11. Taxation and the Economics of Tobacco Control

Introduction

The relevance of economic research and analysis to tobacco control, whether directed at the general population or specifically at women, is becoming increasingly understood. The World Health Organization (WHO) 2009 report on the global tobacco epidemic noted, “While more data and analysis are needed on tobacco’s costs and economic burden, it is clear that its economic impact on productivity and health care—already disproportionately felt by the poor—will worsen as tobacco use increases”.¹ This chapter highlights findings and presents a gender analysis with a focus on women where data are available. Specifically, it reviews costs of tobacco use and the global evidence of the effects of taxation on the consumption of tobacco, in particular the effects of taxes on smoking. Little research on the economic aspects of tobacco has focused specifically on gender and women or the wide range of tobacco products used, including chewing tobacco, snuff, and bidis. Indeed, in some areas of the world, women and men use other tobacco products more than they use cigarettes. For example, in India, 12% of women chew tobacco, whereas only 2.4% of women smoke manufactured cigarettes.² Because many economic concepts, policies, and practices are relevant to a gender analysis, they are presented here to identify gaps needing to be addressed in further research.

Regardless of which subgroup is targeted, tobacco control programmes need to address the economic forces influencing tobacco production and consumption, including the role that tobacco production and sales play in employment, tax revenues, and trade balances in some countries. Tobacco control policies also need to acknowledge the health effects and other costs of tobacco use and to incorporate measures to reduce demand through higher prices. Debate continues about several aspects of the economics related to the consumption of tobacco, including concerns about the equity and efficiency of cigarette taxation.

The first section of this chapter discusses the costs of tobacco consumption. This topic is relevant to millions of women, particularly in developing countries, because tobacco use exacerbates poverty conditions and negatively affects women’s roles as family providers. The costs of treating tobacco-related illnesses and the resulting loss of productivity are leading economic arguments for tobacco control policies. This is especially true for the costs related to illnesses caused by exposure to second-hand smoke (SHS)—costs that are borne by both those exposed to SHS and society in general.

The costs of treating tobacco-related illnesses and the resulting loss of productivity are leading economic arguments for tobacco control policies.

The second section covers various issues concerning taxation and price. Although taxation is a “blunt” instrument that may not have a gender-specific goal, it influences women’s consumer behaviour and is an important source of revenue for governments and public health programmes.

Costs of Tobacco

Costs of Tobacco Consumption

From a policy perspective, it is important to understand how to maintain women’s relatively low smoking rates in the face of greater female autonomy, higher incomes, increased female labour force participation, and increased marketing efforts by tobacco companies in low- and middle-income countries. Moreover, it is imperative to understand how to decrease women’s tobacco use and the costs imposed by tobacco use in countries that have higher prevalence of female tobacco use.

As noted in the chapter on a gender equality framework, tobacco use undermines progress made in social and economic development and creates hardship for the millions of people in the world who live in poverty, the majority of whom are women. Women worldwide are...
the main producers of food, while also being home-care providers and caregivers of children. Tobacco-related diseases impose serious burdens on their care responsibilities, and the costs of care compete for scarce resources needed to feed families. When mothers of young children die from tobacco-related diseases, the loss is social as well as economic. Within the household, expenditures for tobacco may reduce the resources available for necessities, including food and clothing. Tobacco use, in short, is a development issue with economic costs.

At the household level, in Indonesia, where smoking is most common among the poor, 15% of the total expenditure of the lowest income group is for tobacco, while the poorest 20% of households in Mexico spend nearly 11%.

The health costs of tobacco use fall into two broad categories: the financial consequences of tobacco use for health care, life insurance, pensions, and other collective programmes; and the health costs associated with exposure to SHS, which is also referred to as environmental tobacco smoke (ETS). The indirect and intangible psychological costs of pain and suffering arising from smoking-caused disease are particularly difficult to quantify.

Estimates of the treatment costs and productivity losses associated with diseases caused by smoking provide potentially powerful evidence for implementing tobacco control. These costs are borne by individuals and society, generally consequent to the sale of an addicting product for profit. A societal perspective—including individuals, households, employers, government, and society in general—is the most comprehensive perspective. However, data limitations restrict many costing studies to specific perspectives, such as the health-care system, government, or households.

Cost estimates vary by the categories of costs included. One key distinction is between direct costs—including payment for tobacco products and medical care—and indirect costs, which include forgone earnings due to inability to work and productivity losses at the societal level. How deaths that are causally related to smoking are treated is a sensitive methodological point. If smokers die prematurely, there can be a “death benefit” in terms of saved pension costs. However, moral objections aside, these savings are counterbalanced by forgone productivity and increased costs of medical treatment while smokers are alive.

Productivity losses, including lost wages due to time off work for smokers and their caregivers and lower quality of life due to smoking-related illnesses, represent a substantial category of costs. For example, a study using household survey data from the 2005 Albania Living Standards Monitoring Survey found that after controlling for other observable factors, smokers’ wages were 20% lower than those of similar non-smokers.

Data from other countries also provide a basis for concern. The WHO report on the global tobacco epidemic notes that in the United States in 2008, the economic costs related to tobacco use approximated US$ 193 billion per year. In China, the economic costs of smoking were estimated to be US$ 5.0 billion in 2000, equivalent to US$ 25.43 per smoker over the age of 35. Direct costs accounted for US$ 1.7 billion (34% of the total), equivalent to 3.1% of total national health spending in China. Productivity losses related to illness amounted to US$ 0.4 billion (8%), and productivity losses caused by death were US$ 2.9 billion (58%). The direct costs of smoking accounted for an estimated 3.1% of China’s national health expenditures in 2000.

A study conducted in the United States found that smoking-attributable neonatal costs were almost US$ 367 million (in 1996 dollars). This estimate implies that a mother who smokes incurs additional neonatal costs of more than US$ 700 (in 1996 dollars). As discussed in the chapter on the impact of tobacco use on women’s health, women who smoke during pregnancy are at increased risk of premature rupture of membranes, abruptio placenta, placenta previa, and pre-term delivery. Moreover, infants of mothers who smoke during pregnancy are more likely to have lower average birth weight, are more likely to be small for gestational age, and are at increased risk of
stillbirth and perinatal mortality than are the infants of non-smoking women.

As the chapter on a gender equality framework for tobacco control notes, tobacco production causes diseases among agricultural workers, many of whom are women. The diseases include acute nicotine poisoning, known as green tobacco sickness. These health ailments tend to be more common in developing countries, where regulation of tobacco companies for the protection of farmers may be weak or poorly enforced. Tobacco-related diseases in conjunction with injuries incurred while farming impose significant costs on agricultural workers. While the evidence on disease and injury costs is scant, one study conducted in Kentucky between 1992 and 1999 found that hospital costs for tobacco workers averaged US$ 403.7. Physician fees, rehabilitation charges, and other fees related to injuries were not included in the assessment, so this estimate of the health-care cost of treating tobacco workers should be considered conservative. Much more attention needs to be paid to the costs of health care for tobacco-related diseases among women tobacco workers in developing countries.

Costs of Exposure to Second-Hand Smoke

In the chapter on SHS, the authors state that the majority of victims of SHS, particularly in developing countries, are women and children. The costs of SHS exposure are thus very relevant to a gender perspective on tobacco control. While the costs of medical treatment for smoking-related illnesses are well documented, the economic impact of SHS on health-care costs is less well understood. The 2006 US Surgeon General’s report documents in detail the evidence causally linking specific medical conditions to exposure to SHS.8 In Minnesota, the cost of direct medical treatment for conditions for which the Surgeon General’s Office found sufficient evidence to conclude that there was a causal link with exposure to SHS, including lung cancer and coronary heart disease, was estimated to be US$ 228.7 million (in 2008 dollars), equivalent to US$ 44.58 per Minnesota resident.9

A study in China, Hong Kong Special Administrative Region, found that costs related to health care and premature loss of life totalled US$ 53.9 million, equivalent to US$ 62.68 per capita annually.10

A report from the American Society of Actuaries calculated that US$ 2.6 billion was spent on non-smokers in the United States for medical care for lung cancer and heart disease (including heart attacks) caused by exposure to SHS. The report calculated that exposure to SHS resulted in an additional US$ 3.2 billion of economic losses—including lost wages, benefits, and household services—to individuals and governments. On a per capita basis, this is equivalent to US$ 9.02 for medical care and US$ 11.10 for additional economic losses.11,12 More research is needed on such costs related to women and men in developing countries.

As discussed in the section below on smoking and pregnancy, many studies have found that exposure of non-smoking pregnant women to SHS is associated with negative consequences,13 including decreased average mean birth weight, which has been associated with increased costs.14 A study in New York City calculated annual costs of US$ 99 million related to infants’ developmental delays caused by prenatal exposure to SHS.15

Why Tax Tobacco Products?

Given the economic burden that tobacco use places on societies, policy-makers have increasingly looked to
economists to provide input into public health policies. While the taxation of tobacco products around the world is a nearly universal practice, it is not always effectively implemented.

From the public health perspective, tobacco taxation has been clearly shown to prevent non-smokers from starting, to prevent former users from re-starting, and to lead current users to try to quit.

Taxes serve different objectives and have different effects on consumption, depending on the prevalence of smoking, the behavioural impact of the tax, and pricing effects. In most countries, for a given tax increase, the price of tobacco products will rise by an amount equal to or greater than the tax increase. This pricing pattern has been attributed to the addictive nature of the product and the coordinated oligopolistic nature of the tobacco industry in many countries.\(^\text{16}\)

One of the fundamental principles of economics is that of the downward-sloping demand curve. A demand curve that slopes downwards implies that an inverse relationship exists between the real price of a good and the amount of the good that is consumed. Some researchers once believed that because of the addictive properties of nicotine, tobacco products might be an exception to this fundamental principle. However, many econometric studies conducted over the past four decades, including several that have explicitly modelled the addictive nature of cigarettes, have shown that cigarettes are not an exception to the economic law of demand. The inverse relationship between price and consumption has important policy implications. That is, by increasing the real price of cigarettes, a cigarette tax increase has tremendous potential to be an effective policy lever for decreasing cigarette consumption.

There are several justifications for taxation of tobacco products, from the economic and public health points of view. From the public health perspective, tobacco taxation has been clearly shown to prevent non-smokers from starting, to prevent former users from re-starting, and to lead current users to try to quit. Higher taxes also reduce consumption among those who do continue to smoke. In addition, taxation generates revenues for governments, given the relatively inelastic demand for smoking (see below), which can be used to offset both the society-level costs of treating illnesses related to smoking and exposure to SHS and the loss of productivity associated with these illnesses.

Because of the inelasticity of demand, tobacco is an ideal product to tax. The taxes provide a relatively stable, predictable, and sustained source of revenue, and in general, cigarette excise taxes are inexpensive to implement and are administratively relatively easy to apply. Given the price sensitivity of demand for cigarettes, significant taxes can produce substantial public health benefits by discouraging smoking, particularly among children and the poor. Taxation can also blunt one of the most potent weapons the tobacco industry employs—differential pricing to divide and attract segments of the market that have different levels of price sensitivity.\(^\text{17}\)

However, as documented in the WHO report on the global tobacco epidemic,\(^1\) taxes in most countries are well below the levels of those in countries that have used them as part of a comprehensive strategy for reducing tobacco use. Indeed, at least some countries adopt tax structures that tax low-price cigarettes at relatively low rates in order to keep prices low, making the cigarettes more accessible by the poor.

While the strongest rationale for using taxation as a tobacco control measure is that smoking imposes net costs on society, taxation also provides a mechanism to partially recoup these costs from smokers. In addition, the strong negative externalities associated with tobacco use, including illnesses and related medical care for conditions caused by exposure to SHS, provide a strong justification for taxation.

**The Economic Perspective**

Tobacco taxation is a complex topic, partly because of the variety of taxes that are possible. The most common are excise taxes, value-added or ad valorem sales taxes, import duties, and, in the case of state-owned industries, monopoly profits.
The impact of excise taxes on cigarette demand depends on the extent to which changes in the taxes are reflected in cigarette prices and the responsiveness of cigarette demand to price (the price elasticity of demand, discussed below). Excise tax increases will discourage smoking to the extent that the increases are passed on to smokers in the form of higher prices; there is substantial evidence that a tax increase often leads to a more than proportional increase in retail price.\textsuperscript{18}

Ad valorem and specific taxes are the most common excise taxes levied by countries. Ad valorem is levied as a percentage of retail or wholesale price, whereas a specific tax is an absolute value (e.g. US$ 2, or £0.75) levied on packs (e.g. 10, 20, 25 pieces) or number of cigarettes (e.g. per 1000 pieces). In 2008, 33% of countries (60 out of 182) relied on ad valorem taxes, while 30% (55 out of 182) relied on specific excises. Some countries relied on both excises by imposing a mixture of specific and ad valorem excises (48 out of 182). There is still a significant number of countries that do not levy excise on tobacco products (19 out of 182) (WHO database, 2008).

A number of countries impose differential taxes on cigarettes and other tobacco products, based on characteristics of the cigarettes or tobacco products (e.g. price, length, packaging, type of tobacco content, content of cigarettes). In previous years, the United Kingdom imposed differential taxes on cigarettes with high tar and nicotine content.\textsuperscript{3} A differential tax system, however, may be prone to tax avoidance: the industry may alter an aspect of a brand, such as retail price, that subsequently reclassifies the brand into a lower tax bracket. Just such a phenomenon was recently observed in Egypt, where an international brand lowered its price just enough to be reclassified into a lower tax bracket. Excise taxes are relatively easy to collect and therefore have low administrative costs. However, specific excise taxes are susceptible to losing value; they must keep up with inflation in order for their real value not to be eroded. Thus, specific excise taxes must be regularly updated to ensure that their real value is maintained over time. In recent years, a number of countries have shifted to specific excise taxes on tobacco products. However, among 55 countries that rely solely on specific excise taxes, only two (Australia and New Zealand) have automatic inflation adjustment mechanisms in place. A failure to adjust the excise taxes led to a problem in South Africa, as discussed below. Excise taxes there did not keep pace with inflation, leading to a fall in the real price of cigarettes and a concomitant rise in consumption prior to 1991.

In contrast, the real value of an ad valorem tax is maintained when the prices of tobacco products rise in conjunction with those of other goods and services. Thus, the real value of revenues generated by ad valorem taxes stays relatively stable over time, and they are favoured by the tobacco industry, which can maintain the base price, and therefore the tax, at a relatively low level. Similar to a differential tax system, ad valorem taxes are also prone to tax avoidance, since they rely on retail or wholesale price.

Tobacco tax rates differ widely across industrialized and developing countries. The tax rates of most countries that have used taxation as part of a comprehensive approach to reducing tobacco consumption have been around 65% to 75% of the retail price of cigarettes. However, many lower-income countries still have tax rates that fall well below 50% of the price of cigarettes, and many middle-income countries have rates that fall below 25% of the price.

Smokers may engage in compensating behaviours to sustain nicotine intake as a result of tax and price increases. They may smoke longer cigarettes or cigarettes with higher tar and nicotine content; or, because cigarettes and other tobacco products may substitute for one another as a source of nicotine, they may switch to hand-rolled cigarettes, pipes, snuff, chewing tobacco, or other forms of smokeless tobacco. Thus, tax increases need to be applied symmetrically across all types of tobacco products in a manner that equalizes their retail prices, so that consumers will not turn away from relatively high-priced products towards those with relatively lower prices.

Price Elasticity

To fully understand how taxation policies work, it is necessary to understand the concept of elasticity. Economists use the price elasticity of demand to measure the responsiveness of cigarette consumption to changes in the inflation-adjusted price of cigarettes. The price elasticity of demand is defined as the percentage change in the number of cigarettes consumed that results from a 1% increase in the inflation-adjusted price of cigarettes.
The reductions in cigarette use in response to price increases reflect not only increased smoking cessation and decreased smoking initiation, but also reduced relapse among former smokers and decreased average consumption by individuals who continue to smoke despite the higher prices.

*Elastic demand* is defined as an elasticity that is less than –1.0, or, alternatively, whose absolute value is greater than 1.0. In other words, the change in consumption is greater, in percentage terms, than the change in price. *Inelastic demand*, on the other hand, refers to situations in which consumption does go down when the price increases, but by a relatively smaller amount—the percentage change in consumption is less than the percentage change in the price. Inelastic demand is therefore defined as having an elasticity between 0.0 and –1.0.

There is a difference between short-term elasticities and long-term elasticities. In the long term, individuals are more elastic, meaning they will reduce consumption proportionately more than in the short term. Most studies, however, measure demand in the short term only. While a majority of econometric studies of the effect of price on cigarette consumption use aggregate data, a growing number of such studies, particularly in high-income countries, are using individual-level data, which enables assessment of the impact of cigarette prices on smoking in subgroups of the population, such as by age, income, and gender.

**Price Elasticity Estimates**

Most of the econometric studies conducted in high-income industrialized countries, such as the United States, the United Kingdom, and Canada, conclude that the overall price elasticity of demand ranges from –0.5 to –0.25, implying that a 10% increase in the price of cigarettes will decrease overall cigarette consumption in these countries by between 5.0% and 2.5%. Many of these studies used individual-level data to examine the determinants of cigarette demand. Several recent studies that employed individual-level data concluded that approximately one half of the overall impact of price on demand results from decreases in smoking prevalence, and the remainder results from reductions in average cigarette consumption by smokers.

**Price Elasticity and Youth**

The use of individual-level data allows researchers to examine differences in the price elasticity of demand by socioeconomic and demographic characteristics. Numerous studies in the United States have used individual-level data to explore differences in the price elasticity of demand by age. As noted in the chapter on the prevalence of tobacco use and factors influencing its initiation and maintenance, tobacco use among youth is rising, and in some countries, rates are the same for boys and girls. Measuring the impact of economic policies on youth smoking is thus an important global priority. Given that most regular smokers start smoking in their youth, it is important to try to understand the influence of price on this age group. There is a growing body of evidence indicating that adolescents and young adults are substantially more price-elastic than older adults.

Although some studies, such as those of Chaloupka, Wasserman et al., and Townsend et al., found either that younger people were less price-sensitive than adults or that there was no statistically significant difference between youth and adult price-responsiveness, most other studies have found youth to be much more price-sensitive than adults. Young people in industrialized countries generally have relatively low incomes, of which a high proportion is available for discretionary expenditure, so changes in relative price are likely to affect their smoking patterns. Ross and Chaloupka found, in fact, that young people's demand for smoking in the United States, with an elasticity between –0.67 and –1.02, is more elastic than adult demand and that the perceived price of cigarettes is the largest single factor affecting teen smoking.

Most researchers assume that price effects on youth reflect the impact of price on smoking initiation, while the estimate for adults reflects the effects of price on smoking cessation. Although some studies examining smoking initiation found that prices had an insignificant effect on initiation by young people, some of these studies suffered from econometric problems associated with the use of retrospective data. Studies in which missing data are imputed and which use larger samples that include a number of determinants of cigarette demand (such as restrictions on smoking) have found relatively conclusive evidence that price increases will
reduce not only the number of cigarettes smoked but also
the overall prevalence of smoking among young people.

In fact, a majority of the studies that examine the
economic determinants of cigarette consumption among
youth and young adults have concluded that this age
group is more price-responsive than adults, suggesting
that excise tax increases leading to price increases would
be a very effective means of reducing and discouraging
cigarette smoking among adolescents. This would lead
to permanent reductions in smoking in all age groups.
The aforementioned studies are from the United States
and the United Kingdom, high-income countries.
However, a small but growing number of studies about
the response to price and tax increases among youth in
low- and middle-income countries have found evidence
consistent with that from high-income countries on an
inverse relationship between age and price-responsive-
ness. For example, Krasovsky et al. estimated differences
in the price elasticity of cigarette demand by age and
income in Ukraine and found younger smokers to be
more responsive to price changes than older smokers at
each income level. Ross also estimated cigarette demand
equations for students in Ukraine and concluded that
their price elasticities for smoking prevalence ranged
from –0.29 to –0.51, while the estimated price elastic-
ties for average smoking were considerably higher, from
–1.42 to –1.83. Karki et al. estimated the joint demand
for cigarettes and bidis by age in Nepal and found that
young people (15 through 24 years of age) were more
than twice as responsive to price as the overall popula-
tion and that price-responsiveness generally fell with age.
Kyaing estimated price elasticities of smoked tobacco
products in Myanmar and found the price elasticity for
youth and young adults to be approximately 50% greater
than that for the overall population. Ross estimated the
price elasticity of demand for students in Moscow to be
–1.15, well above the estimates provided in the limited
studies of the impact of price on adult smoking in the
Russian Federation.

Economic theory predicts that youth will respond
more to price and tax increases than adults, and the
evidence from the United States and the United
Kingdom is very relevant to low- and
middle-income countries, to which the
tobacco epidemic is steadily shifting.

Lewit et al. suggest that young people are likely to be
more price-sensitive than adults because they have been
smoking for a shorter time and so can adjust more quickly
to price changes than long-time smokers who are strongly
addicted. Moreover, the fraction of disposable
income spent on cigarettes by the young smoker is likely
to be greater than that of an adult smoker. These are all
important reasons for young smokers to be more affected
by price increases than adults. These reasons create an
important opportunity to discourge young people from
taking up smoking. Because youth have higher discount
rates than adults, they do not internalize risks and give
less weight to future consequences from their current
tobacco consumption.

Youth may also be influenced more easily than adults
by bandwagon or peer-group effects. That is, they are more
likely to smoke if their parents, siblings, or peers smoke.
Higher prices could discourage young people from smoking
by the price mechanism’s working through the same peer or
bandwagon channel; that is, a price increase will not only
reduce a youth’s smoking but will also reduce peer smoking.
Given evidence that individuals are far less likely to start
smoking after they reach their mid-twenties, young smokers
who never begin to smoke because of a price increase may
well never become regular smokers. As a result, over a longer
period of time, aggregate smoking and the detrimental
health effects it imposes would be dramatically reduced.
**Price Elasticity and Income**

Some studies have used individual-level data to examine differences in the price elasticity of demand by income, socioeconomic status (SES), and education. These studies generally find that individuals who have lower income, have less education, or are of lower SES respond more to price changes than do individuals who have higher income, have more education, or are of higher SES, respectively.\(^{19,21,35}\)

An inverse relationship between income and response to cigarette prices has also been found when comparing price-elasticity estimates of low- and high-income countries. A recent review of the literature suggests that the price-elasticity estimates for low- and middle-income countries are approximately double those for high-income countries.\(^3\) That is, for low- and middle-income countries, demand is generally found to be more elastic, and estimates of the average price elasticity centre around \(-0.8\).

Researchers found a positive relationship between income and cigarette consumption in all income groups in Turkey. Their results show that income elasticity declines with household income level.

**Income Effect on Demand**

When factors that increase demand (such as rising per capita income) are taken into consideration, the full expected effect of higher prices on cigarette consumption may not be achieved. Evidence from many countries (e.g. Indonesia, Malaysia, Turkey, Viet Nam, and China) shows that changing per capita income significantly affects smoking prevalence, as well as cigarette demand.\(^{36}\) Onder and Yurekli found a positive and significant relationship between income and frequency of cigarette smoking in all income groups in Turkey except for the richest group.\(^{37}\) Their results suggest that as income increases, the prevalence of smoking increases more for the poorest group (0.11) than for the better-off groups (fourth quartile) (0.06), but the richest households decrease their smoking as their income increases (\(-0.02\)). Similarly, Adioetomo et al.\(^{38}\) and Djutahara et al.\(^{39}\) estimated that a rise in incomes in Indonesia would increase the number of smokers by causing more potential smokers to decide to take up smoking. They estimated that a 10% increase in daily income would raise the current number of smoking households' from 60.2% to 60.8% and would increase the quantity of cigarettes smoked by current smokers by 6.5%.”

Onder and Yurekli found a positive relationship between income and cigarette consumption in all income groups in Turkey.\(^{37}\) Their results show that income elasticity declines with household income level. Adioetomo et al. also found a significant and positive relationship between income and the demand for cigarettes in Indonesia.\(^38\) The income elasticity (\(e\)) was 0.65 in Adioetomo et al., and it varied between 0.46 and 0.21 in Djutahara et al.\(^{39}\) As expected, Adioetomo et al. estimated that Indonesian smokers in low-income households were more sensitive to income increases (\(e= 0.9\)) than were smokers in high-income households (\(e = 0.3\)). Adioetomo et al. estimated that a 10% increase in income would increase the quantity of cigarettes smoked by 9% in low-income households, 3% in middle-income households, and less than 1% in high-income households.

The inverse relationship between price and demand and the positive relationship between income and demand will cause a simultaneous per capita income increase and cigarette price increase to have opposing effects on cigarette demand. In order to reduce consumption by a desired amount, the percentage increase in price will need to be higher if income is increasing. If cigarette prices remain unchanged while income increases, the demand for cigarettes will rise.

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* The unit of measurement was households; the data indicate whether there are smokers in the household but do not indicate who smokes. So instead of using the criterion “smokers, non-smokers”, the study refers to “smoking households” (where there are smokers) and “non-smoking households” (where there are no smokers). The results show that as daily income increases by 10%, the ratio between smoking and non-smoking households increases 63%, meaning at least one member of a non-smoking household will smoke, and the household will become a smoking household.

** A 10% increase in daily income will increase the log odd ratio by 2.64% for overall household level and 7.25% for low-income households. When evaluated at the mean values of all the variables, the 10% increase in income would increase the proportion of current households’ smokers from 60.2% to 60.8%, and for low-income households, from 61.1% to 62.8%.
One of the first studies of the impact of tobacco taxes on the demand for cigarettes and other tobacco products was conducted by Chapman and Richardson in 1990. Using annual data from 1973 to 1986 for Papua New Guinea, they estimated tax elasticities of demand for cigarettes and other tobacco products to be –0.71 and –0.50, respectively. These estimates are lower than the true price elasticity of demand because the tobacco taxes are less than 100% of the price of the products. If half of the price is accounted for by the tax, the estimated price elasticity of demand for cigarettes and other tobacco products would be –1.42 and –1.0, respectively, significantly higher than the consensus estimate for high-income countries.

Since the publication of Chapman and Richardson’s paper, interest in tobacco tax and price effects in low- and middle-income countries has been growing. A number of studies have examined the effects of tobacco taxes and prices on the demand for tobacco in these countries, and most, but not all, have shown that the demand for tobacco products is more responsive to price and tax changes there than it is in high-income countries. Studies from China, Viet Nam, South Africa, Zimbabwe, Morocco, Myanmar, Bulgaria, and other low- and middle-income countries have estimated tax or price effects in excess of the consensus estimate for high-income countries. Several studies have examined the differential price response by income level. For example, Sayginsoy et al. estimated cigarette demand elasticities of –1.33, –1.00, and –0.52 for low-, middle-, and high-income individuals, respectively, in Bulgaria. Van Walbeek estimated price elasticities of demand for cigarettes to be –0.71 and –0.50, respectively, significantly lower than the consensus estimate for high-income countries.

**Figure 11.1.** Consumption and Price of Cigarettes in China, 1990–2005

Source: Ref. 52. Calculated by the authors.

**Figure 11.2.** Relationship Between Cigarette Consumption and Excise Tax Rate in South Africa, 1980–2006
elasticities of demand by income quartile in South Africa and found that the lowest quartile was more elastic (−1.39) than the highest quartile (−0.81).51

While the aforementioned studies found inverse relationships between consumption and price by using multivariate analyses that control for a host of other factors thought likely to affect cigarette demand, the inverse relationship can also be seen graphically with bivariate scatter plots. For example, Figures 11.1, 11.2, and 11.3 plot cigarette price and cigarette consumption in China, South Africa, and the United States, respectively, and show a very strong inverse relationship between consumption and price.

**Price Elasticity and Gender**

Of particular importance in this chapter is the relationship between cigarette prices and smoking and patterns of tobacco use among women and men. The relationship between smoking and gender is a complex one that tends to change with changes in the labour force. Demand for cigarettes may increase as more women and girls in developing countries enter the wage labour force and have more disposable income. When the increases in retail prices of cigarettes fall behind the increases in inflation and increases in income, cigarettes become more affordable, and demand increases. This is the case in many countries where the smoking epidemic is highest among men and increasing among women (see Figure 11.4).

It is clear that the epidemiological pattern needs to be analysed in relation to the differential effects of economic development and consumer patterns on women and men. As noted in the chapter on prevalence of tobacco use and factors influencing initiation and maintenance among women, there is now a significant opportunity to prevent a
### Table 11.1. Findings of Selected Studies of the Elasticity of Demand for Smoking by Sex

<table>
<thead>
<tr>
<th>Date</th>
<th>Study</th>
<th>Country</th>
<th>Elasticity Estimate for Females</th>
<th>Elasticity Estimate for Males</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>Atkinson and Skegg</td>
<td>UK</td>
<td>-0.34</td>
<td>No significant response</td>
<td>Aggregate-level annual data on cigarette sales in UK for years 1951–1970</td>
</tr>
<tr>
<td>1982</td>
<td>Lewit and Coate</td>
<td>USA</td>
<td>No significant response</td>
<td>Aged 20–25, -1.4; aged 35+, -0.45</td>
<td>1976 Health Interview Survey</td>
</tr>
<tr>
<td>1990</td>
<td>Chaloupka</td>
<td>USA</td>
<td>No significant response</td>
<td>-0.60 long-run price elasticity</td>
<td>Second National Health and Nutrition Examination Survey</td>
</tr>
<tr>
<td>1994</td>
<td>Townsend, Roderick, and Cooper</td>
<td>UK</td>
<td>-0.61</td>
<td>-0.47</td>
<td>General Household Survey 1972–1990</td>
</tr>
<tr>
<td>1998</td>
<td>Farrelly and Bray</td>
<td>USA</td>
<td>-0.19</td>
<td>-0.26</td>
<td>National Health Interview Surveys 1976–1993</td>
</tr>
<tr>
<td>1999</td>
<td>Chaloupka and Pacula</td>
<td>USA</td>
<td>-0.595</td>
<td>-0.928</td>
<td>8th-, 10th-, and 12th-grade students, Monitoring the Future Surveys 1992–1994</td>
</tr>
<tr>
<td>2000</td>
<td>Hersch</td>
<td>USA</td>
<td>-0.38</td>
<td>-0.54</td>
<td>Tobacco Use Supplement to the Current Population Survey 1992–1994</td>
</tr>
<tr>
<td>2001</td>
<td>Farrelly and Bray</td>
<td>USA</td>
<td>-0.32</td>
<td>-0.18</td>
<td>National Health Interview Surveys 1976–1993</td>
</tr>
<tr>
<td>2001</td>
<td>Stephens et al.</td>
<td>Canada</td>
<td>-0.3</td>
<td>-0.5</td>
<td>National Population Health Survey</td>
</tr>
<tr>
<td>2007</td>
<td>Stehr</td>
<td>USA</td>
<td>-0.51</td>
<td>-0.26</td>
<td>Behavioural Risk Factor Surveillance System 1985–2000</td>
</tr>
</tbody>
</table>

#### Studies of Smoking Transitions

<table>
<thead>
<tr>
<th>Year</th>
<th>Study</th>
<th>Country</th>
<th>Elasticity Estimate of Cessation</th>
<th>Elasticity Estimate of Initiation</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>Tauras and Chaloupka</td>
<td>USA</td>
<td>0.34 to 0.71 price elasticity</td>
<td>0.27 to 0.92 price elasticity</td>
<td>Longitudinal component of the Monitoring the Future Surveys 1976–1995</td>
</tr>
<tr>
<td>2004</td>
<td>Cawley, Markowitz, and Tauras</td>
<td>USA</td>
<td>No significant response</td>
<td>-0.86 to -1.49 price elasticity of initiation</td>
<td>National Longitudinal Survey of Youth 1997 Cohort (1997–2000)</td>
</tr>
<tr>
<td>2004</td>
<td>Cawley, Markowitz, and Tauras</td>
<td>USA</td>
<td>No significant response</td>
<td>-1.20 price elasticity of initiation</td>
<td>Children of the National Longitudinal Survey of Youth 1979 Cohort (1988–2000)</td>
</tr>
</tbody>
</table>

#### Studies of Smoking During Pregnancy

<table>
<thead>
<tr>
<th>Year</th>
<th>Study</th>
<th>Country</th>
<th>Elasticity Estimate</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>Evans and Ringel</td>
<td>USA</td>
<td>-0.50</td>
<td>Not applicable</td>
</tr>
<tr>
<td>2001</td>
<td>Ringel and Evans</td>
<td>USA</td>
<td>-0.70</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>
worldwide epidemic of tobacco use among women and girls, including in countries like China, where sex differences in prevalence and health impact are high.\textsuperscript{55–57}

In the United States, men were found to be very responsive to changes in cigarette prices, with a long-run price elasticity of demand estimated to be \(-0.60\). Women, however, were often found to be less responsive to cigarette price changes, a finding consistent with those of Lewit and Coate.\textsuperscript{58}

Recently published studies that estimated the price elasticity of demand by gender are summarized in Table 11.1. Most of the evidence of a differential price response by gender comes from the United States, the United Kingdom, and Canada. The results from these studies are mixed. A preponderance of those conducted in North American countries concluded that women's cigarette consumption is less responsive to changes in cigarette prices than men's. In contrast, studies in the United Kingdom have generally found women's consumption of cigarettes to be more responsive than men's to price changes.

Studies of Prevalence and Cigarette Consumption by Smokers in the United States

One of the first US studies to examine gender-specific differences in the effects of cigarette prices on consumption was conducted by Lewit and Coate in 1982.\textsuperscript{58} Using a split-sample methodology and data from the 1976 Health Interview Survey, Lewit and Coate found cigarette demand by females to be generally not sensitive to price. In contrast, with the exception of those 26 to 35 years of age, males were found to respond significantly to price. The price elasticities of demand for males aged 20 to 25 and over 35 were estimated to be \(-1.4\) and \(-0.45\), respectively. The male price coefficients were significantly larger than the male and female pooled-sample results, where the male and female price coefficients were constrained to be equal.

Chaloupka also employed a split-sample methodology to examine differences in the effects of cigarette prices on consumption by gender.\textsuperscript{59} Using data from the Second National Health and Nutrition Examination Survey and incorporating the addictive properties of cigarette smoking, including reinforcement, tolerance, and withdrawal, Chaloupka found men to be very responsive to changes in cigarette prices, with a long-run price elasticity of demand estimated to be \(-0.60\). Women, however, were found to be unresponsive to cigarette price changes, a finding consistent with those of Lewit and Coate.\textsuperscript{58}

Lewit et al. examined differences in the effects of cigarette prices on smoking prevalence by gender among ninth-grade students (aged 13 to 16) in 21 North American communities in 1990 and 1992.\textsuperscript{60} Ninth-grade boys were found to be much more responsive to changes in cigarette prices than girls were. The estimated prevalence price elasticities of demand for boys and girls were \(-1.51\) and \(-0.32\), respectively; however, the estimated price coefficients in the girls' equations were found not to be significantly different from zero.

Chaloupka and Pacula used data on eighth-, tenth-, and twelfth-grade students from the 1992–1994 Monitoring the Future Surveys to examine the price sensitivity of cigarette demand by sex.\textsuperscript{61} While price was found to have a negative and significant impact on smoking prevalence rates of both young men and young women, the magnitude of the price effects was very different. The prevalence price elasticity of demand for young men was nearly twice as large (in absolute value) as that for young women: \(-0.928\) vs \(-0.595\).

Hersch extracted data from the 1992 and 1993 waves of the Tobacco Use Supplements to the Current Population Surveys and found that higher prices reduce cigarette demand in both men and women.\textsuperscript{62} The estimated price elasticities of demand were similar for men and women and ranged from \(-0.6\) to \(-0.4\). However, when Hersch restricted the sample to individuals in the workforce, she found males to be significantly more responsive to cigarette price changes than females.
In a series of papers, Farrelly et al. pooled data from National Health Interview Surveys (NHIS) between 1976 and 1993 to investigate the cigarette-price-responsiveness of individuals with different demographic characteristics. In the first paper, Farrelly and Bray controlled for many factors thought likely to affect the demand for cigarettes, including socioeconomic and demographic characteristics, as well as year and region indicators. They found that males were more responsive to changes in cigarette prices than were females. A follow-up study used the same pooled NHIS data but included state fixed effects in each model instead of region fixed effects. With the state-fixed-effect specification, the authors found that women were more price-responsive than men.

The inclusion of state fixed effects eliminates time-invariant unobserved state-level heterogeneity from the model. To the extent that sentiment towards smoking within states is time-invariant during the period under investigation, the inclusion of state fixed effects in the model eliminates an omitted variable bias on the price estimates. That is, sentiment towards tobacco may be driving both changes in cigarette smoking and changes in cigarette excise taxes. Thus, not controlling for antitobacco sentiment may result in an omitted variable bias, producing a spurious negative relationship between price and smoking and resulting in estimated price elasticities biased away from zero. The use of state fixed effects relies on within-state variation in cigarette prices over time (as opposed to interstate differences in prices) to quantify the effect of price on consumption. For the state-fixed-effects approach to be viable, however, researchers must use multiple years of state data. One year of cross-sectional data would result in perfect multicollinearity between the state-specific prices and the dichotomous state indicators. Moreover, even if multiple years of state data are employed, there must be reasonable variation in price over time within states to avoid collinearity issues with the price variable.

Stehr used data from the 1985–2000 Behavioural Risk Factor Surveillance System to investigate differences in the effects of cigarette taxes on cigarette demand by sex. He included gender-specific state fixed effects in his model and concluded that women are nearly twice as responsive to cigarette taxes as men are. Specifically, the total estimated price elasticities of demand for women and for men were –0.51 and –0.26, respectively. The gender-specific state fixed effects are an attempt to control for state-specific gender gaps in smoking rate that may be correlated with cigarette taxes. If a significant correlation exists, the omission of the gender-specific state fixed effects could lead to biased price estimates.

**Studies of Smoking Transitions in the United States**

As noted above, many researchers examining the influence of price on smoking prevalence have assumed that the effect of price on youth is dominated by the effect on smoking initiation, while the effect on young adults and older adults is dominated by the effect on smoking cessation. Several recent studies have attempted to directly quantify the differential impact of price on smoking initiation among youths by gender and the differential impact of price on cessation among young adults. These studies have relied on longitudinal data that track individuals’ smoking behaviour and other determinants over time.

Cawley, Markowitz, and Tauras investigated the determinants of youth smoking initiation, using the first four waves (1997–2000) of the National Longitudinal Survey of Youth 1997 cohort. They investigated two alternative measures of smoking initiation: one that indicated a transition from non-smoker to smoking any positive quantity of cigarettes (termed “less stringent initiation”), and one (termed “more stringent initiation”) that reflected the transition from non-smoker to frequent smoker, as measured by having smoked during at least 15 of the past 30 days. While controlling for smoke-free-air laws, youth-access laws, and residence in tobacco-producing states, the authors concluded that male adolescent smoking initiation was very responsive to changes in cigarette prices, with the average price elasticity of “less stringent initiation” estimated to be –0.86 and the average price elasticity of “more stringent initiation” estimated to be –1.49. Female smoking initiation was found to be not significantly related to cigarette prices but very responsive to body-weight concerns.

A follow-up paper found results very similar to those of the earlier study, despite using a longitudinal dataset that spans a longer period. The authors used data from 1988 to 2000 from the Children of the National Longitudinal Survey of Youth 1979 cohort. After controlling for smoke-free-air laws and youth-access laws, they found that cigarette prices had a negative impact on smoking initia-
tion in all models that were estimated; however, the price coefficients were significantly different from zero in only the male equations. Specifically, the price elasticity of male “less stringent initiation” was estimated to be –1.20.

Tauras and Chaloupka examined gender differences in the impact of price on young adults’ decisions to quit smoking, using the longitudinal component of the Monitoring the Future Surveys and a semiparametric Cox regression to assess the probability that smokers would make a transition from smoking to non-smoking. They concluded that the likelihood of making a smoking cessation attempt for both men and women increases significantly as cigarette prices rise. The estimated price elasticity of smoking cessation ranged from 0.34 to 0.71 for women and from 0.27 to 0.92 for men, implying that a 10% increase in price raises the probability of making a cessation attempt by up to 7% for females and 9% for males.

While comprehensive tobacco control programmes have been found to be effective in reducing smoking in the overall population, some evidence suggests that women benefit in particular.

Previous Studies in the United Kingdom and Canada

One of the first studies to examine gender-specific differences in the effects of cigarette prices on consumption was conducted by Atkinson and Skegg in 1973. Using aggregate-level annual data on cigarette sales in the United Kingdom from 1951 to 1970 and gender-specific shares of consumption, they found clear differences in the estimated price elasticity of demand: women have a total price elasticity of demand of –0.34, and men do not significantly respond to price changes.

Townsend, Roderick, and Cooper used biennial data on smoking from the general household survey for 1972–1990 in the United Kingdom and found that women respond more to price than men do. They estimated the price elasticity of demand to be –0.61 for women and –0.47 for men.

Finally, Stephens et al. used data from Canada’s National Population Health Survey to examine differential response to cigarette prices by gender and found cigarette prices to be positively associated with the odds of being a non-smoker for adults of both sexes; however, males responded more to the price change than did females. The price elasticity for being a smoker for men was estimated to be –0.5, and for women it was estimated to be –0.3.

Policy Implications

Smoking and Pregnancy

Given the well-documented evidence that women who smoke or who are around smokers while pregnant expose their child to increasing health risks, it is important to quantify the impact of cigarette tax and price increases on consumption among pregnant women. The evidence on the impact of higher taxes on smoking during pregnancy comes from two studies conducted in the United States. Using data from the 1989 and 1992 Natality Detail Files, Evans and Ringel found that higher cigarette taxes reduce smoking prevalence rates among maternal smokers but do not decrease average consumption among those who continue to smoke. They calculated a price elasticity of smoking prevalence of –0.50, implying that a 10% increase in the price of cigarettes will reduce the prevalence of maternal smoking by 5%. Moreover, they found that the tax-induced decreases in smoking improved birth outcomes. In particular, the average birth weight rose by approximately 400 g among women who quit smoking because of higher taxes.

In a follow-up study, Ringel and Evans examined the impact of taxes on smoking among different subpopulations of maternal smokers. They extracted data from the 1989 and 1995 Natality Detail Files and found that for all subpopulations except women who did not report their education, tax increases had a significant negative effect on maternal smoking rates. They calculated an overall maternal participation price elasticity of –0.7. For all subgroups except those not reporting education, the price elasticity of participation
was larger (in absolute value) than the consensus general-population participation price-elasticity estimates.

The reduction in smoking rates among pregnant women in response to a tax increase not only improves birth outcomes, but also has cost implications. Lightwood, Phibbs, and Glantz estimated that smoking cessation programmes that reduce smoking rates among pregnant women before or during the first trimester of pregnancy yield significant cost savings. In particular, they found that a 1% decline in smoking prevalence among pregnant women would save US$ 21 million (in 1995 dollars) in direct medical costs alone in the first year. An annual 1% decline in smoking prevalence among pregnant women would save US$ 572 million (in 1995 dollars) in direct medical costs in the first seven years.

Many studies have found that exposure of non-smoking pregnant women to SHS results in negative consequences. A recent systematic review and meta-analysis concluded that SHS exposure was associated with a 33 g reduction in mean birth weight in prospective studies and a 40 g reduction in mean birth weight in retrospective studies. The review also concluded that SHS exposure increased the risk of birth weight being below 2500 g by 22%. This review has very important implications for paternal and other household smoking during pregnancy. Independent of maternal smoking, paternal and other household smoking imposes costs and negative consequences on fetal health.

**Earmarked Taxes and Tobacco Control Programmes**

Earmarking a portion of the revenue generated from tobacco taxes for tobacco control programmes reinforces the effect of the higher tax on consumption. Numerous studies conducted in the United States have examined the impact of comprehensive tobacco programmes on smoking and health. The Institute of Medicine reviewed these studies and concluded that multifaceted tobacco control programmes are effective in reducing tobacco use. Moreover, while such programmes have been found to be effective in the overall population, some evidence suggests that women benefit in particular. A study published by the Centers for Disease Control and Prevention found that from 1988 to 1997, lung cancer rates among women in California, the state with the longest-standing tobacco control programme in the United States, decreased by 4.8%, whereas lung cancer rates increased by 13% among women in other parts of the country. In addition, a report by Abt Associates found that between 1990 and 1999 in Massachusetts, the second state in the United States to create a comprehensive tobacco control programme using earmarked tobacco taxes, smoking among pregnant women declined by more than 50%, the greatest percentage decrease in any state over that time period. Indeed, the 2001 Surgeon General’s report on women and smoking concluded that pregnancy-specific tobacco control programmes, some of which are funded from earmarked revenues, benefit both maternal and infant health and are cost effective.

**The evidence on the impact of higher cigarette taxes on smoking during pregnancy is clear: cigarette taxes reduce smoking prevalence rates among maternal smokers, and the impact of a tax increase is significantly larger on pregnant women than on the general population.**

Other countries, including Canada, Finland, Denmark, Peru, Poland, Indonesia, the Republic of Korea, Malaysia, Romania, Thailand, and Nepal, as well as some US states, have earmarked tobacco taxes for tobacco-related education, counteradvertising, health care for underinsured populations, cancer research, and other health-related activities. Moreover, tax revenues are used in several Australian states and in New Zealand to fund athletic and art events previously sponsored by the tobacco industry. While many finance ministries have concerns about the use of earmarked taxes for reasons relating to loss of control, rigidities in allocating general revenues, and the domino effect of other sectors also wanting hypothecated taxes, it has been argued that earmarked tobacco taxes can help reduce the loss of producer and consumer surplus from higher taxes.
Earmarked tobacco taxes can also be used to target lower-income populations that continue to smoke, and such transfers can help to reduce inequalities in health outcomes. For example, women’s groups have called for more funds to be used to integrate tobacco control into reproductive health services, such as maternal and child health and family planning. These taxes could be used to subsidize cessation programmes and nicotine replacement therapies to assist and support continuing smokers. If women do have more difficulty quitting than men do, and if women in lower socioeconomic groups continue to smoke, supporting services for them through the use of earmarked taxes could help to reduce the burden of taxation falling on them and the resultant inequalities in health.

**Health Implications**

There is solid evidence from countries of all income levels that increased taxation of cigarettes is highly effective in reducing consumption. Moreover, there is a strong economic rationale for governments’ use of taxes to reduce smoking. Studies of price-responsiveness by gender have primarily been conducted in high-income countries, and a majority of studies have concluded that males are slightly more price-responsive than females. The evidence on the impact of higher cigarette taxes on smoking during pregnancy is clear: cigarette taxes reduce smoking prevalence rates among maternal smokers, and the impact of a tax increase is significantly larger on pregnant women than on the general population. Finally, earmarking a portion of the revenue generated from tobacco taxes for tobacco control programmes reinforces the effect of the tax on consumption.

Given the relationship between pricing and demand and the significant health benefits accruing from cessation, tobacco control measures and taxation in particular can potentially avert millions of premature tobacco-related deaths. World Bank estimates of the health impact of control measures on global tobacco consumption are striking. Under conservative assumptions, a sustained real price increase of 10% could lead to 40 million people worldwide quitting smoking and to deterring many more from taking it up. This price increase alone would avoid 10 million premature deaths, or 3% of all tobacco-related deaths. Four million of the premature deaths avoided would be in East Asia and the Pacific region.

While the public health community continues to appeal for higher tobacco taxes on the basis of social costs, few people would deny the justification of a tax increase based on health benefits. Given the empirical and other problems of the social cost argument, research on taxation may indeed be a very valuable pursuit in helping to convince policymakers of the irrefutable health gains that can be achieved from increasing taxes on tobacco.

**Government Perspective: Revenue Generation**

Tobacco tax revenue has accounted for 3% to 5% of total government revenues in most industrialized countries, although its importance has been steadily declining. Nevertheless, in some middle-income countries, tobacco tax revenue constitutes an important share of total government revenue. For example, in South Africa, with an estimated long-run price elasticity of −0.68 and where taxes now account for 40% of the price of cigarettes, a permanent doubling of the cigarette tax would reduce demand by more than 27% in the long run (assuming the tax is fully passed on to consumers) and would increase cigarette tax revenues by nearly 50%. Tobacco taxes would then account for nearly 2% of total government revenues. However, as already noted, because the government did not allow tobacco taxes to keep pace with inflation in the 1970s and 1980s, forgone excise revenue was substantial.

Revenue-generating potential will be highest where the demand for tobacco products is more inelastic or where tax as a percentage of price is relatively low. For most countries, there is still ample room to increase taxes and raise valuable tax revenue. A 10% tax increase will, on average, lead to a 7% increase in tobacco tax revenue. Therefore, even in countries where demand has been more elastic or where taxes are already a large share of price, tax increases would still lead to increases in government revenue, at least in the short run. Given the economic models of addiction and the fact that demand will be more responsive to price in the long run, a permanent change in price will have an effect on demand that will grow over time to almost double the short-run impact. In addition, given the sensitivity of consumers—particularly youth—to price, permanent real increases in tobacco taxes will lead to greater reductions in prevalence and overall consumption. Therefore, increases in tobacco taxes will lead to greater tax revenue increases in the short run than in the long run.
Concerns About Tobacco Taxation

Regressivity

Several concerns have been expressed about using cigarette taxation as a tool for health promotion. These include policy-makers’ considerations about the appropriate level of taxation and issues surrounding the efficiency and equity of taxes. Cigarette taxes impose a regressive burden on people with low incomes in places where they smoke disproportionately more than those with higher incomes. Therefore, there is a dual concern about the increasing burden of smoking-related diseases on low-income groups and the implications of price increases for low income smokers.

Tobacco taxation can violate notions of both horizontal equity (where “equals”, or individuals who are identical except for their smoking behaviour, should be treated equally) and vertical equity (where rich individuals should have proportionally higher taxes because of differences in income). Vertical equity implies that individuals with the greatest ability to pay should carry the highest tax burden—in other words, marginal tax rates should be higher for the rich. Tobacco taxes clearly violate this principle in countries where poorer people smoke more than wealthy people. The disparity is worsened when income falls and tobacco taxes rise as a share of income or total expenditures. Therefore, tobacco taxes are regressive when tobacco use is more prevalent among persons with lower incomes.

However, recent evidence suggests that tobacco taxes may not be as regressive as has been feared, because rich and poor consumers do not smoke and quit at the same rates following a price increase. This has recently been shown by differences in the price elasticity of demand for different socioeconomic groups, which suggest that the regressivity normally attributed to cigarette taxation is overstated. Studies have found the price elasticity of demand to be inversely related to social class, with those in the highest social classes being less price-responsive than those in the lowest social classes.21

Because persons with less education, lower income, and lower SES have been found to be more price-responsive than those with more education, higher income, and higher SES, increased cigarette taxes would reduce differences in smoking among socioeconomic groups. Even though cigarette taxes may fall most heavily on lower-income smokers, increases in taxes may be progressive from a public health standpoint in that larger reductions in smoking occur among that group. The health benefits from tax-induced reductions in smoking would therefore be disproportionately larger for lower-income people. Thus, analyses that have failed to take into account the inverse relationship between elasticity and income overstate the regressive effect of tobacco taxes.

Figure 11.5. Pre-Tax Price of a Pack of Cigarettes in the European Region, 2007

<table>
<thead>
<tr>
<th>Country</th>
<th>Pre-Tax Price of a Pack of Cigarettes €</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT</td>
<td>0.80</td>
</tr>
<tr>
<td>BE</td>
<td>0.79</td>
</tr>
<tr>
<td>BG</td>
<td>0.78</td>
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<tr>
<td>CY</td>
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<tr>
<td>CZ</td>
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<td>DK</td>
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<tr>
<td>EE</td>
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<tr>
<td>TR</td>
<td>0.70</td>
</tr>
<tr>
<td>UK</td>
<td>2.00</td>
</tr>
</tbody>
</table>

Source: European Commission, excise tax data.
However, support may be needed to reduce the regressivity of tobacco taxes for persons in lower income groups who continue to smoke and their families. In low-income families, particularly in developing countries, spending on tobacco can “crowd out” expenditures on other essential household needs, including food and education. Cessation therapies and nicotine replacement products and other support services could be offered to the poor, and earmarking of tax revenues could help in subsidizing these services.

Manufacturers could be required to use serial numbers on each pack to facilitate tracking, while pack-marking technology could provide further information about each link in the supply chain, such as the distributor, the wholesaler, and the exporter.

Related concerns about increased taxation include the effect it may have on cross-border shopping and smuggling and the effect it may have on the tobacco industry regarding employment and, more broadly, the macroeconomy and trade balances. These last two issues are discussed in more detail below.

The Threat of Smuggling

Differences in cigarette taxes and prices potentially lead to casual and organized smuggling and other forms of tax evasion. Worldwide, organized smuggling, which targets a significant amount of cigarettes, is the most serious illicit activity. Smugglers camouflage illicit cigarettes through trade, since the exports are free of duty from the exporting countries. Although tax differences can create a financial incentive for smugglers, this incentive already exists in the absence of taxes, because of the significant differences in pre-tax prices of cigarettes (see Figure 11.5).

The tobacco industry argues that cigarette tax increases can erode valuable tax revenues, which would be lost because of smuggling, while not reducing consumption. Sweden decreased cigarette taxes by 17% in 1998 because of a perception that smuggling led to lost cigarette tax revenues, and it saw its tax revenues fall as a result. Other countries also have chosen not to increase tobacco taxes partly out of fear of the development of a black market, given differences in tax rates across neighbouring countries.

The number of studies trying to quantify the global illicit trade and examine the relationship between tobacco taxes and illicit trade is increasing. Earlier studies estimated that about 30% of internationally exported cigarettes are lost to smuggling, and although the problem is acute, it has often been overstated. Yurekli and Sayginsoy estimated that in 1999, 3.4% of global cigarette consumption was of illegal cigarettes, whereas a study by Joossens et al. found that 11.6% of the global cigarette market is illicit. Large tobacco tax increases—and significant price increases initiated by the tobacco industry—have occurred in several countries without causing dramatic increases in smuggling. Other factors, such as lack of enforcement and a general culture of corruption, may be more important contributors to the likelihood of smuggling. Many countries with high prices, including France, Norway, the United Kingdom, and Sweden, show very little evidence of smuggling, while several countries with low prices, such as Spain and Italy, have evidence of extensive smuggling.

The complicity of the tobacco industry in smuggling should also be recognized when considering the credibility of its call for reducing taxes to prevent smuggling. The tobacco industry is a clear beneficiary of smuggling, in that when smuggled cigarettes account for a high proportion of the total sold, the average price of all cigarettes, taxed and untaxed, falls, increasing sales of cigarettes overall. The tobacco industry has argued that a significant proportion of smuggled cigarettes are counterfeit cigarettes and that these counterfeit cigarettes reduce their sales.

The smuggling problem is exacerbated by the ease with which tobacco products can be transported, the huge potential profits, the informal distribution networks in many countries, the availability of tax-free and duty-free cigarettes, and the lack of enforcement in many countries. Most smuggled cigarettes are well-known international

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The number of studies trying to quantify the global illicit trade and examine the relationship between tobacco taxes and illicit trade is increasing. Earlier studies estimated that about 30% of internationally exported cigarettes are lost to smuggling, and although the problem is acute, it has often been overstated. Yurekli and Sayginsoy estimated that in 1999, 3.4% of global cigarette consumption was of illegal cigarettes, whereas a study by Joossens et al. found that 11.6% of the global cigarette market is illicit. Large tobacco tax increases—and significant price increases initiated by the tobacco industry—have occurred in several countries without causing dramatic increases in smuggling. Other factors, such as lack of enforcement and a general culture of corruption, may be more important contributors to the likelihood of smuggling. Many countries with high prices, including France, Norway, the United Kingdom, and Sweden, show very little evidence of smuggling, while several countries with low prices, such as Spain and Italy, have evidence of extensive smuggling.

The complicity of the tobacco industry in smuggling should also be recognized when considering the credibility of its call for reducing taxes to prevent smuggling. The tobacco industry is a clear beneficiary of smuggling, in that when smuggled cigarettes account for a high proportion of the total sold, the average price of all cigarettes, taxed and untaxed, falls, increasing sales of cigarettes overall. The tobacco industry has argued that a significant proportion of smuggled cigarettes are counterfeit cigarettes and that these counterfeit cigarettes reduce their sales.

The smuggling problem is exacerbated by the ease with which tobacco products can be transported, the huge potential profits, the informal distribution networks in many countries, the availability of tax-free and duty-free cigarettes, and the lack of enforcement in many countries. Most smuggled cigarettes are well-known international
brands smuggled somewhere in transit between the country of origin and the country of destination, reappearing in the country of origin at cut-rate prices, untaxed.

Any of several easy-to-implement policies, including stronger enforcement, use of tax stamps, and greater penalties for smugglers, could significantly reduce the problem. Tax stamps—which must be difficult to forge—on duty-paid packs could help enforcers ensure the legality of packs. Special packaging for duty-free packs would also help.

In addition, all parties in the supply chain could be licensed, as they are in France and Singapore, for example. Manufacturers could be required to use serial numbers on each pack to facilitate tracking, while pack-marking technology could provide further information about each link in the supply chain, such as the distributor, the wholesaler, and the exporter. Manufacturers could be required to keep better records regarding the final destination of their products. Computerized control systems would enable the tracking of individual consignments and their progress at any point in time; such a system is currently in place in Hong Kong SAR. Finally, exporters could be required to label packs with the country of final destination and a health warning in the language of that country.

The threat of smuggling could lead to regional coordination, enabling successful application of tobacco tax policies across countries. Multilateral agreements that take relative tax structures into account could be valuable in applying consistent tobacco control policies across regions. For example, the WHO Framework Convention on Tobacco Control (WHO FCTC), a multilateral treaty addressing global tobacco control with more than 170 Parties, includes provisions with specific obligations regarding taxation, pricing, and controlling smuggling. Specifically, Article 6 of the WHO FCTC, Price and tax measures to reduce the demand for tobacco, encourages Parties to adopt price and tax measures aimed at reducing tobacco consumption and to prohibit or restrict sales and importations of duty-free tobacco products. Article 15, Illicit trade in tobacco products, provides binding guidance on controlling illicit trade; to augment this, the Parties to the WHO FCTC are negotiating a protocol, or additional treaty, on the elimination of illicit trade in tobacco products. The presence of these issues in the WHO FCTC, a legally binding instrument, and the commitment demonstrated by undertaking a new negotiation process for the protocol reflect the importance of coordinated action, since strong national measures taken in a single country can be undone if transnational dimensions such as smuggling are not addressed.

**Impact on Employment**

Although the focus of tobacco control programmes is largely on demand reduction, it is important to acknowledge that the cultivation of tobacco is important to many countries’ economies. Policies regarding the supply side of tobacco production, processing, and manufacture affect millions of women workers. Much more research is needed on the economics of how gender norms and roles affect women and men differently in tobacco growing, production, and marketing. In general, rural women are the backbone of small tobacco-producing farms, performing the most labour-intensive jobs, including weeding, leaf selection, and gathering of fuel for curing. They are also the majority of bidi workers in India and, in some countries, the majority in tobacco-product manufacture.

*In addition to health consequences they share with men, women face additional medical costs linked to tobacco use due to increased complications during pregnancy and low-birth-weight babies.*

Tobacco is grown in more than 125 countries, and the global value of crop production is approximately US$ 25 billion. This is less than 1% of the value of agricultural production globally, but in some countries the relative value is considerably higher. The Chinese government, which controls tobacco production through a state-controlled monopoly, receives about 240 billion yuan (US$ 30 billion) annually from combined profits and taxes related to production. China is the world’s leading cigarette producer, manufacturing one third of the world’s cigarettes. An estimated two thirds of the workers employed worldwide in
cigarette production work in just three countries—China, India, and Indonesia. Tobacco leaf exports constitute an especially large part of the economy in Zimbabwe and Malawi. In Thailand, revenue from taxation of tobacco products accounts for more than 5% of total government revenue. Economic and political concerns about threats to the industry can play a major role in the debate over tobacco control policies in these countries.

One of the main concerns raised by the tobacco industry and the general public is that tobacco control policies may increase unemployment and may negatively impact the economy. Several studies have been commissioned by the tobacco industry to produce estimates of their contribution to employment, incomes, and tax revenue in order to convince legislators that tobacco control policies will harm the broader economy and cause widespread job loss.83–85 These studies have been criticized because they calculate the gross contribution of tobacco to employment, tax revenue, and the economy. They do not take into account the fact that if people stop spending money on tobacco, they usually will spend it on other things, thus generating alternative jobs.

Several independent studies on the overall net effect of tobacco control policies on various economies indicate a very minimal but usually positive effect in the long run.86–89 These studies take into account the compensating effect of alternative jobs that would be generated by money not spent on tobacco.90 Independent studies also show that in most countries and over the medium and long run, even very stringent tobacco control policies will have minimal negative impact on long-run economic growth, employment, tax revenue, and foreign trade balances as expenditure switches and reallocations in the economy take place. A country’s reliance on tobacco exports and its stage of development influence its view of and openness to tobacco control measures, as, in general, a few large tobacco-producing and exporting countries stand to lose more than the majority of countries that are net importers and consumers of tobacco.91

The impact of a fall in consumption will vary, depending on the type of economy in the country where it occurs. The small handful of net exporting economies that are heavily dependent on tobacco for foreign-exchange earnings could experience net national job losses. However, even those agrarian economies that are dependent on tobacco production and exports will have a large enough market to ensure jobs for many years to come, despite gradually declining demand.

The overwhelming evidence suggests that the best approach is to emphasize measures that reduce demand, leaving supply to adjust to evolving changes in demand. As long as demand grows, buy-outs, price supports, subsidies, and alternative crop programmes will have minimal effect, since they will merely produce opportunities and profits for future producers of tobacco.16 At the same time, the WHO FCTC (Articles 17 and 18) commits Party governments to supporting crop diversification, economically viable alternative activities, and sustainable livelihoods to address concerns about the effects of tobacco control on tobacco production and the environment, especially in poor developing countries.

**Conclusions**

This chapter provides a broad review of the economic literature on the costs of smoking and the effects of taxation, highlighting findings pertaining to women. The evidence presented on the health and economic consequences of tobacco use constitutes a robust justification for governments’ use of tobacco taxes as a way to protect women’s health.

Estimates of the treatment costs and productivity losses associated with diseases caused by smoking provide potentially powerful evidence for implementing tobacco control. Significant costs are also associated with SHS exposure, and the majority of victims of SHS are women and children, particularly in developing countries. Because the majority of the smokers are males, women are particularly at risk of SHS exposure at home from their partners. Moreover, since the majority of the people who work outside the home are male, women are likely to be exposed to SHS in the workplace as well. In addition to health consequences they share with men, women face additional medical costs linked to tobacco use, such as increased complications during pregnancy and low-birth-weight babies. Moreover, women face significant tobacco-related personal and economic costs, particularly in low-income countries, where they tend to have fewer resources than men.

The evidence that taxation of cigarettes is highly effective in reducing consumption is supported by more than
100 studies that examined the impact of cigarette prices on the demand for cigarettes in high-income countries. The consensus estimate from these studies is that the overall price elasticity of demand ranges from −0.25 to −0.50, implying that a 10% increase in the price of cigarettes will decrease overall cigarette consumption by between 2.5% and 5.0%. A smaller, but growing, number of studies have examined the effects of price changes in low- and middle-income countries. Recent evidence suggests that the price-elasticity estimates for these countries are approximately double those for high-income countries. That is, demand is generally found to be more elastic in low- and middle-income countries, and the average price elasticity is estimated to be about −0.8.

Economic theory predicts an inverse relationship between age and the response to changes in the price of tobacco products. A majority of the research from high-income countries confirms this prediction, finding that youth and young adults are more responsive to tobacco price changes than adults are. Some recent studies suggest that adolescents may be as much as three times as responsive to price changes as adults.

The number of studies of price-responsiveness by gender is growing. Most of these studies have been conducted in high-income, industrialized countries, and the results are mixed with respect to the influence of price. The evidence from North America generally leads to the conclusion that men’s cigarette consumption is more responsive than women’s to changes in price. However, recent results from the United States indicate that the magnitude of the price response by gender is sensitive to the inclusion of state fixed effects, which are designed to hold constant time-invariant state-level heterogeneity, such as smoking sentiment. Studies conducted in the United Kingdom have generally found women’s consumption of cigarettes to be more responsive to price changes than men’s consumption. Finally, studies from the United States have concluded that cigarette tax increases lead to significant decreases in maternal smoking rates. The price elasticity of smoking participation among pregnant women was estimated to be much larger (in absolute value) than that among the consensus general population.

Earmarking a portion of the revenue generated from tobacco taxes for tobacco control programmes reinforces the effect of the tax on consumption. Numerous studies conducted in the United States have examined the impact of comprehensive tobacco programmes on smoking and health. These studies generally conclude that comprehensive tobacco control programmes, independent of price changes, are effective in reducing tobacco use. Comprehensive tobacco control programmes have been found to be effective in reducing smoking in the overall population, and some evidence suggests that women benefit in particular, with substantial declines in lung cancer rates and in smoking among pregnant women.

Most of the objections to increased taxes and other tobacco control policies on the supply side are based on misinformation and should not be used as arguments to dissuade governments from raising taxes. These include threats of smuggling, the idea that tobacco taxes place a disproportionate burden on the poor, the fear that higher taxes will lead to reductions in revenue, and the possibility that tax increases will lead to decreased employment and macroeconomic vitality. There is little evidence to support these claims, and the threat of not doing anything to prevent the tobacco epidemic from spreading to women and children is far greater than these concerns.

While much has been learned from previous research in industrialized countries, more research is warranted. In particular, more research is required in high-income countries to disentangle the mixed results on the effects of price on smoking prevalence and average consumption by gender. Studies should focus on the impact of unobserved heterogeneity, including sentiment towards tobacco, which may be driving some of the mixed results in research to date. Moreover, additional studies are needed from high-income countries on the gender-specific impact of cigarette prices on smoking initiation and cessation and other transitions in the smoking uptake and cessation continuums. More research is warranted on the impact of comprehensive programmes, independent of cigarette prices, on female tobacco use.

The past few decades have seen a growing recognition of the effects of smoking on women in low- and middle-income countries. Much more research must be conducted on the impact of cigarette prices on demand for cigarettes by gender in these countries. Studies that examine gender differences in the impact of price on smoking prevalence, average consumption, smoking initiation, smoking cessation, and other transitions are desperately needed. Furthermore, the differential response to price by sex should be examined for other tobacco products commonly consumed by women in some countries, e.g. chewing tobacco, hookas, bidis, and
kreteks. For many of these countries, surveys will need to be conducted to collect information on tobacco consumption, SES, and demographic factors. This may not be feasible for countries with limited resources, but in countries where national health surveys are being planned, there is an opportunity for researchers to help design the surveys and collect the data needed for such analyses. Greater attention must be paid to economic research on gender with a focus on women in all their diversity, by age, ethnicity, region, occupation, and political and social status.

References


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www.who.int/tobacco/wntd