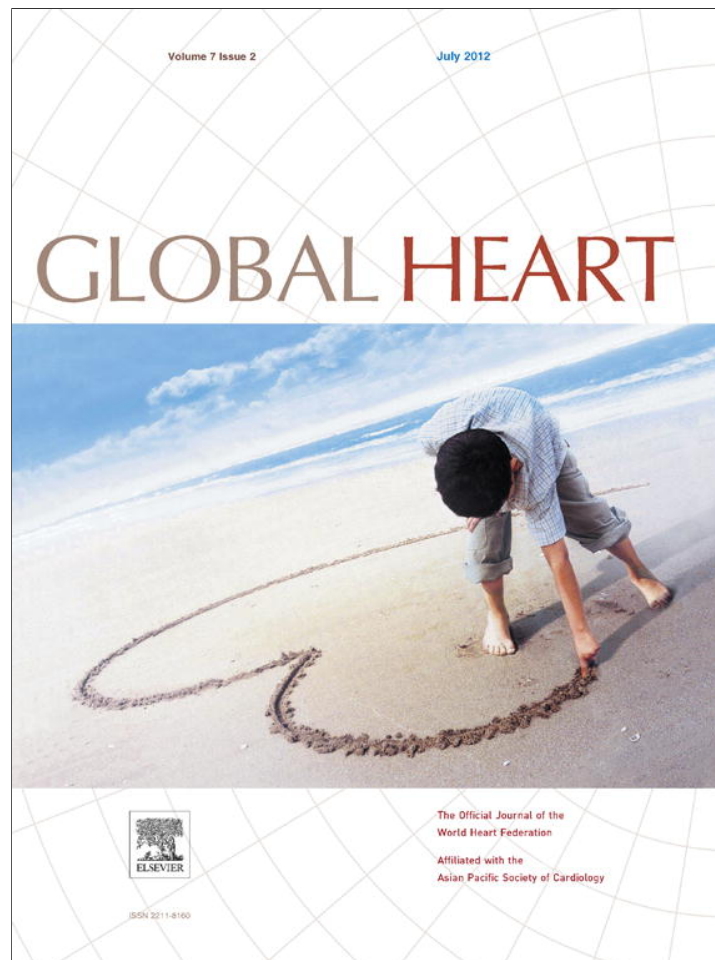


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gOPINION

EDITORIAL VIEWPOINT

Death and Taxes: Epidemiological and Economic Evidence on Smoking

Prabhat Jha

Toronto, Canada

Death rates from smoking-attributable causes have fallen sharply in high-income countries but will rise globally unless today's smokers, most of whom live in low- and middle-income countries, quit smoking before or during middle age. Tripling taxes on tobacco could rapidly raise cessation rates and deter smoking initiation.

CURRENT SMOKING PATTERNS WORLDWIDE

Over 1.1 billion adults over the age of 15 years smoke worldwide [1,2]. Per-adult consumption of cigarettes has more than halved in the last 3 decades in the United States, the United Kingdom, Canada, France, and other high-income countries [3]. In contrast, male smoking has risen sharply in many low- and middle-income countries such as China and Indonesia. In India, smoking most commonly occurs in the form of bidis, which are smaller than cigarettes and typically contain only about one-quarter as much tobacco [4].

CONSEQUENCES OF SMOKING

Tobacco use kills about 5–6 million people annually worldwide, accounting for about 20% of all adult male deaths and 5% of adult female deaths over the age of 30 years [5–8]. Cardiovascular disease is the leading cause of smoking-attributable deaths worldwide and accounts for about 1.5 million smoking deaths annually, of which 0.8 million deaths are from acute heart attack [6,9]. Smoking is a significant risk factor for both fatal and nonfatal heart attack and stroke [10–12].

On current smoking patterns, annual tobacco deaths will rise to about 10 million by 2030, and there will be about 1 billion tobacco deaths in the 21st century [5,13]. The full effects of smoking have not yet been observed in low- and middle-income countries, given the substantial delay of a few decades between the peak effect of smoking and deaths in middle age (defined as about 30–69 years).

Provided due allowance is made for the long delay between smoking onset and disease, reasonably consistent quantitative estimates of risk emerge: About 1 in 2 of all long-term smokers worldwide are killed by their addiction [5,13]. A substantial fraction of tobacco deaths worldwide occur in middle age: 50% in the United States and the United Kingdom [14], 50% in China [15,16], and a surprisingly high 70% in India [3]. The 10-year loss of life among Indian male cigarette smokers is already about as extreme as that observed among U.K. doctors who had started smoking early and stayed as life-long smokers [17], despite the fact that Indian smokers start later in life and smoke fewer cigarettes per day than their Western counterparts do.

At present, about 80% of worldwide smoking deaths occur in men [6], but this is chiefly because men who recently died also smoked more commonly and more intensively when they were young than did the female smokers. The smoker/non-smoker relative risks in U.S. women after 2002 are greater than they are in U.S. men [18].

Smoking cessation. Cessation by today's smokers is the only practicable way to avoid a substantial proportion of tobacco deaths worldwide before 2050. Ex-smoking prevalence is a good measure of

cessation at a population level [2,5]. In the United Kingdom, there are now twice as many ex-smokers as smokers among those currently aged 50 years or over [19]. Similar increases in cessation have been reported in most high-income countries [20]. In contrast, the prevalence of male ex-smokers in most low- and middle-income countries remains well below 10% [1,2]. Even these low figures may be falsely elevated, because they include people who quit because either they are too ill to continue or because of the early symptoms of tobacco-attributable illness, such as respiratory disease.

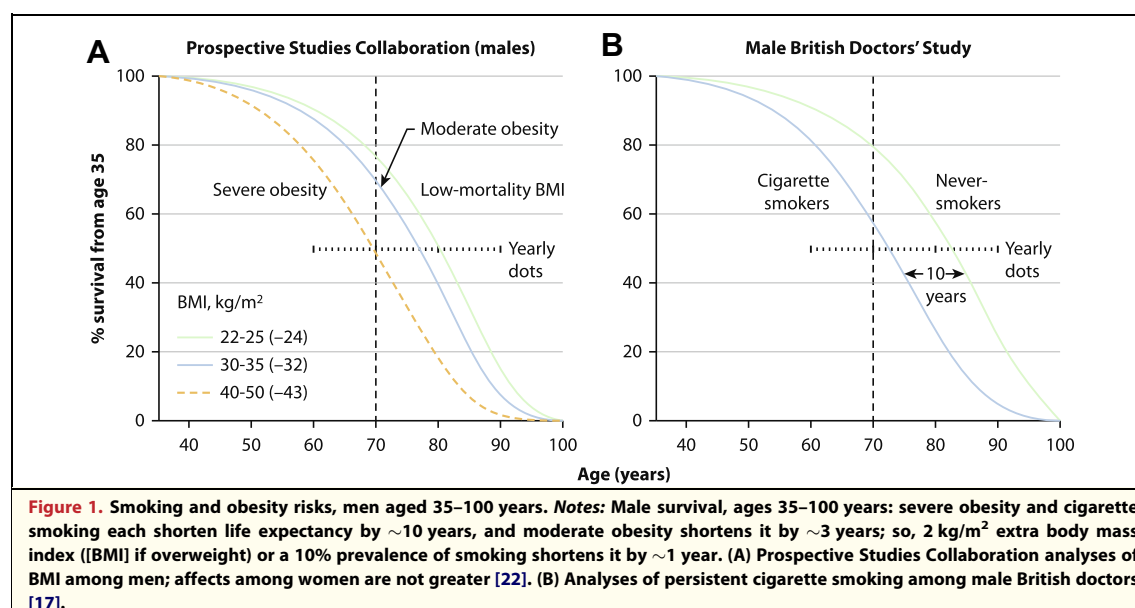
Widespread smoking cessation in high-income countries has afforded researchers the opportunity to study the impact of quitting at various ages on the risk of death from tobacco-attributable diseases. U.K. doctors who quit smoking before the onset of major disease avoided most of the excess hazards of smoking. In comparison to those who continued smoking, the average gain in life expectancy for those who quit smoking at 60, 50, 40, and 30 years of age, was about 3, 6, 9, and nearly 10 years, respectively [17]. Cessation before middle age prevents more than 90% of the lung cancer mortality attributable to smoking [19]. The absolute mortality reduction from cessation may be even greater for other diseases, particularly vascular diseases, than for lung cancer in the first decade or 2 after smoking cessation.

Comparison of smoking and obesity risks. Studies of tens of thousands of deaths have reliably assessed mortality from adult obesity and from persistent

smoking in developed countries [21]. In the Prospective Studies Collaboration study [22] of 70,000 deaths in 900,000 adults, an increase of 2 units in the body-mass index ([BMI] the weight in kilograms divided by the square of the height in meters) among men who were overweight, reduced life span by 1 year (mostly from an increase in vascular disease death rates). This 1-year loss of life was comparable to the life span reduction caused by a 10% increase in the prevalence of smoking seen among U.K. doctors [17] (Fig. 1). Moderate obesity (overweight, defined as BMI range 30–35, mean: 32) shortens life expectancy by approximately 3 years. Only among the small minority of adults with severe obesity (BMI range 40–50, mean: 43) was the loss of life comparable to the 10 years lost for being a life-long smoker. Thus, smoking cessation (which is widely practicable) can lead to a gain of about 10 years in life expectancy; far more than smokers could expect from weight control (which is currently far less practicable).

TAXATION TO RAISE TOBACCO CESSATION RATES WORLDWIDE

Higher taxation is the single most important intervention to raise global smoking cessation rates. Tobacco taxes and consumption are strongly inversely related worldwide [23]. Studies from high-income countries estimate that a 10% increase in cigarette



prices will reduce overall smoking by 2.5–5.0% in the medium term (within a few years) and perhaps twice this in the longer term (5 years or longer) [24]. The few studies from low- and middle-income countries suggest an effect twice as great: a 10% increase in price will reduce smoking by 8% in the medium term [24].

The United States and the United Kingdom each took about 35 years and Canada about 25 years to halve per-adult cigarette consumption (from about 10 per adult per day to about 5 [3]). However, France took only 15 years to halve its consumption [25]. France's uptake of smoking was chiefly after the Second World War and its prevalence rose until the mid-1980s. From 1990 to 2005, cigarette consumption fell from about 6 cigarettes per adult per day to 3 cigarettes per day (Fig. 2). This sharp decline was mostly due to a sharp increase in tobacco taxation starting in 1990 under the then-President Jacques Chirac. These price increases raised the inflation-adjusted price by 3-fold. Among men, the corresponding lung cancer rates at ages 35–44 years (which are good indicators of recent exposure to smoking in the population) fell sharply from 1997 onward. During this period, revenues in real terms raised from about 6 to 12 billion euros [25].

However, taxes are underused in most developing countries [7]. Taxes tend to be absolutely higher and account for a greater share of the retail price (71% as of 2006) in high-income countries. In low- and middle-income countries, taxes account for

54% of the final price of cigarettes [26]. In South Africa, tax as a percentage of retail price fell to about 20% around 1990, but has subsequently risen to nearly 40% [27]. Poland's recent tax increases have doubled the real price of cigarettes and reduced consumption. Mauritius and Mexico recently raised taxes by about 30%, which has already produced a drop in consumption [26].

A tax increase needed to raise the street prices of a pack of 20 cigarettes by 70% would involve a 2- to 2.8-fold increase across countries [5]. The increase would raise the street price from about US\$0.7 to 1.3 in low-income countries, from about US\$1.3 to 2.3 in middle-income countries, and from US\$3.7 to 6.3 in high-income countries. Such increases, though large, have been achieved in numerous countries, including Canada, France, Poland, and South Africa and within the various states of the United States.

Nonprice interventions. A set of nonprice interventions can substantially reduce tobacco consumption [23,28]. Ideal programs are those that combine price and nonprice interventions, including prominent health information for smokers (including local epidemiological evidence as well as use of pictorial graphic warning labels on tobacco products), complete bans on tobacco advertising and promotion, complete bans on smoking in public places, and access to cessation therapies [28].

In sum, smoking-attributable death rates have fallen sharply in high-income countries but will rise globally unless today's smokers, most of whom live

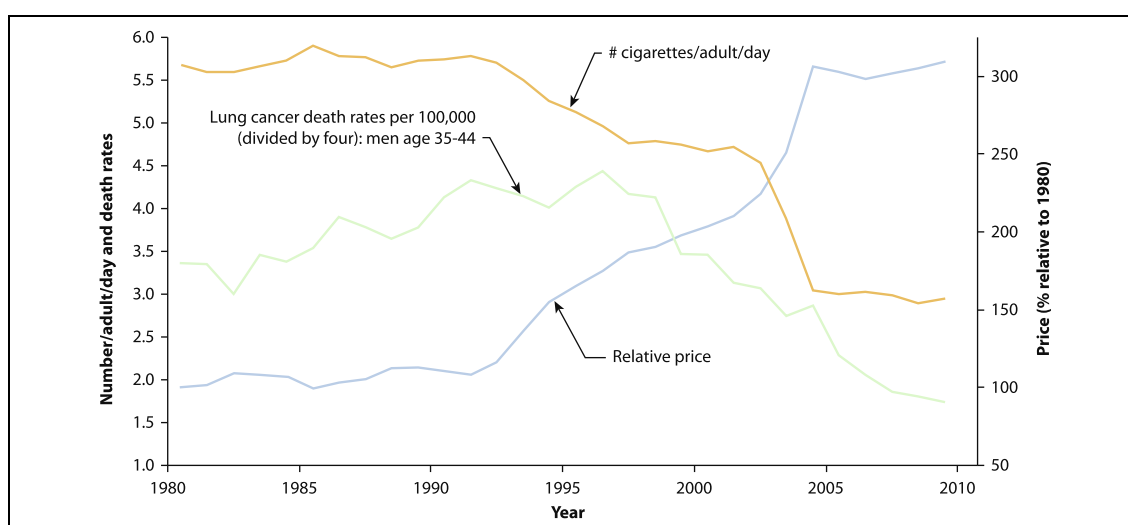


Figure 2. France: smoking, tax, and male lung cancer rates at young ages, 1980–2010. The per capita cigarette consumption, lung cancer death rates, and relative price cigarettes are shown on the y-axes over time. Smoking per person per day and relative prices are provided by Hill et al. [25]. The lung cancer death rates per 100,000 are divided by 4, so as to enable these to be on the same scale as smoking amount per day. Female lung cancer rates peaked later than for the men, but those rates have also halted their rise as of 2002.

in low- and middle-income countries, quit smoking before or during middle age. Tripling taxes on tobacco could rapidly raise cessation rates and deter smoking initiation and could avoid several tens of millions of premature deaths worldwide.

ADDITIONAL MATERIAL

Additional information on tobacco hazards in India, China, and developed countries (including updated results to 2005 for the United Kingdom, the United States, and Poland) are available at www.cghr.org/tobacco and deathsfromsmoking.net.

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