age the annual number of deaths will have increased from 2 million to about 3 million, but in less developed countries the increase will be far larger, from about 1 million to about 7 million in about 2025, leading to a world total of about 10 million deaths a year from tobacco²

Imperial Cancer Research Fund Cancer Studies Unit, Nuffield Department of Clinical Medicine, Radcliffe Infirmary, Oxford OX2 6HE

Richard Peto, professor of medical statistics and epidemiology

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prospective study of smoking and death in the world. It began in 1951, when Doll and Bradford Hill used BMA records to ask all the doctors in Britain what they smoked, and it still continues today, more than 40 years later. The American studies have tended to be shorter but to have a larger sample size. Indeed the American Cancer Society studies in the 1960s and 1980s both included over a million Americans.

By the mid-1950s, these prospective studies had shown strong associations between smoking and death not only from lung cancer (and later from other cancers) but also from respiratory disease, particularly chronic bronchitis, and vascular disease, particularly heart attacks.^{7,8} Tobacco accounted for most of all the deaths from lung cancer, and in addition it caused an even larger number of deaths from other diseases.

Although these early reports attracted much attention, in retrospect they greatly underestimated the hazards of prolonged smoking. When the 20 year follow up of the British doctors study was reported in 1976 the death rate in middle age from all causes was already twice as great in smokers as in non-smokers,⁹ but worse was to come. During the second half of the 40 year follow up (1971-91),^{10,11} the death rate from all causes in middle aged smokers was three times that of non-smokers (fig 2). At last the true hazards of really prolonged smoking had been assessed reliably.

Similar findings have recently been reported from America. Two enormous prospective studies have

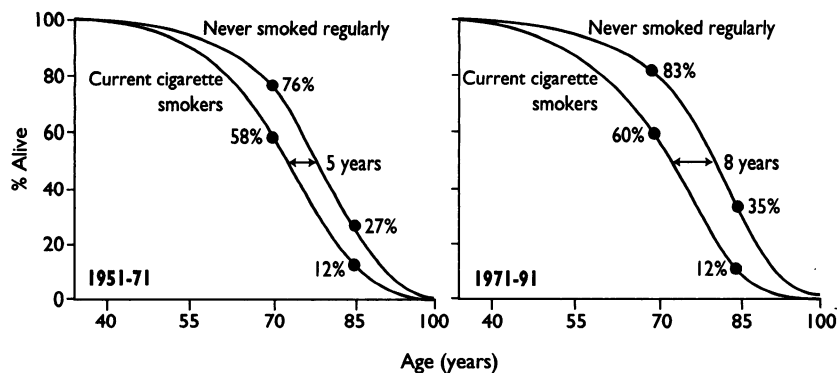


FIG 2—Smoking and death in 40 000 British doctors, 1951-71 (left) and 1971-91 (right)¹³

monitored deaths in the early 1960s and deaths in the mid-1980s.¹² The lung cancer death rate in non-smokers stayed roughly the same between the 1960s and the 1980s, but the rate among male smokers doubled. The rate of lung cancer was 10 times greater than in non-smokers in the 1960s and 20 times greater in the 1980s.² Presumably this is because men smoking cigarettes in the United States today have been doing so regularly throughout their adult life, whereas this was often not the case in the 1960s. For overall mortality in middle age, the ratio of the all cause rate among smokers to that among non-smokers has likewise risen from 2:1 in the 1960s to 3:1 in the 1980s,¹² and most of this excess involves diseases that are likely to be caused by smoking (table II). This means that more

TABLE II—Mean annual mortality* per 100 000 men aged 35-69 in the American Cancer Society million person prospective study, 1984-88

Underlying cause of death	Never smoked regularly	Current cigarette smoker	Excess rate in smokers
Cancer:			
Lung	8	196	188
Mouth, larynx, oesophagus	5	28	23
Other	109	188	79
Respiratory disease	9	62	53
Vascular disease	176	446	270
Other medical causes	39	81	42
(Cirrhosis, suicide, homicide, accident)	(37)	(81)	(44)
All causes	382	1083	701

*Average of rates at ages 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69.¹²

Hazards for individual cigarette user: 1990s British and American evidence²

- The risk is great, especially among those who start smoking cigarettes regularly in their teenage years: about half of teenagers who keep smoking steadily will eventually be killed by tobacco (about a quarter in old age plus a quarter in middle age)
- Those killed by tobacco in middle age (35-69) lose an average of 20-25 years of non-smoker life expectancy
- Nationwide, tobacco is much the greatest cause of death. In non-smokers, cancer mortality is decreasing slowly and total mortality is decreasing rapidly
- Most of those killed by tobacco were not particularly heavy smokers, but most did start in their teenage years
- Stopping smoking works. Even in middle age, stopping smoking before having cancer or some other serious disease avoids most of the later excess risk of death from tobacco, and the benefits of stopping at earlier ages are even greater

than half of all the deaths of smokers in middle age (plus rather less than half of those in old age) are caused by tobacco. The old statement, based partly on the first 20 years of the study of British doctors, that "at least a quarter" of all regular cigarette smokers would be killed by the habit now needs revision. In fact, the proportion is about one half (box).² By coincidence, the proportion of smokers who agree with the statement that "Smoking can't be all that dangerous, or the government would ban advertising" is also about one half.¹⁴

Public information

Once the hazards had been shown the next step was public information. In 1962 the Royal College of Physicians published the first official report specifying the dangers of smoking,¹⁵ and this was followed two years later, with even greater impact, by the United States Surgeon General's report on tobacco.¹⁵ The Royal College of Physicians' report was written by Charles Fletcher, who had also instigated the 1959 MRC bronchitis survey,¹⁶ which provided the first detailed evidence of the respiratory benefits of stopping smoking.

Public health

Tobacco illustrates the importance of an approach to public health that is quantitative and highlights the value of large epidemiological studies. In one sense it represents a substantial success, since a moderate reduction in a big cause of death can save many lives. Moreover, although we have seen only a moderate reduction in use of tobacco in Britain and the United States over the past few decades, this could easily have been a moderate increase given the power and subtlety of the tobacco marketing methods now confronting children and teenagers.

In another sense, however, smoking represents a great failure in public health: more than 40 years after the hazards were first established, cigarettes are still responsible for 30% of deaths in middle age in Britain and the United States,² and worldwide sales are increasing. More than \$5bn a year is spent on global advertising and promotion (which, according to the tobacco manufacturers, has no effect on the proportion of children who choose to smoke).

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Health information for the developing world

Rajendra Kale

This is a report of the conference "Getting information from the developed to the developing world" held in July at BMA House, London.

Doctors and other health professionals in developing countries are missing out on relevant information about health. A lot of the information they need is available in the developed countries, and those who have it are happy to share it with them. But transporting information, like food or medicines, from one part of the world to another is not an easy task nor is it the complete answer to the information drought. It is one thing to ferry books and journals from Europe to Africa and another to make relevant information available to the right person at the right time at an affordable cost.

Gross inequalities exist in the availability of health information in the developing and the developed worlds. Paucity of relevant information is a chronic feature of health care in developing countries and in the formerly communist countries of eastern Europe. As a result many health professionals in these countries have gradually been lulled into believing that they can go about their job without new information.

The position in the developed world is quite the reverse. Most doctors are deluged every week with so much information that they are virtually paralysed by its plethora. Too much irrelevant information is also unhelpful. Transferring all available information from the developed countries to the developing ones is obviously not to going to meet the health information needs of the developing world.

"Getting information from the developed to the developing world" was the title of a conference held at BMA House, London, earlier this year. The meeting came about because the BMJ Publishing Group regularly receives requests for free subscriptions to its journals from doctors in the developing world. The group does provide journals free of charge, although it worries that this is probably a highly inefficient way of getting information to the developing world. The group is also willing to make its information available to doctors in the developing world at minimal cost, and the problem then is one of distribution. How can relevant and useful information be transferred to doctors and others in the developing world at minimal cost? How can we know which material is wanted?

The 67 participants at the conference represented international organisations, government and non-government bodies, and publishers and included journalists, doctors, and other interested individuals. The aims of the meeting were to bring together people who know what material is wanted in the developing world, publishers who might make health material

available as cheaply as possible, and people who know about distribution to the developing world; to look at how material is currently getting to the developing world (many donation and distribution schemes already exist); to see if more material might be made available as cheaply as possible; to see if distribution channels can be made better known and developed; and to make practical suggestions on getting material to the developing world. As with all conferences, much of the benefit of the meeting came simply from putting people in contact with each other. A network is being established of people interested in the distribution of health material to developing countries, and anybody who would like to join should contact Ms Carol Priestley, who is the director of the International Network for the Availability of Scientific Publications (see useful addresses at end).

By the end of the day it was apparent that the title of the conference was inappropriate. Some of the information needed by developing countries—for example, epidemiological data—needs to be generated by the countries themselves. Some of this information would also be of interest to health professionals in developed countries, and needs to flow in a "south-north" direction (south being regarded as the developing countries and north as the developed countries). Some data are already available in some developing countries but need to be shared among other developing countries—that is, a south-south flow of information. Undoubtedly, however, much of the information needed is available in developed countries and needs to flow in a north-south direction.

What is wanted?

Health workers in many countries, particularly in sub-Saharan Africa, have almost no access to up to date information. "The shelves in our libraries are full of outdated books, most of them 15 to 30 years old," lamented Ms Helga Patrikios, from the University of Zimbabwe Medical Library. Economic decline has affected her library as it has others in Africa, but her centre is better than many because it is based in a medical college that was once well funded. The library at Nigeria's Nsukka University subscribed to no journals nor got support from donors till 1993.

One consequence of the dearth of information, explained Ms Patrikios, is that health workers get used to practising without keeping up to date. This also happens in the developed world, but, according to the editor of the *National Medical Journal of India*, only

BMJ, London WC1H 9JR
Rajendra Kale, editorial registrar

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