



# CMH Working Paper Series

Paper No. WG5 : 7

## **Title**

The Evidence Base for Reducing Mortality from Smoking in Low and Middle Income Countries

## **Authors**

F.J. Chaloupka, P. Jha, M.A. Corrao, V. Costa e Silva, H. Ross, C. Czart, and D. Yach

Date: June 2001

The Evidence Base for Reducing Mortality from Smoking in Low and Middle Income Countries

Frank J. Chaloupka

Department of Economics and Health Research and Policy Centers (HRPC), University of Illinois at Chicago, and National Bureau of Economic Research, and International Tobacco Evidence Network (ITEN)

Prabhat Jha

Economics Advisory Service (EAS), World Health Organization (WHO) and ITEN

Marlo A. Corrao  
EAS, WHO

Vera Luiza da Costa e Silva  
Tobacco Free Initiative, WHO

Hana Ross  
HRPC and ITEN

Christina Czart  
HRPC and ITEN

Derek Yach  
Non Communicable Disease and Mental Health Cluster, WHO

June 26 2001

## **Abstract**

Cigarette smoking and other tobacco use imposes a huge and growing public health burden globally. Currently, approximately 4 million persons are killed annually by tobacco use; by 2030, estimates based on current trends indicate that this number will increase to 10 million, with seventy percent of deaths occurring in low and middle-income countries. Numerous studies from high-income countries, and a growing number from low and middle-income countries, provide strong evidence that tobacco tax increases, dissemination of information about health risks from smoking, restrictions on smoking in public places and in workplaces, comprehensive bans on advertising and promotion, and increased access to cessation therapies are all effective in reducing tobacco use and its consequences. Despite this evidence, tobacco control policies have been unevenly applied—partly due to political constraints.

This paper provides a summary of these issues, beginning with an overview of trends in global tobacco use and its consequences and followed by a review of the evidence on the effectiveness of tobacco control policies in reducing tobacco use. A description of the types and comprehensiveness of policies currently in place and a discussion of some of the factors correlated with the strength and comprehensiveness of these policies follows. Finally, the constraints against implementing tobacco control policies and global efforts to overcome these constraints are discussed.

## **Introduction**

Cigarette smoking and other tobacco use is currently estimated to kill approximately four million people worldwide annually, accounting for one of every ten adult deaths. By 2030, estimates indicate that this number will increase to ten million, or one of every six adult deaths. Given current trends, about 500 million people alive today will die prematurely as a result of tobacco use, with one billion deaths from tobacco expected during this century (1,2).

Given the public health toll from tobacco use, governments have a strong incentive for intervening to reduce tobacco use. However, many governments have resisted taking strong action because of concerns that effective interventions would have harmful economic consequences. Recent efforts by the World Bank, in partnership with the World Health Organization (WHO), have addressed these concerns. A team of over 40 economists, epidemiologists, and other tobacco control experts examined the state of the knowledge about tobacco use and tobacco control strategies. A summary of this work was published in 1999 (3), and the background papers contributing to this work were published in 2000 (4, 5).

This paper reviews and updates the findings from these efforts. The paper begins with an overview of trends in global tobacco use and its consequences, followed by a review of the evidence for the effectiveness of tobacco control policies. A description of the types and comprehensiveness of policies currently in place and a discussion of some of the factors correlated with the strength and comprehensive of these policies follows. Finally, the constraints against implementing tobacco control policies and global efforts to overcome these constraints are discussed.

## **Tobacco Use and its Consequences**

Estimates indicate that over 1.1 billion people smoke worldwide, with about 82 percent of the world's smokers residing in low- and middle-income countries (Table 1). Smoking prevalence is highest in the European/Central Asia region, where overall prevalence is 40 percent. Over one-third of all smokers reside in the East Asia/Pacific region, with the vast majority of these in China. As Table 1 indicates, smoking prevalence is significantly higher among men in low and middle-income countries, with the difference between smoking prevalence among men and women being smaller in high-income countries (6).

### TABLE 1 ABOUT HERE

As a result of early information linking smoking to health consequences, smoking prevalence has been declining for the past two decades in most high-income countries, most clearly in men. Smoking continues to increase, however, in many low- and middle-income countries. Increasing incomes have contributed to the increases in smoking, as has increased trade liberalization (7).

The impact of smoking on health has been extensively documented elsewhere (8-10). Estimates for 1998 indicate that about four million people died from tobacco-attributable diseases (9). Data from numerous studies in high-income countries, where the consequences of tobacco use are well established, and several studies in low and middle-income countries suggest that about half of all long-term regular smokers are killed by their addiction. Half of these deaths occur during productive middle age (35-69 years old) (10). Currently, about half of all tobacco-related deaths occur in high-income countries, while the others occur in low and middle-income countries. Given the recent trends in smoking and the lags between smoking and disease onset,

approximately 70 percent of the 10 million tobacco-attributable deaths expected in 2030 will take place in low- and middle-income countries.

Smoking is more common among poor men than among rich men in nearly all countries. In developed countries, smoking accounts for much of the mortality gap between the rich and poor. Estimates from Canada, England and Wales, Poland, and the United States (US), for example, suggest that eliminating smoking-attributable differences in mortality would approximately halve the socioeconomic disparity in mortality between men in these countries (11). For women, who have generally been smoking in large numbers for a shorter period, the relationship between smoking, smoking-attributable mortality, and socioeconomic status is more variable.

### **Interventions to Reduce Smoking**

In addition to the public health burden caused by tobacco, there are several economic rationales for government interventions to reduce tobacco use. First, consumers have inadequate information about the health consequences of tobacco use and a poor understanding of the addictive nature of tobacco products (12, 13). General awareness of the health risks from smoking is relatively low in low- and middle-income countries (14). While general awareness of risks is higher in high-income countries, many still underestimate tobacco's danger relative to other health risks, and many smokers fail to fully internalize these risks (15). Likewise, the addictive nature of tobacco is under-appreciated. In the US for example, less than two of five teens who are smoking as high school seniors and who believe they will quit within five years actually succeed in doing so (16).

In addition to preventing children from adopting a tobacco habit, comprehensive approaches to promote smoking cessation are critical to near-term improvements in public health. As illustrated

by Figure 1, a mix of tobacco control policies that is effective *only* in reducing smoking initiation would have little impact on smoking-attributable deaths during the first half of the 21<sup>st</sup> century. The vast majority of tobacco-attributed deaths over the next 50 years will occur among current smokers (1). In contrast, a set of policies that was effective in significantly reducing tobacco use in all segments of the population (current and never-smokers) would generate substantial reductions in the public health toll caused by tobacco.

FIGURE 1 ABOUT HERE

### *Demand Side Interventions*

Numerous studies, mostly from high-income countries, have examined the impact of interventions aimed at reducing the demand for tobacco products on smoking and other tobacco use. The small but growing number of studies from low and middle-income countries provides useful lessons about differences in the impact of these interventions between high-income countries and low and middle-income countries.

### Tobacco Taxation

Nearly all governments tax tobacco products. Some of these taxes are specific, or per unit, taxes, while others are expressed as a percentage of wholesale or retail prices (*ad valorem* taxes). Historically, these taxes have been primarily used to generate revenues. In recent years, however, a growing number of governments have increased tobacco taxes to promote public health, earmarking some of the new revenues generated from the higher taxes for comprehensive programs to reduce tobacco use and/or implement other health-related programs.

There are significant differences across countries in the level of tobacco taxes. As illustrated by Figure 2, taxes tend to be absolutely higher and to account for a greater share of price (two-thirds or more) in high-income countries. In low and middle-income countries, taxes are generally much lower, and they account for less than half of the price of cigarettes.

#### FIGURE 2 ABOUT HERE

Well over one hundred studies from high-income countries clearly demonstrate that increases in cigarette and other tobacco product taxes lead to significant reductions in cigarette smoking and other tobacco use. These studies confirm the most fundamental law of economics that states that as the price of a product increases, the demand for that product falls. The reductions in tobacco use that result from higher taxes and prices reflect the combination of increased smoking cessation, reduced relapse, lower smoking initiation, and decreased consumption among continuing tobacco users. Economists use the term “price elasticity” of demand to reflect the impact of price changes on consumption, where the elasticity is defined as the percentage change in the quantity consumed resulting from a one-percent increase in price.

Studies from the US, United Kingdom (UK), Canada, and many other high-income countries generally estimate that the price elasticity of cigarette demand ranges from  $-0.25$  to  $-0.50$ , indicating that a ten percent increase in cigarette prices will reduce overall cigarette smoking by 2.5 to 5.0 percent (17, 18, 19). These studies apply a variety of econometric and other statistical methods to aggregated time-series and pooled cross-sectional time-series data, as well as to individual-level survey data. Recent studies using survey data have concluded that half or more of the effect of price on overall cigarette demand results from reducing the number of smokers (20, 21).

Several studies over the past decade have examined the relationship between addiction and cigarette demand (22, 23). Economic theories of addiction predict that the long-run impact of a permanent change in the price of an addictive substance will exceed the short-run impact, given that addicted consumers will change their behavior slowly, over time (24, 25). The empirical applications of these theories generally estimate long-run price elasticities that are approximately twice those estimated for the short run, with the long-run estimates centered on  $-0.8$  (23).

Many recent studies from the US have used individual-level data to explore differences in the price elasticity of cigarette demand by age, with a particular emphasis on youth and young adults (17, 18, 19). Given that most smoking behavior begins and becomes firmly established during teenage years and young adulthood, interventions that are effective in preventing smoking initiation and the transition to regular, addicted smoking will have significant long-term public health benefits. Estimates from these recent studies conclude that there is an inverse relationship between price elasticity and age, with estimates for youth price elasticity of demand up to three times those obtained for adults (26, 27, 28). Several recent studies have begun to explore the differential impact of cigarette prices on youth smoking uptake, concluding that higher cigarette prices are particularly effective in preventing young smokers from moving beyond experimentation into regular, addicted smoking (29, 30, 31).

Similarly, several studies have explored differences in the price sensitivity of cigarette demand by income, education, and/or socioeconomic status (17, 18, 19). Economic theory predicts that individuals with lower incomes and/or less education will be more responsive to price. The studies demonstrate how less educated persons (22), lower income individuals (20), and people in lower socioeconomic classes (32) show greater reductions in smoking in response to price

increases than people who are more educated, have higher income levels, and are in higher socioeconomic classes.

The finding that price responsiveness is higher among lower income persons is supported by new literature on the demand for tobacco products in low and middle-income countries (17). In general, estimates of price elasticity for low and middle-income countries are about double those estimated for high-income countries, implying that significant increases in tobacco taxes in these countries would be very effective in reducing tobacco use.

In summary, the empirical evidence indicates that increases in tobacco taxes reduce tobacco use by preventing initiation (and subsequent addiction) among youth, increasing the likelihood of cessation among current users, reducing relapse among former users, and reducing consumption among continuing users. The reductions in tobacco use that result from higher tobacco taxes will lead to substantial improvements in public health.

### Restrictions on Smoking

Over the past three decades, as information about the health consequences of exposure to passive smoking has increased, many governments, especially in high-income countries have enacted legislation restricting smoking in a variety of public places and private worksites. In addition, increased awareness of the consequences of passive smoking exposure, particularly among children, has led many workplaces and households to adopt voluntary restrictions on smoking. While the intent of these restrictions is to reduce nonsmokers' exposure to environmental tobacco smoke, the policies also reduce smokers' opportunities to smoke. In turn, these smoke-free indoor air policies can also lead to reductions in cigarette smoking prevalence. Additional

reductions in smoking, especially among youth, will result from the changes in social norms that are reflected by adopting these policies (16).

Comprehensive restrictions on cigarette smoking do lead to significant reductions in cigarette smoking (18, 19, 33, 34). As with higher taxes, these restrictions reduce both the prevalence of smoking and cigarette consumption among smokers. For instance one recent study based on survey data found that workplace smoking bans reduced smoking prevalence among adults by five percent, while it reduced cigarette consumption among continuing smokers by ten percent (35). The no-smoking policies were most effective when strong social norms against smoking helped to make smoking restrictions self-enforcing (36).

#### Health Information and Counter Advertising

The 1962 report by the British Royal College of Physicians and the 1964 Surgeon General's Report were landmark events in tobacco control in high-income countries. These publications represented the first widespread press coverage of the scientific links between smoking and lung cancer. The reports were followed, in many countries, by policies requiring health warning labels on tobacco product packaging that were later extended to tobacco advertising.

Research from high-income countries indicates that these initial reports and the publicity that followed about the health consequences of smoking led to significant reductions in cigarette smoking, with initial declines between four and nine percent, and longer-term cumulative declines of 15 to 30 percent (14, 37). Efforts to disseminate information about the risks of smoking and other tobacco use in low and middle-income countries have led to similar declines in tobacco use in these countries (14). In addition, mass media anti-smoking campaigns, in many cases funded by earmarked tobacco taxes, have generated reductions in cigarette smoking and

other tobacco use (14, 38). The continuing accumulation of evidence about the harmful effects of tobacco use and inadequate understanding of these risks among members of the public in the lowest income countries, particularly in the lowest income countries implies, however, that there is still much to be done in terms of health education.

### Bans on Advertising and Promotion

Cigarettes are one of the most heavily advertised and promoted products in the world. In 1999, for example, cigarette companies spent \$8.24 billion on advertising and promotion in the United States, the highest spending level reported to date (39). Tobacco advertising efforts worldwide includes traditional forms of advertising on television, radio and billboards, in magazines and newspapers, as well as favorable product placement, price related promotions such as coupons and multi-pack discounts, and sponsorship.

Numerous econometric studies, mostly from the US and the UK, have explored the relationship between cigarette advertising and promotional expenditure and cigarette demand. In general, these studies have produced mixed findings, with most studies concluding that advertising has, at most, a small positive impact on demand (17, 37). However, critics of these studies note that econometric methods, which estimate the impact of a marginal change in advertising expenditures on smoking, are ill suited for studying the impact of advertising (17, 37, 39). Approaches employed by other disciplines, including survey research and experiments that assess reactions to and recall of cigarette advertising, do support the hypothesis that increases in cigarette advertising and promotion directly and indirectly increase cigarette demand (16, 41). These studies conclude that cigarette advertising is effective in getting and retaining children's

attention, with the strength of these associations strongly correlated with current smoking behavior, smoking initiation, and smoking intentions.

Several researchers have hypothesized that studying the impact of advertising and promotion bans on cigarette smoking would provide more direct evidence on the impact of advertising (18, 38). One recent study using data from 22 high-income countries, for the period from 1970 through 1992, provides strong evidence that comprehensive bans on cigarette advertising and promotion lead to significant reductions in cigarette smoking. The study predicted that a comprehensive set of tobacco advertising bans in high-income countries could reduce tobacco consumption by over six percent (40). However, the study concludes that partial bans have little impact on smoking behavior, given that tobacco industry can shift its resources from the banned media to those that are not banned.

### Smoking Cessation Treatments

Near term reductions in smoking-related mortality depend heavily on smoking cessation. There are numerous behavioral smoking cessation treatments available, including self-help manuals, community-based programs, and minimal and intensive clinical interventions (19). In addition, pharmacological treatments, including nicotine replacement therapies (NRT) and bupropion, have become much more widely available in recent years in high-income countries (19, 42). Current research provides mixed evidence on the impact of behavioral therapies on successful smoking cessation (19, 42). However, the evidence is strong and consistent that pharmacological treatments significantly improve the likelihood of quitting, with success rates two times those when pharmaceutical treatments are not employed (19, 42, 43).

While successful in treating nicotine addiction, the markets for NRT and other pharmacological therapies are highly regulated. In turn, pharmaceutical treatments are less affordable and less available than nicotine-containing tobacco products that are distributed in a relatively unrelated market. Recent evidence indicates that the demand for these products is related to economic factors, including their price (44). Policies that decrease the cost of NRT and increase their availability, such as mandating private health insurance coverage of NRT, including NRT coverage in public health insurance programs, and subsidizing NRT for uninsured or underinsured individuals, would likely lead to substantial increases in the use of these products. Similarly, WTO Trade-Related Aspects of Intellectual Property aspects of NRT have been poorly examined and deserve further study. Given their demonstrated efficacy in treating smoking, these policies could generate significant increases in smoking cessation and the health benefits that result from cessation.

#### *Effectiveness of Demand Side Interventions*

As described above, demand side interventions, including tax and price increases, restrictions on smoking, bans on advertising and promotion, dissemination of information on the health consequences of tobacco use, and improved access to cessation therapies, are highly effective in reducing the demand for tobacco products. Given the health risks from tobacco use, widespread adoption of these interventions would generate substantial reductions in the public health toll from tobacco.

#### TABLE 2 ABOUT HERE

Based on the existing evidence, Table 2 summarizes findings from a recently updated simulation model that estimates the global impact of alternative policies aimed at reducing the demand for

tobacco (45). The policies considered are tax increases that would raise the price of cigarettes globally by ten percent, a comprehensive set of non-price measures (including information campaigns, comprehensive advertising and promotion bans, and strong restrictions on smoking in public places), and increased use of NRT (as a result of policies that lowered price and increased availability of these therapies). The assumptions underlying this simulation model are deliberately conservative. Nevertheless, the simulations indicate that substantial reductions in tobacco use and its consequences would result from the various policy changes. The ten percent price increase, for example, would reduce expected smoking attributable deaths among current smokers globally by an estimated five to 16 million. Similar large reductions in the numbers of smokers and smoking-attributable deaths would result from the other policy measures considered in the model. Finally, this analysis concludes that these interventions are highly cost-effective, particularly for low and middle-income countries, when compared to other public health interventions.

### *Supply Side Interventions*

In contrast to the effectiveness of demand side interventions, there is much less evidence that interventions aimed at reducing the supply of tobacco products are effective in reducing cigarette smoking (2). The US experience provides mixed evidence about the effectiveness of limiting youth access to tobacco products in reducing youth tobacco use (19, 33). In addition, the effective implementation and enforcement of these policies may require infrastructure and resources that do not exist in many low and middle-income countries. Crop substitution and diversification programs are often proposed as means to reduce the supply of tobacco. However, there is little evidence that these programs significantly reduce supply, given that the incentives for tobacco growing attract new farmers who replace those who do move out of tobacco farming

(46). Similarly, direct prohibition of tobacco is not likely to be politically feasible, effective, or economically optimal (2). Likewise, while trade liberalization has contributed to increases in tobacco use, particularly in low- and middle-income countries, restrictions on trade in tobacco and tobacco products that violate international trade agreements and/or draw retaliatory measures may be more harmful. More effective means of deterring tobacco use and improving public health would be strong measures to reduce the demand for tobacco products, such as tax increases and advertising bans, that are applied equally to both domestic and imported products (6).

The key intervention on the supply side is the control of smuggling. Recent estimates suggest that six to eight percent of cigarettes consumed globally are smuggled (47). While differences in taxes and prices across countries suggest a motive for smuggling, a recent analysis comparing the degree of corruption in individual countries with price and tax levels, finds that corruption within countries is a stronger predictor of smuggling than price (47). Several governments are adopting policies aimed at controlling smuggling. Effective measures include prominent tax stamps and warning labels in local languages, better methods for tracking cigarettes through the distribution chain, aggressive enforcement of anti-smuggling laws, and stronger penalties for those caught violating these laws (48).

#### *Comprehensive Programs to Reduce Tobacco Use*

In recent years, several governments, mostly in high-income countries, have adopted comprehensive programs to reduce tobacco use, often funded by earmarked tobacco tax revenues. These programs generally have consistent goals for reducing tobacco use, including: preventing initiation among youth and young adults; promoting cessation among all smokers;

reducing exposure to environmental tobacco smoke; and identifying and eliminating disparities among population subgroups (19). In general, these programs have one or more of four key components: national and community interventions, counter marketing campaigns, policy and regulation, and surveillance and evaluation (19). Programs have placed differing emphasis on these four components, with substantial diversity among the types of activities supported within each component. Recent analyses from the US and UK clearly indicate that these comprehensive efforts have been successful in reducing tobacco use and in improving public health (19, 49, 50, 51). In California, for example, the state's comprehensive tobacco control program has doubled the rate of decline in tobacco use seen in the rest of the US. California lung cancer incidence has fallen by 14% from 1988 to 1997. In contrast declines of 2.7% have been seen in the rest of the country (52).

Similarly, the WHO MONICA Project, a multinational effort to monitor trends and determinants of cardiovascular disease, showed that decreases in smoking prevalence were largest in countries where the public is consistently reminded of the dangers of smoking by extensive coverage of issues related to tobacco in the news media (53). Media coverage was one part of a comprehensive approach to smoking control in these countries, that combined tobacco taxes, smoke-free indoor air policies, antismoking advocacy, litigation against tobacco companies, and restrictions on the promotion and sale of tobacco products in order to change the dynamics of the smoking epidemic. Furthermore, MONICA data suggest that the decrease in smoking prevalence observed among men in some countries is due to the higher prevalence of never smoking in younger age groups. Among women, increasing prevalence of smokers in younger age cohorts counterbalanced increasing prevalence of former smokers in older age groups to yield little overall change in prevalence (53).

Clearly, more significant decreases in the proportion of smokers among men *and* women could be achieved by implementing comprehensive tobacco control programs that discourage young people from initiating smoking habits. The extent to which comprehensive programs can prevent young people from becoming persistent smokers today will affect mortality rates in the middle or second half of the 21<sup>st</sup> century (54). Mortality rates in the near future and throughout the first half of the century, however, could be reduced by aiding current smokers in quitting the habit. A recent study from the United Kingdom found that smoking cessation before middle age avoids more than 90% of the lung cancer mortality risk attributable to tobacco (54).

### **Coverage of Effective Tobacco Control Policies**

While there is substantial evidence concerning the effectiveness of numerous policy interventions to reduce tobacco use, the use of these interventions globally is uneven and limited. This section reviews the use of tobacco control policies globally and provides some evidence on the factors related to the extensiveness (or lack thereof) of the policies that governments have adopted.

#### *Methods*

Legislative data were abstracted from the *Tobacco Control Country Profiles* database, which divides national tobacco provisions into six categories: prohibitions and restrictions on advertising and sponsorship, health promotion and education efforts against tobacco, sales and distribution requirements, tobacco product regulations, smoke-free indoor air restrictions, and other provisions to include the formation of a national or territorial committee on tobacco control (55).

A coding scale was developed to empirically evaluate the content of the laws, regulations, and their summaries, based loosely on the Assessment of the Comprehensiveness of Tobacco Laws Scale (ACT-L Scale) (56). As it was originally intended to evaluate sub-national and local laws, the ACT-L scale was modified to contend with variation among nationally legislated provisions. The scale consists of 34 items representing the content of a maximally comprehensive tobacco control policy, in addition to the progressive steps toward a model tobacco control policy. With the exception of nine summary items, each scale item is scored 1 (present in the legislation or regulation) or 0 (absent in the legislation or regulation). Summary items are valued at one point greater than the sum of their sub-items. For instance, a complete ban on the use of registered brand names of tobacco products, trademarks, or logos in all media is given a value of 6 points, one point greater than the sum of its component prohibitions on advertising via television, radio, billboards, cinema, and print. There were two outliers in the general coding scheme. In the environmental tobacco smoke sub-scale, prohibition on tobacco use in all enclosed public places, except in designated areas, is given a score of 3 points. In the access sub-scale, banning the sale of tobacco products outside of a specialty shop is given a score of 4 points, the same value received if each of its four components are present (bans on tobacco sales within a specified distance of schools, in pharmacies, in government buildings, and in hospitals).

The content of the scale items were as follows: 10 focus on interventions against passive smoking, 8 focus on advertising and promotion, 9 focus on reducing access to tobacco products (especially among minor children), 5 focus on tobacco packaging and product regulation, and 2 focus on tobacco taxes. The total legislative score indicates the comprehensiveness of the national provisions. The legislative data set was coded on two independent occasions by the

same rater; countries with variability in the two scores were examined and coded again to resolve the discrepancy.

### *Results*

For each country, a total score and scores on each of the five sub-scales were computed. Countries for which no legislative information was available were excluded from the analysis. As shown in Table 3, the total score, across all countries, ranged from 1 to 36 (mean 12.3, standard deviation 7.7) of a possible 64 points when the tax sub-scale is included in the analysis. When the tax scale is excluded from the analysis, the total score, across all countries, ranged from 1 to 33 (mean 11.9, standard deviation 7.5) of a possible 57 points. The tax scale is excluded from some analysis because data on tax as a percent of cigarette prices are available for only 30 of the 133 countries with legislative profiles.

#### TABLE 3 ABOUT HERE

Countries were divided according to the income group number assigned by the World Bank (57); lowest income countries belong to income group 1, middle income countries belong to group 2, and upper-middle income countries belong to group 3. Tables 4 and 5 describe the mean scores of each income group in relation to one another, with and without the tax sub-scale. Table 6 presents comparable information for the subset of countries with data on tax as a percent of price.

#### TABLES 4, 5 AND 6 ABOUT HERE

The upper-middle income group had significantly higher total legislative scores than the low and middle-income groups, suggesting a relationship between the comprehensiveness of tobacco

control policies and income level. This difference persisted in analyses of total scores with and without the tax sub-scale. Furthermore, there is a positive correlation between GDP per capita, PPP (current international \$) (PPP) and total legislative score (correlation 0.43). When the 30 countries with tax as a percent of price data were examined alone, however, no significant difference was found in tax sub-scale scores between income groups.

### *Discussion*

The existence of tobacco control provisions in national laws, regulations, and ministerial orders are only one measure of a country's commitment to tobacco control at the policy level. Furthermore, the presence of a tobacco control provision in legislation, regulations, or ministerial orders does not mean that the measure is enforced to the full extent of the law. Conversely, the absence of provisions from the sources reviewed by the *Tobacco Control Country Profiles* does not necessarily mean that tobacco control provisions do not exist in a particular country and are not enforced. The greatest limitation of this analysis lies in the completeness of legislative data available for most countries. As more full-text laws and regulations become available, more sensitive analysis will be possible and should be pursued.

The wide variation observed between total and sub-scale scores within and between income groups can not explained by variance in income level alone. The variability in total scores (without the tax sub-scale) is shown in Figures 3-5. The legislative coding scheme does not account for tobacco industry (multinational) influence in each country, countries' reliance on tobacco agriculture or manufacturing, and related factors that could either impede or encourage the development of tobacco control policy at a national level.

FIGURES 3, 4, AND 5 ABOUT HERE

In an analysis of the relationship between tobacco agriculture employment as a percent of total labor force and total legislative score, there was nearly no correlation between the two variables (-0.025). Furthermore, there exist many different indicators of governance (such as rule of law, government effectiveness, and graft) that could influence government priorities and policy decisions. Correlation between some of these indicators (voice and accountability, political stability, government effectiveness, regulatory framework, rule of law, and control of corruption) yielded weak positive associations between governance indicators and total legislative score (ranging from 0.23 to 0.36). Clearly, there is need to examine each of these factors as they relate to tobacco control policy on a country-by-country basis.

### **Constraints against implementing effective tobacco control policies**

Why is there so much variation in tobacco control policies? The political economy of tobacco control has been under-studied. We outline a few plausible areas of interest. First, it is plausible that governments and public health agencies simply do not know which tobacco control policies are the most effective. There is some evidence that improved national capacity and local needs assessment could increase the likelihood that tobacco control measures will be adopted. For example, academic analyses in South Africa geared to local policy needs substantially increased the willingness of South Africa to implement control policies (58).

Second, the cost of implementing control programs appears not to be a major factor. Current estimates of the costs of implementing a comprehensive tobacco control program range from \$2.50 to \$10 per capita in the US, while the Centers for Disease Control and Prevention recommends spending \$6 to \$16 per capita in high-income countries for a comprehensive tobacco control program in the US (59). Canadian spending on tobacco control programs was

approximately \$1.65 per capita in 1996 (60). At the highest recommending spending level (\$16) in the US, annual funding for a comprehensive tobacco program would equal only 0.9% of US public spending, per capita, on health. For low and middle-income countries, the World Bank estimates that an “essential package of public interventions” that includes tobacco as one of its components would cost between \$4 and \$7 per capita (61). In contrast, global funding for tobacco control research appears to be inadequate. It is estimated that for every death due to tobacco (1990 estimates), governments and public agencies spent about \$50 on tobacco research, for a global total of \$148-\$164 million. In comparison, they spent \$3000 for every HIV-related death in the same year, for a global total of \$919-985 million (62). The vast majority of research and development in tobacco control, as for HIV/AIDS, has been taking place in high-income countries.

Tobacco control programs, including research funded by tobacco product taxes are self-financing. While tobacco tax as a prominent source of government revenue in many high-income countries has faded, tobacco tax revenues account for a significant share of total government revenues in many upper middle-income countries (63). World Bank data reveal that there is ample room to increase tobacco taxes: in 1995 the average percentage of all government revenue derived from tobacco tax was 0.63%. Middle-income countries averaged 0.51% of government revenue from tobacco taxes, while lower-income countries averaged only 0.42%. An increase in cigarette taxes of 10 percent globally would raise cigarette tax revenues by nearly 7 percent, with relatively larger increases in revenues in high-income countries, and smaller increases in revenues in low and middle-income countries (64).

TABLE 6 ABOUT HERE

The most obvious constraint would be political opposition, but this is difficult to quantify. Opposition from the tobacco industry is well organized and well funded (65). For a limited number of countries, government reliance on tobacco tax revenue can also lead to long term concern about revenue loss, although the importance of excise taxes is falling as economies diversify. If governments wished to get rid of tobacco altogether, obviously it would disappear as a source of revenue. Net revenue loss would only occur if tobacco taxes were not replaced with some other equally yielding tax. Finally, in a handful of African countries, there is legitimate concern about harming tobacco farmers. Here again, it is worth pointing out that transitions away from tobacco are slow, and that like any other industry, tobacco farmers would have time to adjust to changes.

A key political tool for addressing political opposition is an earmarked tobacco tax. Earmarking introduces clear restrictions and inefficiencies on public finance. For this reason alone, most macroeconomists do not favor earmarking, no matter how worthy the cause. Analysis does suggest, however, that the efficiency or dead-weight losses from earmarking tobacco taxes are minimal (66). Earmarking could be justified if governments used these funds for services that would not have been otherwise used. However, earmarked taxes also have a political function, in that they help to concentrate political winners of tobacco control, and thus influence policy. Earmarked funds that support broad health and social services (such as other disease programs) broaden the political and civil society support base for tobacco control. In Australia, broad political support among Ministries of Sports and Education helped to convince the Ministry of Finance that raising tobacco taxes was possible. Indeed, once an earmarked tax was passed, the Ministry of Finance went on to raise tobacco taxes further without earmarking them (67).

Targeting tobacco taxes to other health programs for the poorest socioeconomic groups could produce “double health gains”-- reduced tobacco consumption and increased access to and use of health services. In China, a 10% increase in cigarette taxes would decrease consumption by 5% and increase government revenue by 5%. These increased earnings could finance a package of essential health services for one-third of China’s poorest 100 million citizens (68).

A key pillar in tobacco control to help overcome some of these constraints is the Framework Convention on Tobacco Control (FCTC). The FCTC aims to be an international treaty that would commit countries to adopting strong, effective tobacco control policies (69). The treaty is being developed by the WHO in response to the unanimous adoption of a resolution calling for work on it at the 1999 World Health Assembly meetings. It is currently being negotiated by the 191 member states of the WHO and will likely consist of the framework convention and a series of negotiated protocols. The framework convention itself will provide the basic principles and structure for the treaty, while the protocols will consist of separate agreements governing specific areas. Countries agreeing to the negotiated protocols would adopt appropriate legislation, if necessary, to implement them. Negotiations on the treaty began in autumn 1999, with the adoption of the framework convention and related protocols targeted for May 2003.

In January 2001 the FCTC negotiations took a step forward with the release of the Chair’s Text, the first draft of the FCTC. In 20 sections, the Chair’s Text outlines substantive and procedural obligations under the FCTC. With respect to substantive obligations, the draft reflects a comprehensive approach to global tobacco control addressing a broad array of tobacco control concerns, including: (a) general obligations to develop comprehensive, multisectoral national tobacco control programs; (b) specific tobacco-specific provisions such as price and tax demand

reduction measures; non-price demand reduction strategies such as clean air laws, regulation of tobacco product contents, regulation of tobacco product disclosures, tobacco packaging and labeling, tobacco advertising and promotion; demand reduction strategies related to cessation; and supply measures such as youth protection and illicit trade in tobacco products . The Chair's Text also addresses: (a) other potential national obligations under the WHO Convention, such as education, training and public awareness, and multilateral cooperation in a number of areas including surveillance, scientific research and information exchange; (b) the institutions that might be established under the FCTC, including the Conference of the Parties and the Secretariat, a subsidiary body for science and a subsidiary body for implementation; and (c) implementation mechanisms, such as for national reporting and dispute settlement .

Supporters of the treaty contend that it is an effective way to address the concerns associated with globalization of the tobacco industry and the anticipated increases in tobacco use and its health consequences described above. It is particularly appropriate, they argue, for dealing with issues that cross national boundaries, including restricting tobacco-related advertising and promotion on television, radio and the Internet, controlling the smuggling of tobacco products, improving the sharing of information internationally, and more. Prospects for the treaty appear promising. During the debate over the resolution at the 2000 World Health Assembly, a record number of countries took the floor to provide support, including a number of major tobacco growing and exporting countries.

## **Conclusions**

Along with HIV, cigarette smoking is the other large and growing cause of death in the world. According to current consumption patterns, about 1 billion people in the 21<sup>st</sup> century will be

killed by their addiction. There is strong evidence that tobacco tax increases, the dissemination of information about the health risks from smoking, restrictions on smoking in public places and workplaces, comprehensive bans on advertising and promotion, and increased access to cessation therapies are effective in reducing tobacco use. Despite this evidence, these policies have been unevenly applied, partly due to political constraints and lack of awareness of the power of interventions.

## Literature Cited

1. Peto R, Lopez AD. The future worldwide health effects of current smoking patterns. In: Koop EC, Pearson CE, Schwarz MR, Eds. *Critical Issues in Global Health*. New York: Jossey-Bass, 2001:154-161.
2. World Health Organization. *Tobacco or health: a global status report*. Geneva: World Health Organization, 1997.
3. Jha P, Chaloupka FJ. *Curbing the epidemic: governments and the economics of tobacco control*. Washington, D.C.: World Bank, 1999.
4. Jha P, Chaloupka FJ, eds. *Tobacco control in developing countries*. Oxford: Oxford University Press, 2000.
5. Jha P, Chaloupka FJ. The economics of global tobacco control. *British Medical Journal* 2000;321:358-61.
6. Jha P, Ranson K, Nguyen S, Yach D. Estimates of global and regional smoking prevalence in 1995 by age and gender, *Am J of Public Health*, 2001 (in press)
7. Taylor AL, Chaloupka FJ, Guindon E, Corbett M. The impact of trade liberalization on tobacco consumption. In: Jha P, Chaloupka FJ, eds. *Tobacco control in developing countries*. Oxford: Oxford University Press, 2000:343-364.
8. Gajalakshmi CK, Jha P, Ranson K, Nguyen S. Global patterns of smoking and smoking-attributable mortality. In Jha P and Chaloupka FJ, eds. *Tobacco Control in Developing Countries*. Oxford: Oxford University Press; 2000:11-39.
9. World Health Organization. *Making a Difference, World Health Report 1999*. Geneva: World Health Organization, 1999.
10. Peto R, Lopez AD, Boreham J, Thun M, Heath C Jr. *Mortality from Smoking in Developed Countries, 1950-2000*. Oxford: Oxford University Press, 1994.
11. Bobak M, Jha P, Nguyen S, Jarvis M. Poverty and smoking. In Jha P and Chaloupka FJ, eds. *Tobacco Control in Developing Countries*. Oxford: Oxford University Press; 2000:41-61.
12. Jha P, Musgrove P, Chaloupka FJ, Yurekli A. The economic rationale for intervention in the tobacco market. In: Jha P, Chaloupka FJ, eds. *Tobacco control in developing countries*. Oxford: Oxford University Press, 2000:153-174.
13. Warner KE, Chaloupka FJ, Cook PJ, Manning WG, Newhouse JP, Novotny TE, et al. Criteria for determining an optimal cigarette tax: the economist's perspective. *Tobacco Control* 1995; 4: 380-386.

14. Kenkel D, Chen L. Consumer information and tobacco use. In: Jha P, Chaloupka FJ, eds. *Tobacco control in developing countries*. Oxford: Oxford University Press, 2000:177-214.
15. Weinstein ND. Accuracy of smokers' risk perceptions. *Annals of behavioral medicine* 1998;20:135-140.
16. US Department of Health and Human Services. *Preventing tobacco use among young people. A report of the Surgeon General*. Atlanta, Georgia: US Department of Health and Human Services, Public Health Service, Centers for Disease Control, Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 1994.
17. Chaloupka FJ, Hu T-W, Warner KE, Jacobs R, Yurekli A. The taxation of tobacco products. In: Jha P, Chaloupka FJ, eds. *Tobacco control in developing countries*. Oxford: Oxford University Press, 2000:237-272.
18. Chaloupka FJ, Warner KE. The economics of smoking. In: Culyer AJ, Newhouse JP, eds. *Handbook of health economics*. Amsterdam: North-Holland, 2000: 1539-1627.
19. US Department of Health and Human Services. *Reducing tobacco use. A report of the Surgeon General*. Atlanta, Georgia: US Department of Health and Human Services, Public Health Service, Centers for Disease Control, Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2000.
20. Centers for Disease Control and Prevention. Response to increases in cigarette prices by race/ethnicity, income, and age groups – United States, 1976-1993. *Morbidity and mortality weekly report* 1994;43(26):469-72.
21. Wasserman J, Manning WG, Newhouse JP, Winkler JD. The effects of excise taxes and regulations on cigarette smoking. *Journal of Health Economics* 1991;10(1):43-64.
22. Chaloupka FJ. Rational addictive behavior and cigarette smoking. *Journal of political economy* 1991;99(4):722-42.
23. Becker GS, Grossman M, Murphy KM. An empirical analysis of cigarette addiction. *American Economic Review* 1994;84(3):396-418.
24. Becker GS, Murphy KM. A theory of rational addiction. *Journal of political economy* 1988;96(4):675-700.
25. Chaloupka FJ, Tauras JA, Grossman M. The economics of addiction. . In: Jha P, Chaloupka FJ, eds. *Tobacco control in developing countries*. Oxford: Oxford University Press, 2000:107-129.

26. Gruber J. *Youth smoking in the US: prices and policies*. Working paper no. 7507. Cambridge (MA): National Bureau of Economic Research, 2000.
27. Ross H, Chaloupka FJ. *The effect of public policies and prices on youth smoking*. Research paper no. 8. Chicago: ImpacTeen, Health Research and Policy Centers, University of Illinois at Chicago, 2001.
28. Harris JE, Chan SW. The continuum-of-addiction: cigarette smoking in relation to price among Americans aged 15-29. *Health Economics* 1999;8(1):81-6.
29. Emery S, White MM, Pierce JP. Does cigarette price influence adolescent experimentation? *Journal of health economics* 2001;20:261-70.
30. Ross H, Chaloupka FJ, Wakefield M. *Youth smoking uptake progress: price and public policy effects*. Research paper no. 11. Chicago: ImpacTeen, Health Research and Policy Centers, University of Illinois at Chicago, 2001.
31. Tauras JA, O'Malley PM, Johnston LD. *Effects of price and access laws on teenage smoking initiation: a national longitudinal analysis*. Research Paper no. 2. Chicago: ImpacTeen and YES!, Health Research and Policy Centers, University of Illinois at Chicago, 2001.
32. Townsend JL, Roderick P, Cooper J. Cigarette smoking by socio-economic group, sex, and age: effects of price, income, and health publicity. *British Medical Journal* 309(6959):923-6.
33. Woolery T, Asma S, Sharp D. Clean indoor-air laws and youth access. In: Jha P, Chaloupka FJ, eds. *Tobacco control in developing countries*. Oxford: Oxford University Press, 2000:273-286.
34. Hopkins DP, Briss PA, Ricard CJ, Husten CG, Carande-Kulis VG, Fielding JE, Alao MO, McKenna JW, Sharp DJ, Harris JR, Woollery TA, Harris KW, Task Force on Community Preventive Services. Reviews of evidence regarding interventions to reduce tobacco use and exposure to environmental tobacco smoke. *American journal of preventive medicine* 2001;20(2S):16-52.
35. Evans WN, Farrelly MC, Montgomery E. Do workplace smoking bans reduce smoking? *American Economic Review* 1999;89(4):728-47.
36. Jacobson PD, Wasserman J. *Tobacco control laws: implementation and enforcement*. Santa Monica: RAND, 1997.
37. Townsend JL. Policies to halve smoking deaths. *Addiction* 1993;88:43-52
38. Saffer H. Tobacco advertising and promotion. In: Jha P, Chaloupka FJ, eds. *Tobacco control in developing countries*. Oxford: Oxford University Press, 2000:215-236.

39. Federal Trade Commission. *Cigarette Report for 1999*. Washington DC: Federal Trade Commission, 2001.
40. Saffer H, Chaloupka F. Tobacco advertising: economic theory and international evidence. *Journal of Health Economics* 2000;19(6):1117-37.
41. UK Department of Health. *Effect of tobacco advertising on tobacco consumption: a discussion document reviewing the evidence*. London: UK Department of Health, Economics and Operational Research Division, 1992.
42. Novotny TE, Cohen JC, Yurekli A, Sweaner D, de Beyer J. Smoking cessation and nicotine-replacement therapies. In: Jha P, Chaloupka FJ, eds. *Tobacco control in developing countries*. Oxford: Oxford University Press, 2000:287-307.
43. Raw M, McNeill A, West R. Smoking cessation: evidence-based recommendations for the healthcare system. *BMJ* 1999; 318:182-85.
44. Tauras JA, Chaloupka FJ. *The demand for nicotine replacement therapies*. Working paper. Cambridge (MA): National Bureau of Economic Research, in press.
45. Ranson MK, Jha P, Chaloupka FJ, Nguyen SN. *Global and regional estimates of the effectiveness and cost-effectiveness of price increases and other tobacco control policies*. Working paper, Health Policy Unit, London School of Hygiene and Tropical Medicine, 2001.
46. Jacobs R, Gale HF, Capehart TC, Zhang P, Jha P. The supply-side effects of tobacco-control policies. In: Jha P, Chaloupka FJ, eds. *Tobacco control in developing countries*. Oxford: Oxford University Press, 2000:311-341.
47. Merriman D, Yurekli A, Chaloupka FJ. How big is the worldwide cigarette smuggling problem? In: Jha P, Chaloupka FJ, eds. *Tobacco control in developing countries*. Oxford: Oxford University Press, 2000:365-392.
48. Joossens L, Chaloupka FJ, Merriman D, Yurekli A. Issues in the smuggling of tobacco products. In: Jha P, Chaloupka FJ, eds. *Tobacco control in developing countries*. Oxford: Oxford University Press, 2000:393-406.
49. Farrelly MC, Pechacek TF, Chaloupka FJ. *The impact of tobacco control program expenditures on aggregate cigarette sales: 1981-1998*. Working paper. Cambridge (MA): National Bureau of Economic Research, in press.
50. Wakefield MA, Chaloupka FJ. Effectiveness of comprehensive tobacco control Programs in reducing teenage smoking in the United States. *Tobacco Control* 2000;9(2):177-86.

51. Townsend J. UK smoking targets: policies to attain them and effects on premature mortality. In: Abedian I, van der Merwe R, Wilkins N, Jha P, eds., *The Economics of Tobacco Control: Towards an Optimal Policy Mix*. Cape Town: Applied Fiscal Research Centre, University of Cape Town, 1998:185-198.
52. Centers for Disease Control and Prevention. Declines in lung cancer rates – California, 1988-1997. *Morbidity and Mortality Weekly Report* 2000;49(47):1066-9.
53. Molarius A, Parsons RW, Dobson, AJ, Evans, A, Fortmann, SP, Jamrozik K, Kuulasmaa, K, Moltchanov V, Sans, S, Tuomilehto J, Puska, P. Trends in cigarette smoking in 36 populations from the early 1980s to the mid-1990s: findings from the WHO MONICA Project. *American Journal of Public Health* 2001;91(2):206-12.
54. Peto R, Darby, S, Deo H, Silcocks, P, Whitley, E, Doll, R. Smoking, smoking cessation, and lung cancer in the UK since 1950: combination of national statistics with two case control studies. *British Medical Journal* 2000;321(7257):323-9.
55. Corrao MA, Guindon GE, Sharma N, Shokoohi DF. Eds. *Tobacco Control Country Profiles*. Atlanta, GA: American Cancer Society, 2000.
56. Klonoff EA, Landrine H, Alcaraz R, Campbell RC, et al.. An instrument for assessing the quality of tobacco-control policies the ACT-L scale. *Preventive Medicine* 1998;27:808-14.
57. World Bank, *World Developmental Indicators*, 2000, World Bank, 2001, Washington, DC.
58. Abedian I, van der Merwe, R, Wilkins, Jha P, Editors, *The Economics of Tobacco Control: Towards an Optimal Policy Mix*. Cape Town: University of Cape Town; 1998.
59. Centers for Disease Control and Prevention. *Best Practices for Comprehensive Tobacco Control Programs*. US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, Atlanta, GA, 1999.
60. Pechmann C, Dixon P, Layne N. An assessment of US and Canadian smoking reduction objectives for the year 2000. *American Journal of Public Health* 1998;88(9):1362-7.
61. World Bank. *The World Development Report 1993: Investing in Health*. Oxford University Press: New York, NY, 1993.
62. World Health Organisation. 1996. Investing in Health Research and Development: Report of the Ad Hoc Committee on Health Research Relating to Future Intervention Options (Document TDR/Gen/96.1). Geneva: World Health Organisation.

63. Jha P, Paccoud F, Nguyen S. Strategic priorities for governments and development agencies in tobacco control. In Jha P and Chaloupka FJ, eds. *Tobacco Control in Developing Countries*. Oxford: Oxford University Press; 2000: 449-464.
64. Sunley EM, Yurekli A, Chaloupka FJ. The design, administration and potential revenue of tobacco excises. In Jha P and Chaloupka FJ, eds. *Tobacco Control in Developing Countries*. Oxford: Oxford University Press; 2000:409-426.
65. Pollock D. Forty years on: a war to recognise and win. How the tobacco industry has survived the revelations on smoking and health. *British Medical Bulletin*; 1996: 52:174-82
66. Hu TW, Xu X, Keeler T. Earmarked tobacco taxes: Lessons learned. In: Abedian, I et al, *The Economics of Tobacco Control*. Cape Town, South Africa: Applied Fiscal Research Centre, University of Cape Town, 1998: 102-118.
67. Galbally, RL. Health-promoting environments: who will miss out? *Aust N Z J Public Health* 1997; 21: (4 Spec No):429-30.
68. Saxenian H, McGreevey B. China: Issues and Options in Health Financing. World Bank Report No. 15278-CHA, World Bank, Washington, D.C.1996.
69. Taylor AL, Bettcher DW, WHO Framework Convention on Tobacco Control: a global "good" for public health, *Bulletin of the World Health Organization* 2000, 78: 7: 925.

**Table 1. Estimated smoking prevalence (by gender) and number of smokers, 15 years of age and over, by World Bank region, 1995**

World Bank Region	Smoking Prevalence			Total smokers	
	Males	Females	Overall	(millions)	(% of all smokers)
East Asia and Pacific	62%	5%	34%	429	38%
Europe and Central Asia	53%	16%	34%	122	11%
Latin America and Caribbean	39%	22%	31%	98	9%
Middle East and North Africa	38%	7%	23%	37	3%
South Asia (cigarettes)	20%	1%	11%	84	7%
South Asia (bidis)	20%	3%	12%	94	8%
Sub-Saharan Africa	28%	8%	18%	56	5%
<b>Low &amp; Middle Income</b>	49%	8%	29%	919	82%
<b>High Income</b>	37%	21%	29%	202	18%

Note: Country economies are divided according to 1999 GNI per capita, calculated using the World Bank Atlas method. The groups are: low income, \$755 or less; lower middle income, \$756- \$2,995; upper middle income, \$2,996- \$9,265; and high income, \$9,266 or more ([http://www.worldbank.org/data/databytopic/class.htm#Definitions\\_of\\_groups](http://www.worldbank.org/data/databytopic/class.htm#Definitions_of_groups)).

Source: Ref 5

**Table 2. Potential impact of a price increase of 10%, increased NRT use, and a package of non-price measures**

Region	Smoking-attributable deaths (millions)	Change in number of deaths (millions)					
		10% price increase		NRT with effectiveness of:		Non-price interventions with effectiveness of	
		Low elasticity *	High elasticity *	0.5%	2.5%	2%	10%
<b>Low-income and middle-income</b>	303	-4.6 -(1.5%)	-13.7 -(4.5%)	-1.1 -(0.3%)	-5.3 -(1.7%)	-4.2 -(1.4%)	-21.2 -(7.0%)
<b>High-income</b>	67	-0.5 -(0.7%)	-2.0 -(3.0%)	-0.2 -(0.3%)	-1.2 -(1.7%)	-0.9 -(1.4%)	-4.7 -(7.0%)
<b>World</b>	370	-5.1 -(1.4%)	-15.7 -(4.2%)	-1.3 -(0.3%)	-6.5 -(1.7%)	-5.2 -(1.4%)	-25.9 -(7.0%)

\*Low elasticity is -0.2 for high-income regions and -0.4 for low-income and middle-income regions.  
High elasticity is -0.8 for high-income regions and -1.2 for low-income and middle-income regions.

Source: Ref 45

*Table 3. Tobacco Control Legislation Sub-scale Scores*

Category	N	Highest Possible Score	Mean	Standard Deviation	Score Range
Passive smoking	133	20	5.2	3.1	0-12
Advertising	133	16	3.5	3.1	0-13
Reducing	133	13	0.9	1.4	0-6
Product Regs	133	8	2.2	2.1	0-8
Tax	30	7	1.7	2.3	0-7

Source: Authors

*Table 4. Mean Legislative Scores by Income Group Designation without Tax Sub-Scale*

Income Group	n	Passive smoking	Advertising and Promotion	Youth Access	Product Regulation	Total Score
Low	51	3.9	3.18	0.29	1.33	8.71
Middle	52	5.96	3.73	1.15	2.58	13.42
Upper-Middle	30	6.3	3.7	1.53	3.17	14.7

Source: Authors

**Table 5. Mean Legislative Scores by World Bank Income Group Designation with Tax Sub-Scale**

Income Group	n	ETS	Advertising and Promotion	Youth Access	Product Regulation	Tax as a Percent of Price*	Total Score
Low	51	3.9	3.18	0.29	2.0	1.33	9.1
Middle	52	5.96	3.73	1.15	1.33	2.58	13.65
Upper-Middle	30	6.3	3.7	1.53	1.73	3.17	15.33

\*Note: Tax as a percent of price available for 10 Income Group 1 countries, 9 Income Group 2 countries, and 11 Income Group 3 countries.

Source: Authors

**Table 6. Mean Legislative Scores of Only Countries with Tax Data by World Bank Income Group Designation**

Income Group	n	ETS	Advertising and Promotion	Youth Access	Product Regulation	Tax as a Percent of Price	Total Score
Low	10	5.4	4.4	1	2.5	2	15.3
Middle	9	5.89	3.67	1.67	3	1.33	15.56
Upper-Middle	11	7.45	5.45	2.36	4.54	1.73	21.54

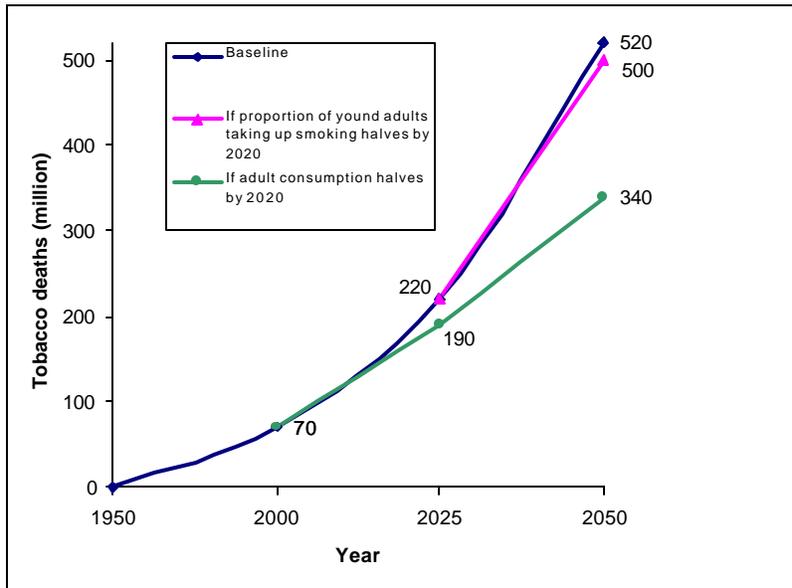
Source: Authors

Table 6. Estimated Impact of a Ten-Percent Increase in Cigarette Taxes on Cigarette Consumption and Cigarette Tax Revenues, Selected Countries

Country	%Change in Cigarette Consumption	%Change in Cigarette Tax Revenues	Country	%Change in Cigarette Consumption	%Change in Cigarette Tax Revenues
<b>Lower Middle</b>			<b>High Income</b>		
Belize	-2.24	7.54	Australia	-2.60	7.14
Bolivia	-4.88	4.63	Austria	2.92	6.79
Bulgaria	03.33	6.33	Belgium	-3.00	6.70
Colombia	-3.60	6.04	Canada	-2.05	7.74
Costa Rica	-6.00	3.40	Denmark	-3.36	6.30
Dominican Rep.	-1.07	8.82	Finland	-2.92	6.79
Egypt	-4.56	4.98	France	-3.00	6.70
El Salvador	-3.40	6.26	Germany	-2.88	6.83
Estonia	-5.60	3.84	Ireland	-3.00	6.70
Jamaica	-3.36	6.30	Italy	-2.92	6.79
Moldova	-1.49	8.36	Japan	-2.40	7.36
Panama	-4.80	4.72	Korea, Republic	-2.40	7.36
Paraguay	-0.80	9.12	Netherlands	-2.88	6.83
Philippines	-5.06	4.44	New Zealand	-2.72	7.01
Slovak Rep.	-2.76	6.97	Norway	-3.12	6.57
Thailand	-4.96	4.54	Portugal	-3.24	6.44
Turkey	-3.36	6.30	Singapore	-2.92	6.79
<b>Low Income</b>			Spain	-2.88	6.83
Albania	-5.60	3.84	Sweden	-2.76	6.96
Armenia	-4.00	5.60	Switzerland	-2.08	7.71
Bangladesh	-2.40	7.36	Taiwan	-0.15	9.84
Cambodia	-1.60	8.24	United Kingdom	-3.12	6.57
China	-3.23	6.45	United States	-1.20	8.68
Honduras	-0.80	9.12	<b>Upper Middle</b>		
India	-6.00	3.40	Argentina	-5.60	3.84
Indonesia	-2.40	7.36	Brazil	-6.00	3.40
Nepal	-5.86	3.56	Chile	-5.60	3.84
Pakistan	-5.84	3.58	Czech Republic	-0.01	9.99
Sri Lanka	-1.91	7.90	Greece	-2.92	6.79
Vietnam	-2.88	6.83	Hungary	-3.39	6.27
Zambia	-2.40	7.36	Malaysia	-2.67	7.06
Zimbabwe	-6.40	2.96	Mexico	-4.83	4.69
			Slovenia	-5.04	4.46
			South Africa	-2.66	7.07
			Uruguay	-4.80	4.72
			Poland	-3.14	6.55

Source: 63

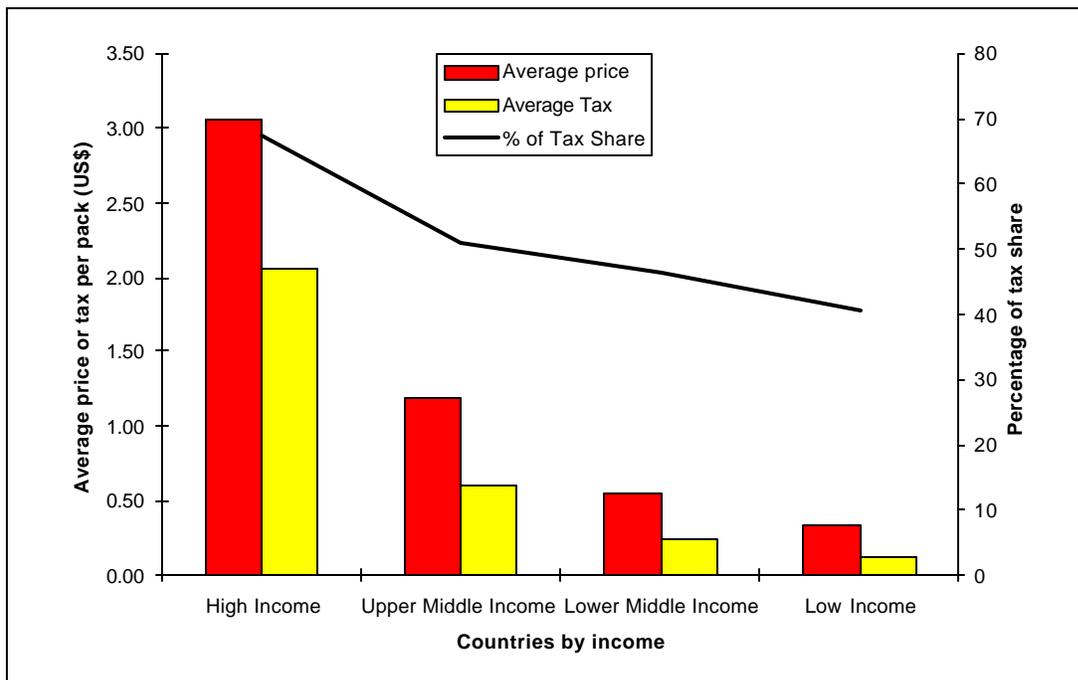
**Figure 1. Unless current smokers quit, tobacco deaths will rise dramatically in the next 50 years**



Sources: Ref 1 and 10

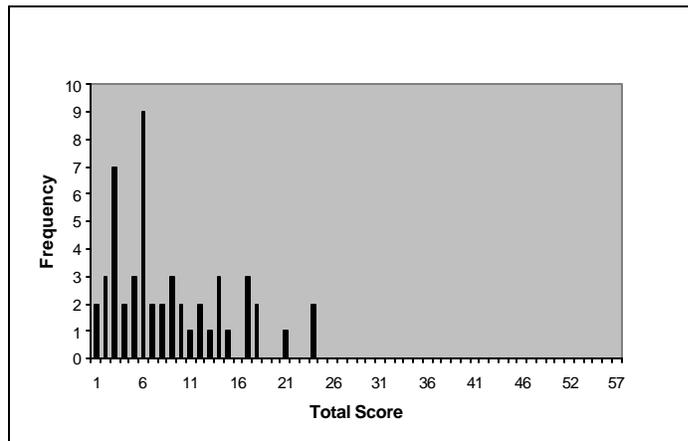
Note: Peto and others estimate 60 million tobacco deaths between 1950 and 2000 in developed countries. We estimate an additional 10 million between 1990 and 2000 in developing countries. We assume no tobacco deaths before 1990 in developing countries and minimal tobacco deaths worldwide before 1950. Projections for deaths from 2000 to 2050 are based on Peto and Lopez, 2000

**Figure 2. Average cigarette price, tax, and percentage of tax share per pack, by income group, 1996**

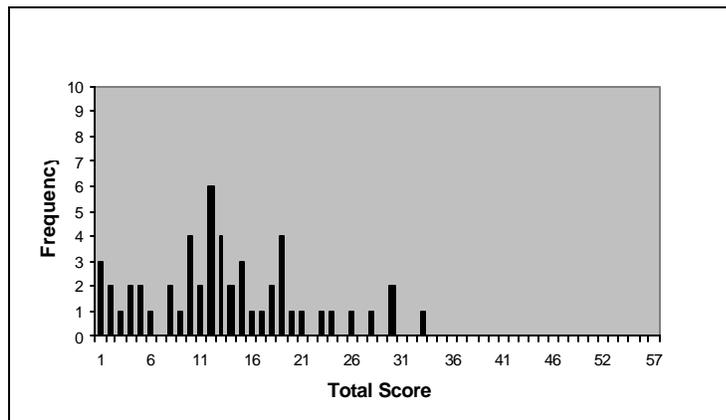


Source: World Bank; and authors' calculations

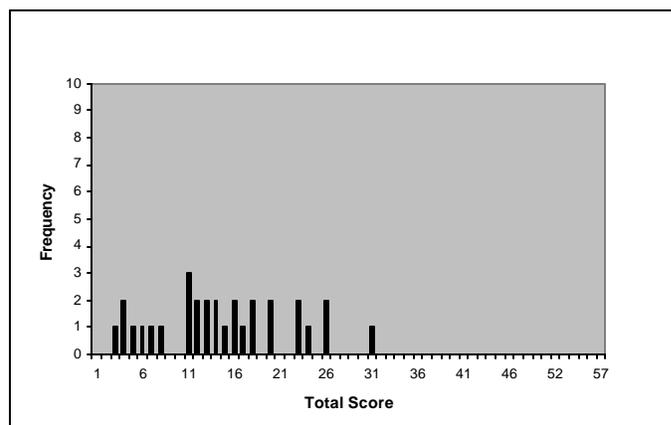
*Figure 3. Distribution of low-income legislative scores.*



*Figure 4. Distribution of middle-income legislative scores*



*Figure 5. Distribution of upper middle-income legislative scores.*



Source: Authors