

Using Fiscal Policy to Promote Health: Taxing Tobacco, Alcohol, and Sugary Beverages

Prepared for the Task Force on Fiscal Policy for Health, March 2018

By Frank J. Chaloupka and Lisa M. Powell

"Sugar, rum, and tobacco, are commodities which are no where necessities of life, which are become objects of almost universal consumption, and which are therefore extremely proper subjects of taxation."

Adam Smith, The Wealth of Nations, 1776ⁱ

I. Introduction

Non-communicable diseases (NCDs) impose enormous economic costs, in addition to their impact on public health. The World Economic Forum recently called NCDs "a real threat not only to human health but to global prosperity," with the cumulative direct and indirect economic costs of NCDs, during the period 2016-2030, estimated at \$140 trillion.ⁱⁱ The health and economic burden of NCDs has increasingly shifted from high-income countries (HICs) to low- and middle-income countries (LMICs).ⁱⁱⁱ The threat of NCDs to development resulted in the United Nation's Agenda for Sustainable Development to include a commitment from governments to reduce the premature mortality from NCDs by one-third by 2030.^{iv}

While there are a variety of factors explaining the rise in NCDs, from ageing populations to increased urbanization and industrialization, a key factor is the increased adoption of unhealthy lifestyles that often accompanies economic development.^v Of note are the increases in tobacco use, excessive drinking, and consumption of highly processed foods and beverages, particularly sugary beverages, that follow increases in incomes in LMICs.^v

This paper highlights how excise taxation can be used to raise prices, curb unhealthy consumption, promote health, and, in turn, enhance economic growth. Excise taxes are relatively simple to implement, and most governments already levy them on tobacco products and alcoholic beverages, while an increasing number are doing the same with sugary beverages. The empirical evidence on the effectiveness and cost-effectiveness of these taxes in reducing consumption and its consequences is well established for tobacco and alcohol use and is emerging for SSB consumption.^{vi,vii,viii} Given this evidence, WHO has identified tobacco and alcohol tax increases as among the 'best buys' for preventing NCDs.^{ix} At the same time, these taxes generate considerable revenues that can be used to support complementary evidence-based cost-effective interventions to reduce NCDs.

We begin by providing an overview of the economic rationale for intervening in the markets for tobacco, alcohol, and sugary beverages, describing the failures inherent in these markets. This is followed by a review of the global evidence on the impact of taxes and prices on the consumption of these products and their health and social consequences, with an emphasis on the evidence from LMICs. The next sections identify 'best practices' in tax policy and tax administration. We then briefly describe the current status of tobacco, alcohol, and sugary drink excise taxes around the world. We then provide a discussion of the oppositional arguments commonly used against the imposition of or increase in these taxes. We end with a brief summary that lays out the rationale for raising excise taxes that can provide both health and fiscal benefits of reducing consumption of tobacco, alcohol and sugary beverages.

II. Economic Rationale for Using Fiscal Policy to Promote Health

Governments around the world have long taken Adam Smith's advice, with nearly all taxing tobacco products and alcoholic beverages for well over a century, while a growing number have implemented taxes on sugary beverages in recent years. Revenue generation has historically been, and often continues to be, the primary motivation for these taxes. These products are produced by a small number of manufacturers, they are widely consumed, and they have relatively few substitutes. Thus, taxes on these products are relatively easy to collect and result in significant tax revenues. More recently, as the health, economic, and social consequences of consumption have become clearer, governments have increasingly used these taxes as a way of discouraging unhealthy consumption.

In general, economists argue that consumers know best how to allocate their incomes to various goods and services and that governments should not interfere in the workings of a free market through taxation or other regulations. This notion of consumer sovereignty is based on several strong assumptions, most notably that consumers make fully-informed rational choices that reflect the costs and benefits of consumption including future health consequences, and that consumers bear all costs of their consumption decisions. When these assumptions are met, a free market results in the most efficient allocation of society's scarce resources.

However, the assumptions behind consumer sovereignty do not always apply in the real world, particularly for products whose consumption negatively impacts health. The markets for these products are often characterized by significant information failures: consumers do not have enough information on these products and are unaware of many of the health consequences of consumption; producers have greater information than consumers about product contents and the health impact of consumption; and, aggressive product marketing highlights the benefits of consumption while failing to provide information about the harms.^x

Information failures have been evident in the markets for tobacco products.^{vi} Manufactured cigarettes were widely consumed for many decades before the health consequences of smoking were identified. While scientific evidence about the risks from smoking has accumulated over time, new evidence continues to emerge that establishes the causal link between smoking and various diseases. Even now, while understanding about the major risks from smoking is relatively high in HICs, knowledge about the full range of risks and the relative risks of different products is poor. These information failures are greater in LMICs where surveys show a low understanding of even the major risks of smoking and where tobacco control efforts which would have helped counter these information failures have, until recently, been limited.

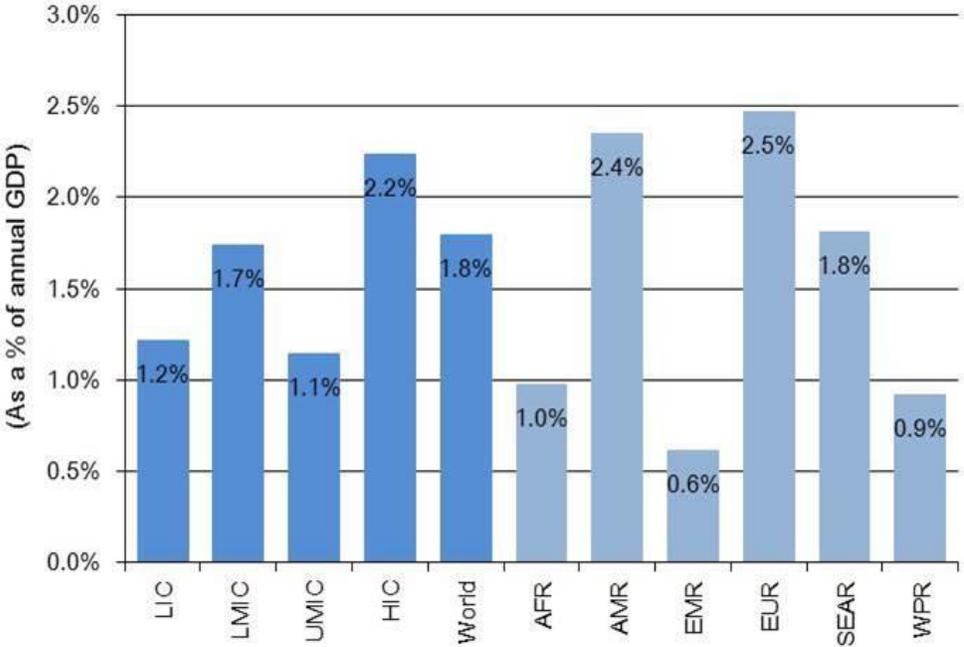
Internal tobacco industry documents revealed through litigation highlight the efforts by tobacco companies to deny and distort the evidence on the harms of smoking, designing their products so as to maximize their addictiveness. They have also marketed their products in ways that assuage fears about the health consequences of smoking, for example misleading consumers about the relative risks of filtered, light, and low-tar cigarettes all of which carry significant risks.

While perhaps less extensive than the information failures in the tobacco markets, the same problems are apparent in the markets for alcoholic and sugary beverages, with many consumers underestimating the risks from excessive drinking and underestimating or being unaware of the risks stemming from sugary beverage consumption.^{xi} Both industries heavily market their products in ways that distort the costs and benefits of consumption. Indeed, the evidence that links sugary drink consumption to obesity, type II diabetes, cardiovascular disease and other negative health outcomes is still being documented.^{xii,xiii,xiv} In addition, even when consumers are aware of potential negative health effects associated with their consumption of either tobacco, alcohol or sugary beverages, they may have a present bias and overly discount those costs which often do not occur until later in life, later regretting their decisions.^{xv} This results in over-consumption even with full information.

Further, tobacco users, excessive drinkers, and consumers of sugary beverages impose costs on others – what economists refer to as negative externalities.^{xi} The health of non-smokers, and particularly children, is harmed by exposure to tobacco smoke. Non-drinkers and/or responsible drinkers are often the victims of traffic crashes and violence (e.g. homicides, assaults, rapes, child abuse, and spousal abuse) caused by excessive drinking. Maternal smoking, drinking or obesity during pregnancy results in a variety of complications, including low birthweight, premature birth, congenital anomalies, stillbirth, fetal alcohol syndrome, and sudden infant death syndrome, and can affect a child’s health later in life.^{xvi}

In addition, tobacco use, excessive drinking, and sugary drink consumption impose significant economic costs, including the health care costs to treat the consequences of consumption and productivity losses related to presenteeism, absenteeism and premature death. The economic costs of smoking were estimated to be over \$1.4 trillion globally in 2012, with \$422 billion going to treat the diseases caused by smoking (see Figure 1).^{xvii} Recent estimates found that the annual economic costs from alcohol consumption were equivalent to 2.5% of GDP in HICs, and 2.1% of GDP in middle-income countries.^{xviii} The economic costs of obesity and type II diabetes, two of the health consequences of sugary drink consumption, were recently estimated to be \$2.0 trillion for healthcare and productivity and \$670 billion per year for health care costs only, respectively.^{xix,xx} While there is significant variation across countries in who bears these costs, in all countries at least some of these costs are borne by non-users, most notably health care costs covered by publicly financed health care systems.

Figure 1: Economic Costs of Smoking-Attributable Diseases as Share of GDP, 2012, by Income Group and WHO Region



Source: Goodchild, et al., 2017

Taxes on tobacco products, alcoholic beverages, and sugary beverages can be used to correct for these negative externalities. The idea of using taxes to correct for negative externalities was first proposed by economist Arthur Pigou, hence the use of term “Pigovian taxes”.^{xxi}

III. Excise Taxes Reduce Consumption and Consequences

A variety of taxes are applied to tobacco products, alcoholic beverages and sugary beverages. These taxes generally result in higher prices for consumers. According to the law of demand, an increase in the price of a given product, all else constant, will reduce the quantity consumed of that product. How large or small the reduction depends on the price elasticity of demand (the percentage change in the quantity demanded resulting from a one percent increase in price). Price elasticity is a function of various factors, including whether or not consumers treat the good as a necessity or a luxury item, how much of a consumer's income is spent on that good, and the availability of substitutes. For many years, conventional wisdom held that the demand for addictive products was unresponsive to changes in price. Advances in economic theory and empirical evidence show that this is not the case, with demand for addictive products somewhat responsive to price in the short run, and more responsive to price in the long run.

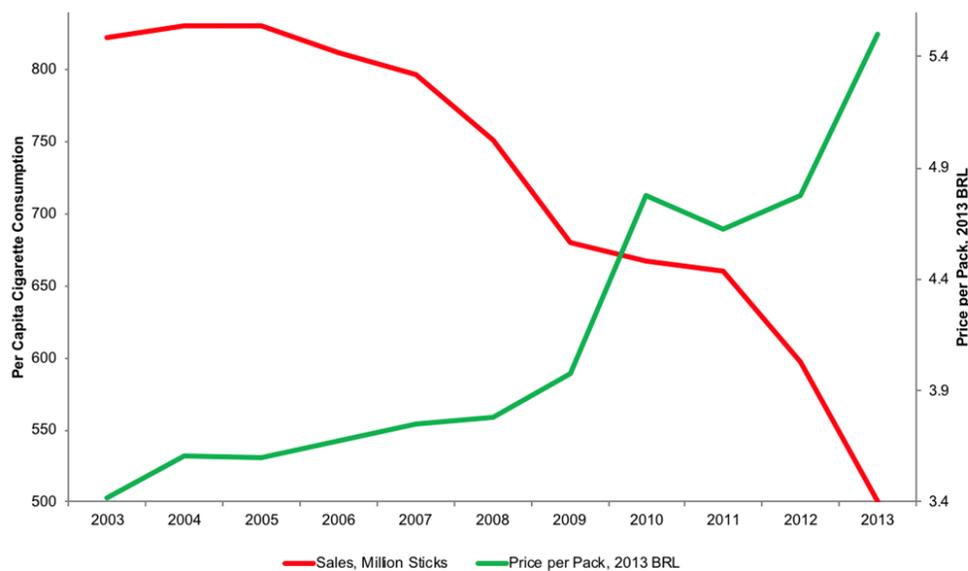
Over the past few decades, extensive evidence has accumulated on the impact of taxes and prices on the demands for tobacco products and alcoholic beverages, and, in recent years, similar evidence has emerged on the demand for sugary beverages. Much of the early evidence on tobacco and alcohol demand came from HICs. While there has been considerable research on the demand for tobacco products in LMICs over the past 15 to 20 years, similar evidence on alcohol demand is limited. Much of the recent evidence on sugary drink demand has come from LMICs, particularly Mexico where the first significant tax was levied. This section briefly reviews the evidence on the price responsiveness of the demand for tobacco, alcohol and sugary beverages.

Tobacco Products

Hundreds of studies from around the world and for countries at all income levels have estimated the impact of taxes and prices on the demand for tobacco products.^{xxii,vi} Most of this research focuses on the demand for manufactured cigarettes, given that these account for the vast majority of tobacco consumption, but similar evidence exists on the demand for other tobacco products, such as bidis, cigars, pipe tobacco, smokeless tobacco, and, more recently, electronic cigarettes.

Evidence from HICs consistently shows that tobacco demand responds to changes in prices, with most estimates of overall price elasticity clustering around -0.4, implying that a ten percent increase in price would reduce overall consumption by four percent. Estimates from LMICs also generally find that cigarette demand is responsive to price, although price elasticity estimates are more variable, most in the range from -0.2 to -0.8, clustering around -0.5. Figure 2 illustrates this based on recent experiences in Brazil, where cigarette taxes and prices were increased significantly since 2000. The wider range of elasticity estimates in LMICs results from a variety of factors, including lower incomes, complex tobacco tax structures, trends in cigarette affordability, the availability of other tobacco products, and the extent of illicit cigarette trade.^{xxii} More limited evidence for other tobacco products generally find estimates of price elasticity greater than those for cigarette demand^{xxiii}; studies from India, for example, find that a ten percent increase in prices would reduce bidi smoking by about nine percent, while reducing cigarette smoking by less than three percent.^{xxiv}

Figure 2: Per Capita Cigarette Consumption & Cigarette Price Brazil, Inflation Adjusted, 2003-2013



Sources: Ministry of Health, Brazil; EIU; World Bank; and authors' calculations

Most studies of demand for multiple tobacco products find evidence of substitution among products in response to changes in relative prices, particularly among more 'like' products (e.g. roll-your-own tobacco, little cigars, and cigarettes), while increases in income lead users to 'trade up' to products they perceive as higher quality (e.g. switching from local cigarette brands to international brands or switching from bidis to manufactured cigarettes).^{xxiii} In Lebanon, for example, increases in cigarette prices relative to waterpipe tobacco prices lead some smokers to switch to roll-your-own tobacco,^{xxv} while in Bangladesh, some tobacco smokers have switched from bidis to cigarettes as incomes have increased.^{xxvi}

Given the addictiveness of tobacco use, it takes time for users to fully response to higher prices, with evidence showing that the long run impact of price increases is about double the short run impact.^{vi,xxii} Evidence shows that about half of the short run impact of price on tobacco use comes through reductions in the number of people who use, largely due to current users quitting, with the remainder from reductions in how much continuing users consume.^{vi,xxii} One study for the U.S. estimates that a ten percent price increase induces almost four percent of smokers to quit smoking, while other studies find greater effects on cessation among young smokers.^{xxvii} Studies generally find that younger and/or lower socioeconomic groups are relatively more responsive to price.^{vi,xxii} Estimates of price elasticity for youth smoking prevalence, for example, tend to be two to three times greater than those for adults, while a few studies from HICs estimate that a ten percent price increase would reduce youth smoking initiation by more than four percent, with larger reductions in the transition from experimental smoking to regular smoking.^{xxvii} Similarly, most studies assessing differences by SES find that high SES populations are largely unresponsive to cigarette prices, while low SES population are highly responsive.^{vi,xxii}

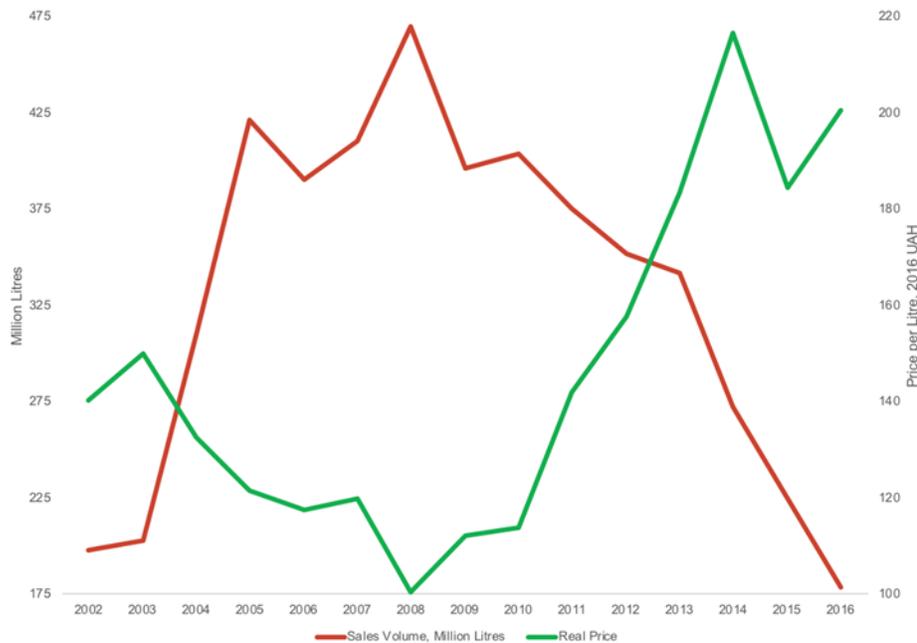
Evidence shows that the disease and premature deaths caused by smoking are inversely related to cigarette taxes and prices. One recent U.S. study, for example, found that higher taxes reduced overall mortality, and deaths

from throat, lung, and other cancers, and respiratory diseases.^{xxxviii} Others found that higher cigarette taxes reduced hospitalizations for heart failure and the severity of childhood asthma.^{xxix,xxx} Estimates show that smoking among pregnant women is particularly responsive to price, with prevalence elasticities two to three times greater than for adults.^{xxxi} As a result, higher taxes and prices reduce low-birthweight births, sudden infant death syndrome, and overall infant mortality.^{xxxii,xxxiii}

Alcoholic Beverages

Similar evidence exists on the impact of taxes and prices on the demand for alcoholic beverages. Research from HICS have produced generally consistent findings about the impact of taxes and prices on overall demand for alcoholic beverages (beer, wine and spirits). The findings show that overall price elasticity for alcohol in HICs falls between -0.51 and -0.77.^{xxxiv,xxxv} Limited evidence from LMICs produces an overall elasticity of -0.64.^{xxxvi} The inverse relationship between alcoholic beverage prices and drinking is illustrated in Figure 3 which shows the experiences in Ukraine over the past 15 years.

Figure 3: Distilled Spirits Sales and Prices Ukraine, 2002-2016, Inflation Adjusted



Sources: Euromonitor; World Bank; and author's calculations

In general, estimates show that the demand for spirits is most responsive to price, while demand for beer is least responsive.^{xxxiv,xxxv,xxxvi} Evidence on substitution among alcoholic beverages in response to changes in relative prices is mixed, with relatively strong evidence for substitution among beverages within a given category (e.g., between low, medium and high alcohol content beer, or between red and white wine), and little evidence of substitution across beverage categories (e.g., from beer to wine or spirits).^{xxxvii,xxxviii}

A number of studies based on survey data, all from HICs, have explored the impact of taxes and prices on various aspects of drinking behavior, including drinking prevalence, frequency and intensity.^{xxxiv,xxxv} The majority find that there is an inverse relationship between prices and the measures of alcohol use examined; one review found a mean elasticity of -0.28 for heavy drinking and another concluded that higher taxes and prices were associated with reductions in binge drinking and other measures of excessive drinking.^{xxxiv,xxxv} A few studies have found that

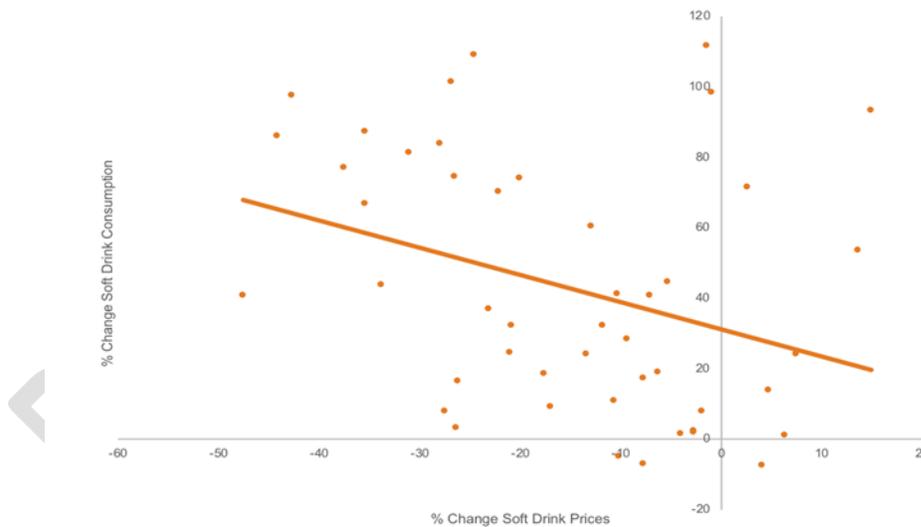
heavier drinkers, while responsive to price, are less responsive than light or moderate drinkers.^{xxxiv} Several studies have explored differences in elasticities by age and gender, producing some evidence that drinking and excessive drinking among young men is more responsive to price.^{xxxv} Unlike the literature on the demand for tobacco products, evidence on differences in price elasticity by socioeconomic status is lacking.

More consistent evidence for the impact of taxes and prices on excessive drinking comes from the relatively large evidence base, again limited almost entirely to studies from HICs, on various harms from excessive drinking. Economists have studied a variety of outcomes, including: motor vehicle crashes and fatalities; deaths from liver cirrhosis, alcohol dependence, and various other diseases caused by excessive drinking; incidence of sexually transmitted diseases; crime and violence, including homicides, rape, robbery, child abuse and spousal abuse; and, workplace accidents. These studies produce generally consistent evidence that higher taxes and prices lead to reductions in the consequences of excessive drinking. One review of 50 studies examining the impact of taxes and prices on various harms caused by alcohol, concluded that the tax elasticity for all alcohol-related disease and injury outcomes was -0.35.^{xxxix}

Sugary Beverages

Studies on the impact of taxes and prices on the demand for soft drinks (e.g., carbonated beverages, fruit drinks, sports drinks, ready-to-drink teas and coffees, energy drinks, and flavored waters, including both sugar-sweetened and artificially-sweetened varieties), find that the elasticity is around -0.8, based largely on evidence from HICs.^{xl} This is consistent with the global data shown in Figure 4 highlighting changes in soft drink prices and sales from 2000 through 2014.

Figure 4: Soft Drink Prices & Consumption Percentage Change, 2000-2014, Selected Countries



Source: Euromonitor, 2015, and author's calculations

Studies that focus on sugary drink demand only find that demand is more responsive to price, with the elasticity around -1.2, with the greater elasticity reflecting the opportunity to substitute from sugary drinks to other soft drinks in response to an increase in sugary drink prices.^{xli, xlii} Recent studies from LMICs produce similar or greater elasticity estimates. For example, recent studies from Mexico, Ecuador, Chile and Guatemala estimated price elasticities of soft drink demand of -1.06, -1.20, -1.37, and -1.39, respectively.^{xliii, xliv, xlv, xlvi} Similarly, a recent study

from South Africa estimated elasticities of -1.18 and -1.17 for carbonated soft drinks and fruit juice concentrates, respectively.^{xlvii} Another study from India estimated that a price elasticity of sugary drink consumption of -0.94.^{xlviii}

There is generally consistent evidence of substitution among different types of beverages in response to changes in relative prices, such as substituting bottled water and milk in response to higher soft drink prices.^{xlix,l} A few studies have examined substitution between beverages and other sources of calories, concluding that increases in beverage prices will lead to some substitution to various foods, partially offsetting the reductions in added-sugar and/or caloric intake from reduced consumption of the higher priced beverages.^{li,lii} Findings from a few recent studies indicate that sugary drink demand among lower-income populations responds more to price than demand among higher-income populations.^{liii,liv,lv}

Mexico was the first country in the region of the Americas to adopt a significant excise tax on sugary beverages, and several studies have assessed the impact of the one peso per liter sugary drink tax implemented by Mexico in 2014. This tax raised sugary beverage prices, reducing sales and purchases of taxed beverages, while increasing bottled water sales and purchases.^{lvi,lvii,lviii,lix} Lower SES households were found to respond more to the tax than higher SES households.^{lviii,lx} Similar differences were observed across households based on purchase levels, with households that initially consumed the most sugary beverages reducing their purchases by more than moderate consuming households, while the tax had a small impact on purchases by low- or non-consuming households.^{lxi} In the U.S., recent evidence from Berkeley's one cent per ounce tax, effective March 2015, found that one-year post-tax, sugary drink sales dropped by 9.6% while sales of untaxed beverages rose by 3.5% and bottled water sales increased 15.6%.^{lxii}

Early studies on the impact of beverage taxes and prices on weight outcomes in the U.S. capitalized on differences in state sales taxes on various beverages.^{xli} These studies produced mixed evidence on the impact of these taxes, given the relatively low sales tax rates (typically below 7%), the non-specificity of the taxes (e.g., taxing both sugary and artificially sweetened beverages), and the non-comprehensiveness of the taxes (e.g., taxing only carbonated soft drinks and excluding other soft drinks). A few studies examining the impact of beverage prices on weight outcomes provide evidence on the association of higher prices and lower body weight.^{xlix,li} Several simulation models which allow for some substitution to other sources of calories suggest that the reductions in sugary drink consumption that follow the implementation of a sugary drink tax would result in lower obesity rates, reduced incidence of diabetes, and other improvements in health.^{lxiii,lxiv,lv,xlvi}

IV. Best Practices in Excise Tax Policy

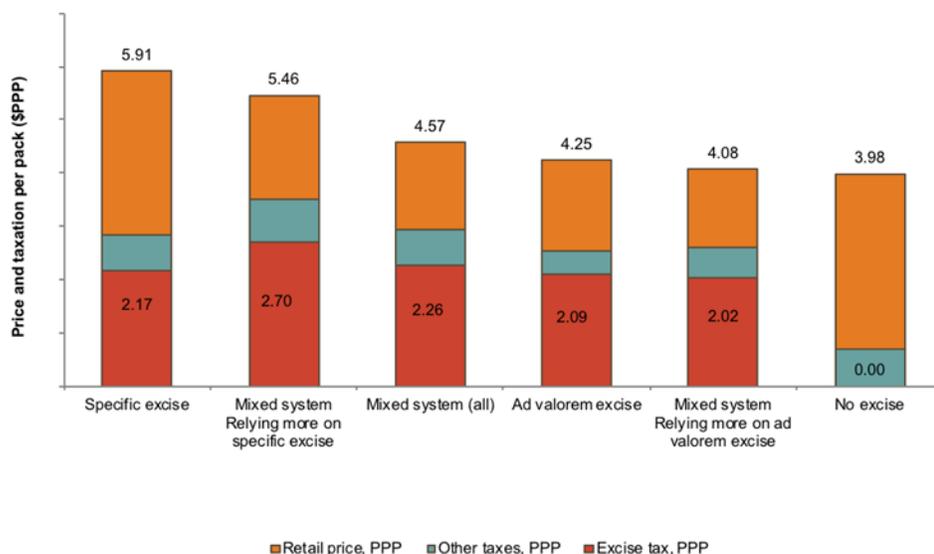
Governments can and do impose a variety of taxes on tobacco, alcohol, and sugary beverages, including customs duties, value added or general sales taxes, and excise taxes. Of these, excise taxes are most important when using fiscal policy to promote health, given since they are uniquely applied to the products and thus will have a greater impact on the *relative* price of the taxed product than will taxes on a broader range of goods and services. In addition, excise tax rates can be set at much higher rates than is likely to be feasible for broader based taxes.

Excise taxes can be levied as specific taxes, based on some measure of quantity, or as *ad valorem* taxes, based on the price of a product. In the case of alcoholic and sugary beverages, some specific taxes are at times referred to as 'unitary' taxes which are taxes based on volume, while specific taxes may be used to describe taxes on the ingredient being taxed (e.g. ethanol for alcohol and sugar for sugary beverages). For this discussion, specific taxes will be used to broadly include taxes based on quantity, volume, or constituents.

Specific excise taxes have many advantages over *ad valorem* excises.^{lxvi,lxvii,vi,vii} They reduce the price gaps among different brands of the taxed product, reducing opportunities for consumers to trade down to cheaper brands when taxes are increased. Also, since specific excise taxes are applied on a per unit basis rather than as a function of price, quantity discounts are still taxed at the same rate. They tend to encourage production of higher priced

products. They produce more stable revenues as they are not as subject to industry price manipulation. Specific taxes are relatively easy to administer and are not as susceptible to industry tax avoidance and evasion, Such as under-invoicing in countries which use the CIF or ex-factory price as the base. The main disadvantage of a specific excise tax is that it needs to be increased regularly or its value will be eroded by inflation. As shown in Figure 5, countries that rely on specific cigarette taxes generally have higher taxes and prices on average than do countries that rely more on *ad valorem* taxes.

Figure 5: Excise tax structure: Specific and mixed relying more on the specific component tend to lead to higher prices



Source: WHO 2017 GTCR data; unpublished figure.

Notes: Averages are weighted by WHO estimates of number of current cigarette smokers ages 15+ in each country in 2015; Prices are expressed in Purchasing Power Parity (PPP) adjusted dollars or international dollars to account for differences in the purchasing power across countries. Based on prices as of July 2016 for 53 high-income, 100 middle-income and 27 low-income countries with data on prices of most sold brand, excise and other taxes, and PPP conversion factors.

Since they are based on price, *ad valorem* excise taxes tend to keep up with inflation. Some view *ad valorem* excises as more equitable than specific excises, given that the amount of the tax levied will be greater on the higher priced premium brands more likely to be chosen by more affluent consumers. However, *ad valorem* taxes tend to result in larger gaps in prices between high and low-price brands, creating more opportunities for consumers to trade down to cheaper brands as taxes and prices rise. They also produce less stable revenues, as industry price cuts reduce the amount of the tax collected.

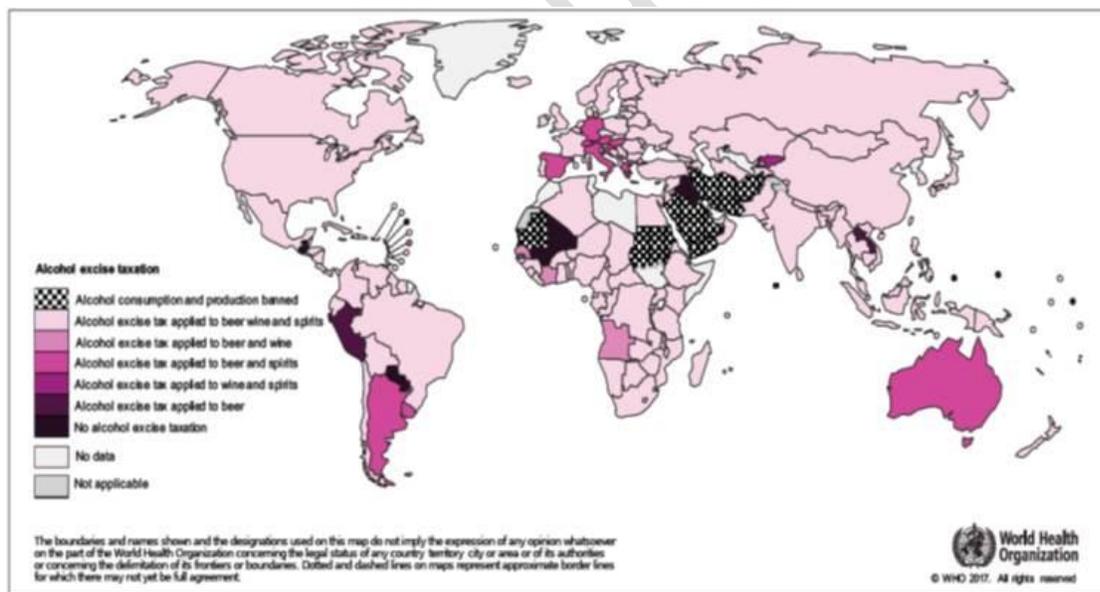
Some governments apply combinations of specific and *ad valorem* excises or employ an *ad valorem* tax with a minimum specific tax floor in an effort to capitalize on the advantages of each. This type of mixed system will have less of an impact on health than a purely specific system would have and will be more difficult to administer.

Some governments employ tiered tax structures (specific, *ad valorem*, or mixed) where the tax varies based on price and/or product characteristics. Tiered tax structures have several disadvantages, including widening price gaps between brands and facilitating tax avoidance by producers who may manipulate prices or their product to reduce the tax they face. But they may also encourage product reformulation if levied on an unhealthy product ingredient, such as a sugary beverage tax levied based on sugar content or an alcoholic beverage tax based on ethanol content. This supply-side response can add to the public health impact of the tax.

The base on which the tax is levied also has important implications for its impact on health and for tax administration. A given *ad valorem* tax rate that is levied based on prices early in the distribution chain will have a smaller impact on retail prices than it will if levied based on retail price. In addition, *ad valorem* excises levied earlier are more subject to abusive transfer pricing, where producers and/or distributors set artificially low prices at the point where the tax is levied and then raise the price further along the distribution chain. This can be particularly problematic when the industry is highly vertically integrated.

Another important aspect of the base is the definition of what products will be taxed. With tobacco, for example, most countries levy excise taxes on manufactured cigarettes, cigars, bidis, and roll-your-own tobacco, albeit often at different rates, but some do not tax smokeless tobacco products.^{lxviii} Relatively few governments tax electronic cigarettes and other vaping products that have emerged in recent years, and even fewer tax the newest 'heat-not-burn' products. Most governments tax alcoholic beverages, but some apply taxes to one or two beverage categories (e.g. beer and spirits) but not to others (e.g. wine) (see Figure 6).^{vii} With regard to the base for sugary beverage taxation, the public health objective to reduce sugar intake suggests a tax on all sugary beverages including soda, fruit drinks, sports drinks, energy drinks, sweetened teas/coffees, and sweetened/flavored milk. To the extent that any "free sugars" are considered a health risk, the tax base would also include 100% fruit juice. However, the base for sugary beverage taxation generally excludes products where the first ingredient is milk and 100% fruit juices and the base also varies widely, with some governments taxing soda (carbonated beverages) but not other types of sugary beverages, while others levy taxes on both sugary and artificially-sweetened beverages.^{viii} Which products are included in the base can have a significant impact on the health and revenue effects of the tax. The narrower the product base, the greater the opportunities for consumers to substitute away from taxed to untaxed products, reducing the effectiveness of a tax in promoting health, while also generating lower revenues.

Figure 6: Alcoholic Beverage Excise Taxes by Beverage Type

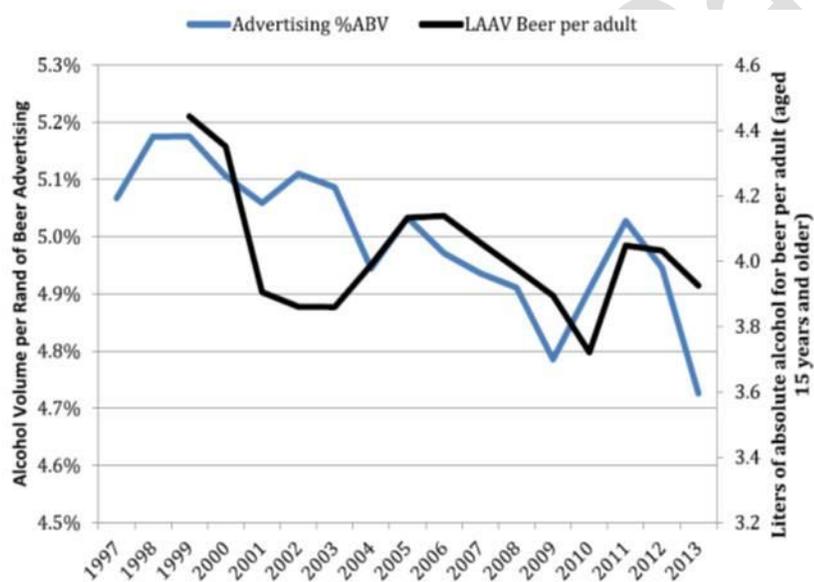


Source: WHO alcohol report, 2017

A related issue concerns the product ingredient on which the tax is levied, which can reflect the harms caused by consumption. Before it was clear that light and/or low-tar/nicotine cigarettes were just as harmful as full-flavor cigarettes, for example, some governments levied taxes based on tar and nicotine content, likely undermining the

health impact of the tax by encouraging substitution to the lower taxed products rather than promoting cessation.^{lxx} More recently, some have suggested differential taxing on tobacco products based on differences in harmfulness; for example, proposing lower taxes on some forms of smokeless tobacco and vaping products than on cigarettes and other combustible tobacco products.^{lxx} Given that ethanol is the primary driver of the health, economic, and social consequences of excessive drinking, taxing alcoholic beverages based on ethanol content may be more effective in promoting health than taxing based on volume.^{lxx,vii} The same is likely to be true for sugary beverage taxes that are levied based on sugar content rather than volume.^{lxx} These types of ingredient-based taxes encourage consumers to switch to lower-taxed products. At the same time, they incentivize producers to reformulate their products in order to face a lower tax and may encourage them to market their lower-taxed products more aggressively than their higher taxed products. These supply-side responses were observed in South Africa following the country's shift to a specific beer excise tax based on ethanol content rather than volume alone.^{lxx} Figure 7 illustrates this for beer advertising and consumption over time, based on the ethanol content of beer. However, ingredient-based taxes are more challenging to administer.

Figure 7: Beer Advertising and Consumption, Average Ethanol Content, South Africa, 1997-2013



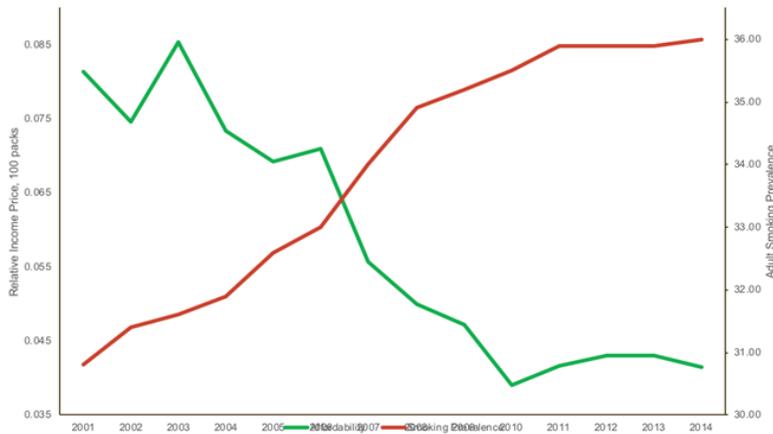
Source: Blecher, 2015

When the evidence on the harms from a particular ingredient are clear, taxing based on that ingredient will almost certainly produce better health outcomes given the incentives for consumers to switch to less harmful products and given the incentives for producers to reformulate their products in an effort to reduce the tax they pay. However, ingredient-based taxation raises additional challenges for tax administration, given the need to verify the product's composition. Extending this to taxation based on relative harms across products has been proposed, at least for tobacco products, but this is particularly challenging in the case of newer products where there is little or no evidence on the long-term health impacts.

In recent years, it has also become clear that taxes need to be increased regularly over time by enough to offset inflation and income growth, in order to reduce the affordability of the taxed products.^{lxxi} Modest increases in specific taxes may not keep pace with inflation, resulting in reductions in the real price of a product, leading to increases in consumption. In particular, in LMICs where incomes have grown rapidly, the increases in income can result in increases in demand that more than offset the reductions due to real tax and price increases. Recent data

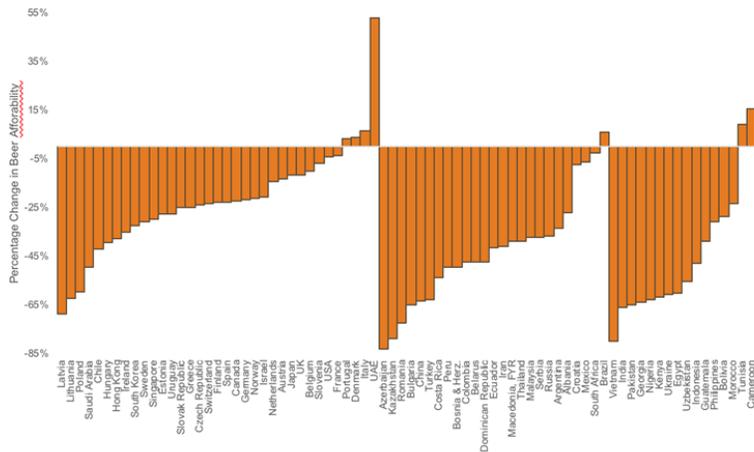
show that cigarettes have generally become less affordable over time in HICs where taxes have been increased and income growth is small, while getting more affordable in many LMICs where taxes have changed little over time while incomes have grown rapidly.^{vi} Figure 8 illustrates trends in cigarette affordability and smoking prevalence in Indonesia, where affordability increased rapidly in the early 2000s, contributing to increased smoking rates, before stabilizing in more recent years. In contrast, alcoholic and sugary beverages have generally become more affordable over time in both LMICs and HICs, as shown in Figures 9 and 10, respectively.

Figure 8: Affordability & Tobacco Use Adult Smoking Prevalence, Indonesia, 2001-2014



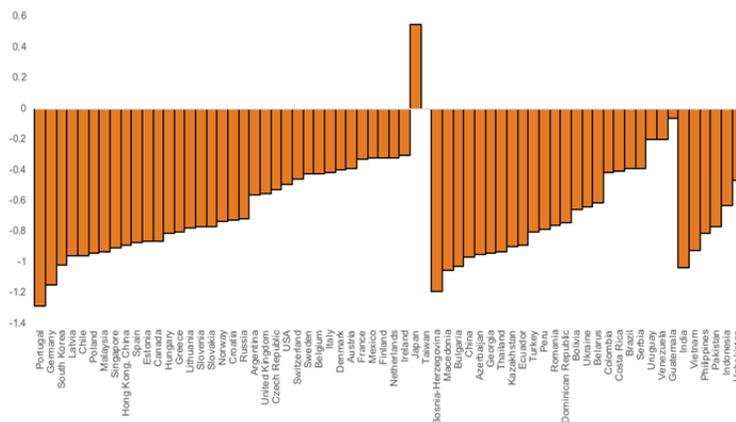
Sources: Euromonitor, EIU, World Bank, and Authors' Calculations

Figure 9: Change in Beer Affordability 2002-2016, Selected Countries



Source: Euromonitor, World Bank, and author's calculations

Figure 10: Change in Soft Drink Affordability 2000-2013, Selected Countries



Source: Euromonitor, World Bank, and author's calculations

It is challenging to determine the optimal level of tax or magnitude of tax increases. With tobacco, the World Bank has recommended that *total* cigarette taxes in LMICs should be set to account for two-thirds to four-fifths of retail prices, based on tax levels in HICs that included significant tax increases as part of a comprehensive strategy for reducing tobacco use.^{lxxii} More recently, WHO has recommended that *excise* taxes should account for 70 percent of retail prices, a target that would require significant tax increases in nearly all countries.^{lxxvi} Such targets, however, do not capture problems with tax structures or may not lead to high retail prices if industry prices are very low.

It has been recommended that sugary beverage tax rates be set high enough to raise prices by 20 percent, given that this is likely to result in net reductions in caloric intake that are potentially large enough to improve weight outcomes at the population level.^{viii} Lower sugary beverage tax rates such as the 10% rate in Mexico have had significant impact on overall consumption but the impact on weight is not yet known. There are no similar recommendations for the level of taxes on alcoholic beverages.

Modest tax and price increases will have relatively small effects on consumption and health, while large increases would have a larger impact. Large tax increases signal to consumers that these products are dangerous and would lead to large reductions in their use. This is captured in the World Bank's recent recommendation that governments "go big, go fast" when increasing their tobacco taxes, stating that a more gradual approach "means condemning large numbers of people to avoidable illness and premature death."^{lxxiii}

Finally, the use of the increased revenues that result from increases in excises on tobacco products and alcoholic beverages, and the new revenues that are generated by new sugary drink taxes can add to the health impact of these taxes. Earmarking these revenues for programs that discourage consumption of these products, such as mass media public education campaigns, cessation and prevention programs, enforcement of related policies, and other efforts to reduce the harms caused by consumption can result in greater reductions in use and its consequences.^{vi,lxxviii} Similarly, using these revenues for other health promotion efforts, such as programs to support increased physical activity, healthy eating, and universal health coverage, can also add to the health benefits that accrue from the tax. While hard earmarking can be difficult in some environments, soft earmarking may be a more viable option.^{lxxix} Moreover, public support for tax increases is much stronger when there is a clear

connection between the use of the tax revenues and the behaviors targeted by the tax.^{lxxiii} For example, data from the Global Adult Tobacco Surveys in many countries show that many smokers support increases in cigarette taxes when the revenues are used to support or improve health programs.^{lxxiv}

V. Excise Tax Administration

The design of the tax is critical to the ease of tax administration, with simple, uniform specific taxes much easier to administer than complex, multi-tiered, *ad valorem* taxes.^{vi,vii,lxxv}

Effective tax administration maximizes the health and revenue impact of a given tax by minimizing tax avoidance and evasion. Strong tax administration begins with control over the distribution chain, including licensing of all involved in the manufacture, import, distribution, and retail sales of the taxed product and the monitoring of the product as it moves through the distribution chain.^{lxxv,lxxvi} State-of-the-art systems are used in several countries for tobacco products, alcoholic beverages, and soft drinks. These systems include sophisticated tax stamps or other product markings with overt and covert security features that are very difficult to counterfeit. An effective tracking and tracing system can be used to: verify the quantity produced or imported; confirm correct tax payments; track products through the supply chain; trace illegally diverted products back to their sources; and, ensure authenticity of the product.^{lxxvii} Kenya, for example, uses a sophisticated tracking and tracing system for cigarettes that includes production monitoring, high-tech tax stamps, and an electronic monitoring system for following products as they move through the distribution process.^{lxxviii} In addition, effective tax administration includes strong enforcement activities coupled with significant penalties on those engaged in tax evasion.^{lxxvi,lxxv}

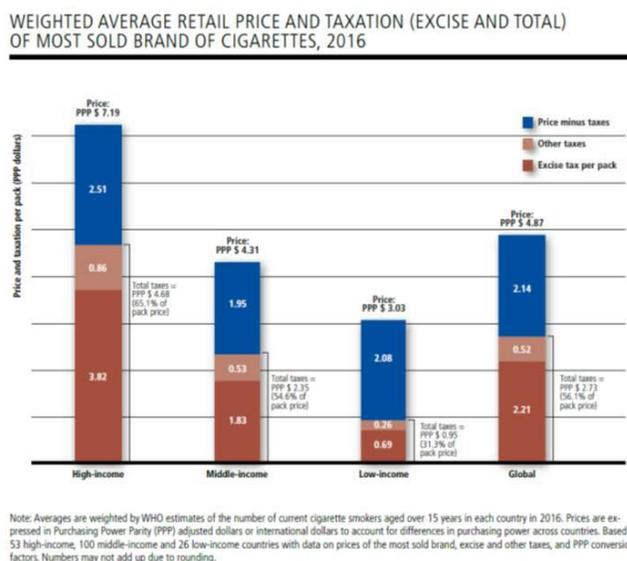
Effective tax administration also depends on the technical capacity of the administering agency, particularly administrators' ability to monitor tax compliance and to understand how changes in taxes and other market forces affect demand, supply, and tax avoidance and evasion.^{lxxvi,vii} It also involves cooperation between tax administrators and taxpayers, including timely payment of taxes and tax credits or refunds for unsold or damaged products, while also following a 'trust but verify' approach that includes record-keeping requirements and periodic audits to ensure compliance.^{vii,lxxvi}

VI. Current Status of Tobacco, Alcohol, and Sugary Drink Excise Taxes

Nearly all governments levy excise taxes on manufactured cigarettes, with only 15 of the 188 countries who reported tax and price data for 2016 to the World Health Organization (WHO) reporting that they did not levy an excise tax.^{lxxviii} Tobacco taxes have increased in many countries since the entry into force of the WHO's Framework Convention on Tobacco Control in 2005, given Article 6 of the treaty's recognition of the effectiveness of tax and price increases in reducing tobacco use, particularly among young people. In 2016, cigarette excise taxes varied widely from country to country, with taxes ranging from less than \$0.02 per pack in Guinea to almost \$10 per pack in the Cook Islands, and ranging from less than 3% of price in Azerbaijan to over 76% of price in Argentina. Most countries also impose a value added tax or general sales tax on cigarettes, while several impose other special levies. On average, cigarette excise taxes account for about one-third of price (32%) in LMICs, and about one-half (48%) of price in HICs (see Figure 11). About 38% of countries levy specific excise taxes, while 27% levy *ad valorem* excises; the remainder use a combination of specific and *ad valorem* taxes. The base on which the *ad valorem* taxes are levied varies across countries, with some levied based on producer or import prices, others on distributor prices, and still others on retail prices. LMICs tend to rely more on *ad valorem* excises, while HICs are more likely to employ a specific or mixed tax. Of 175 countries reporting detailed tax information in 2016, 150 applied the same tax to all cigarettes, while 25 employed a tiered tax structure where the tax varied based on price and/or product characteristics (e.g. length, production type, presence/absence of a filter). LMICs are more likely to have complex tax structures. For example, Indonesia's tax structure includes 10 tiers, with taxes varying for kreteks (clove cigarettes) and white cigarettes, hand-rolled vs. machine produced, etc. That said, Indonesia recognizes the complications this creates and it is in the process of simplifying its tobacco tax structure. Bangladesh levies

different *ad valorem* taxes on brands based on retail prices, with rates increasing as prices increase. Taxation of other tobacco products is more variable, with many countries taxing some or all other products, but generally at rates well below the rate imposed on manufactured cigarettes.

Figure 11: Cigarette Prices and Taxes by Income Group, 2016



Source: WHO 2017

Similarly, nearly all governments levy excise taxes and value added or sales taxes on alcoholic beverages, although which beverages are taxed varies to some extent across countries. Of the 192 countries that provided data for WHO's Global Information System on Alcohol and Health in 2012 (the most recent available data), 155 levied an excise tax on beer, 138 on wine, and 151 on distilled spirits; alcohol sales were banned in some, but not in all of the non-taxing countries (see Figure 6 above).^{vii,lxxix} Comprehensive data on tax rates and prices is not available, but from the limited available information, excise taxes on alcoholic beverages appear to be lower and account for a lower share of price in LMICs than in HICs, following a pattern similar to cigarette taxes. Alcoholic beverage excise taxes typical account for a lower share of price than do cigarette taxes. Among the 74 reporting countries, excise taxes as a share of retail prices ranged from a low of 0.3% in Kyrgyzstan to a high of 44.9% in Norway, with an average of 17.3%. Taxes as a percentage of price tend to be lowest on beer and highest on distilled spirits, but there was considerable variation across reporting countries. Tax structures also vary across countries; of the 138 countries reporting on tax structures, one-third levied *ad valorem* taxes only, just over one-fifth levied specific or unitary taxes only, and almost half used a combination of taxes. As with cigarette taxes, the base for *ad valorem* taxes varies across countries. The base for specific alcohol taxes also varies to some extent, with some countries levying specific taxes based on volume, and others based on alcohol content. In some countries, different tax structures are used for different beverages (e.g. a volume-based tax on beer and a tax based on ethanol content on wine and spirits).

Relatively few governments levy an excise tax on sugary beverages, although some have had broader soft drink taxes for many years, and soft drinks are often included in broader VAT or general sales taxes.^{viii,lxxvii} Norway, for example, implemented a tax on products containing refined sugar, including sugary beverages in 1922. Denmark first imposed a soft drink tax in the 1930s, and raised the tax over time, peaking at DKK 1.64 in 2013, before the tax was repealed in 2014. Revenue generation appears to be the primary motivation for these early taxes.

More recently, as concerns about obesity have grown, governments have adopted taxes which are, at least in part, aimed at promoting healthier diets. Hungary, for example, began taxing sugary beverages in 2011 as part of its broader public health product tax, and France implemented a tax on soft drinks with either added sugars or artificial sweeteners in 2012.^{lxvii} These and other taxes implemented in the first wave of more health-motivated taxes tended to be relatively small, raising prices by a few percent, although some smaller countries (e.g., Mauritius) did implement larger taxes. Mexico was the first country in the region of the Americas to adopt a significant tax specifically on sugary beverages, a one peso per liter tax that was implemented in January 2014 and that raised prices on taxed beverages by about ten percent, on average.^{lvi} Since then, other jurisdictions have adopted or proposed more significant taxes primarily aimed at reducing sugary drink consumption and promoting health, including several U.S. localities, South Africa, the United Kingdom, Ireland, Portugal, Saudi Arabia, the United Arab Emirates, Dominica and Barbados (see Figure 12). Most of these taxes aim to raise retail prices by at least ten percent, with a few resulting in more significant increases (e.g. Saudi Arabia and the UAE’s special 50% value added tax on soft drinks and 100% value added tax on energy drinks). As with alcoholic beverage taxes, there is considerable variability in tax structure, with some governments using *ad valorem* taxes, others applying volume-based specific taxes, and still others taxing based on sugar content (e.g. the UK and Ireland’s two-tiered tax based on sugar content, with a tax of 18p per liter for drinks with more than 5g/100 ml and 24p per liter for those with 8g/100ml or more; South Africa’s tax of ZAR 0.021 per gram of sugar above 4g/100ml).

Figure 12: Sugary Drink Taxes, August 2016



http://library.crossfit.com/free/pdf/CFJ_SipBecomes_Drag_Cecil_Map.jpg

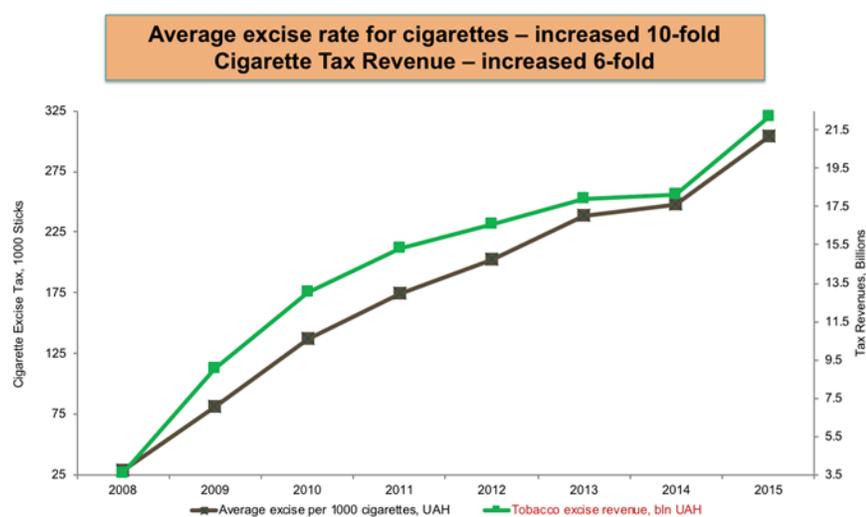
Finally, tobacco, alcohol, and sugary drink excise taxes, while generating significant revenues, tend to account for a relatively small share of overall government revenue in most countries. In 90 countries for which data were available for 2013, tobacco excise tax revenues accounted for less than three percent of total revenues in 64 countries, and for more than five percent in 10 countries. In 19 of 24 countries for which data were available in 2013, alcohol excise tax revenues accounted for less than three percent of total revenues, and for more than five percent in only three countries. Mexico’s sugary drink tax generated nearly 16 billion pesos in 2015, less than one-half of one percent of total revenues. In general, excise tax revenues account for a greater share of total tax revenues in LMICs than in HICs, but this varies considerably across countries.

VII. Economic Impact of Excise Tax Increases - Myths & Facts

Several arguments are commonly used in opposition to increased tobacco and alcohol taxes and to the implementation of a sugary drink tax. These arguments often come from the taxed industries or their allies. They include arguments that a tax increase will: reduce revenues from the tax given declines in consumption; will not be fully passed on to consumers and hence not have the intended health impacts; have harmful macroeconomic effects by causing unemployment and spurring inflation; hurt the poor given the regressivity of consumption taxes; and, lead to extensive tax avoidance and evasion. Experiences from around the world demonstrate that these arguments are either false or greatly overstated.

At least in the short- to medium-term, increases in taxes on tobacco products and alcoholic beverages will result in increases in revenues, given the relative inelasticity for these products and the share of price accounted for by tax. For example, in a country where the cigarette excise tax accounts for half of retail price, a doubling of the tax, if fully passed on to consumers, would result in a 50 percent rise in prices. For the average LMIC with a price elasticity of cigarette demand of -0.5, cigarette consumption would fall by 25 percent. The remaining 75 percent of consumption would now be taxed at twice the rate, resulting in a 50 percent increase in revenues. Even in countries where taxes are already at very high levels, tax increases will continue to generate new revenues, as seen with recent cigarette tax increases in countries like Australia and the U.K. Indeed, in every country that has raised its tobacco tax by a non-trivial amount, consumption fell and revenues rose. The positive impact of higher taxes on revenues is illustrated in Figure 13 for Ukraine, where cigarette taxes have increased sharply over the past decade, followed by increases in cigarette tax revenues.

Figure 13: Cigarette Tax and Tax Revenues Ukraine: 2008-2015



Source: Syvak and Krasovsky, 2017

The relative revenue impact will be even greater for alcoholic beverage tax increases given that these taxes typically account for a much smaller share of prices than do cigarette taxes. Similarly, the imposition of a new sugary drink tax will generate significant new revenues, as seen in Mexico following the introduction of its peso per liter tax. Moreover, given the relatively low share of price accounted for by existing sugary drink taxes, increases in these taxes will still generate new revenues despite the elastic demand for these beverages. For example, the doubling of an existing sugary drink tax that accounts for 10 percent of price, if fully passed on to

consumers, will raise prices by 10 percent. Given a price elasticity of demand of -1.2 for sugary beverages, the price increase would result in a 12 percent drop in consumption. The remaining 88 percent of consumption would be taxed at twice the rate, resulting in a 76 percent rise in revenues.

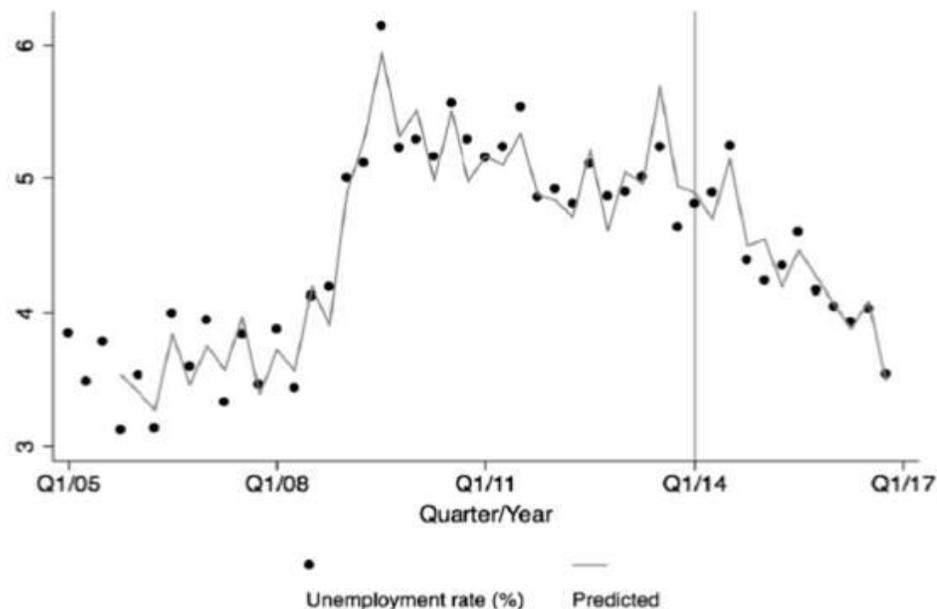
In the longer run, as taxes are increased and other policies aimed at curbing consumption are implemented, tax revenues will eventually fall, but this turning point is a long way off in nearly all countries and particularly in LMICs.

The impact of an excise tax depends on the extent to which the tax is passed through in the form of higher retail prices of the taxed products. In competitive markets, taxes are expected to be fully passed on. However, taxes may also be over-shifted (where prices increase more than the tax) or under-shifted (where prices increase by less than the tax) depending on the market conditions and the price elasticity of demand. Additionally, industry may decide to incur short-run losses by absorbing part of the tax to undermine its impact. Understanding the extent of tax pass-through for a given tax is important for understanding the observed effects of the tax since demand will not fall as expected unless the tax is passed on through higher retail prices.

Evidence for tobacco, mostly from HICs, shows either full pass through or overshifting of taxes, given that tobacco companies take advantage of the tax increase and inelastic demand to raise prices further, protecting their revenues to at least some extent.^{vi,xxii} Limited evidence from the U.S. shows that alcohol tax increases are also overshifted, with prices rising by more than the tax, particularly in on-premise drinking establishments.^{lxxx,lxxxi} Studies on sugar-sweetened beverage excise taxes have found varying pass-through rates, depending on the beverage type, brand, and size of the tax.^{lv,lxxxii,lxxxiii}

The tobacco, alcoholic beverage and soft drink industries argue that they create numerous jobs, both directly in the production and distribution of their products, and indirectly as a result of employees spending their incomes on various goods and services. Given this, they contend that tax increases, by reducing sales of their products, will cause significant job losses. While it is true that there may be some job losses in the taxed industry, these will be offset by job gains in other sectors. Consumers who are no longer spending on the taxed products will spend on other goods and services, leading to job gains in other sectors. Governments will spend the new tax revenues, typically on more labor-intensive activities than tobacco, alcohol, and sugary beverage production, leading to additional job gains. A relatively large evidence base consistently finds that reductions in tobacco use resulting from higher taxes or other tobacco control efforts either have no net impact on jobs or lead to modest job gains in nearly all countries.^{vi} Recent studies from the US and Mexico, have reached similar conclusions for alcoholic and sugary beverage taxes.^{lxxxiv,lxxxv,lxxxvi} Figure 14 illustrates one of the findings from Mexico, showing that there was not an increase in overall unemployment following the implementation of the country's sugary drink and junk food taxes.^{lxxxvi} To the extent that there are concerns about job losses in the taxed sector (e.g. among tobacco or sugar cane farmers), governments can dedicate some of the new revenues to programs to facilitate transitions to other livelihoods, as Turkey did by earmarking some of its tobacco tax revenues to programs to help tobacco farmers shift to other crops.^{lxxxvii}

Figure 14: Unemployment Rate Mexico, 2005-2016

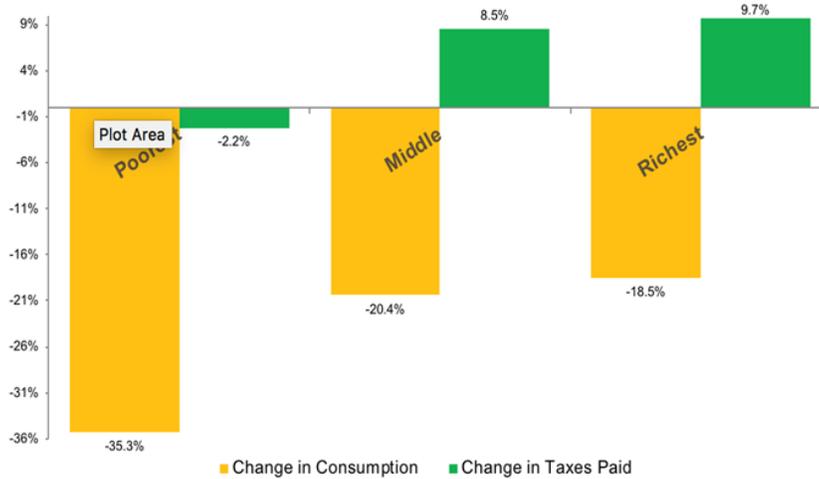


Source: Guerrero-Lopez, et al., 2017

Concerns about inflation can be a deterrent to tobacco, alcohol and sugary beverage taxes, particularly in countries where wages and/or government spending are indexed to a measure of consumer prices. However, the inflationary impact of these taxes is minimal in most countries, given relatively low shares of taxes in prices and given the weight of the taxed products in the consumer price index.^{lxvi} To the extent that this is a concern, governments can follow the lead of other countries that have excluded some products, including tobacco and alcohol, from the price index used for indexing wages, pension payments, and other outlays.^{lxvi}

Given that consumption taxes are generally regressive taxes, opponents of these taxes argue that they will have a particularly adverse impact on the poor. This is particularly true for tobacco products and sugary beverages, products for which consumption is often higher for lower socioeconomic groups in many countries.^{vi,xi} However, the inverse relationship between socioeconomic status and consumption implies that the health consequences of use are also regressive. Coupled with the greater price sensitivity of lower income populations described above, this implies that the health impact of tax increases on tobacco products and new taxes on sugary beverages will have a progressive health impact. Figure 15 illustrates this for cigarette taxes in Turkey, based on estimates of price elasticity for low, medium, and high-SES populations.^{lxxxviii} Recent work by the World Bank on tobacco taxation that accounts for the longer-term impact of consumption on medical care spending and increases in working years finds that tobacco tax increases are financially progressive in countries like Chile and Moldova, given the greater elasticity of demand among lower income groups.^{lxxxix,xc} Finally, the equity implications of these taxes should be considered within the context of the broader fiscal system. To the extent that the revenues generated by these taxes are used to support programs that disproportionately benefit the poor (e.g. the tobacco-tax funded universal health care program in the Philippines), their impact will be even more progressive.^{lxxiii}

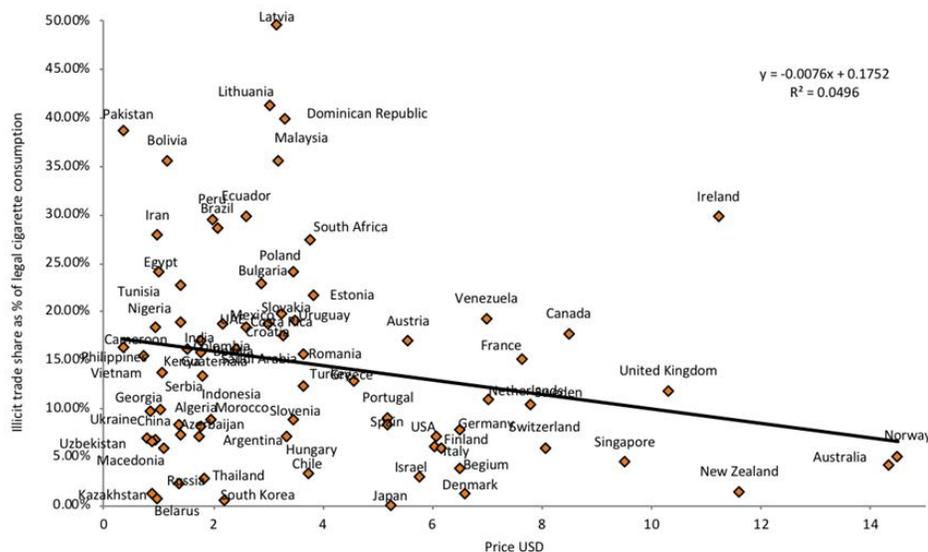
Figure 15: Who Pays & Who Benefits Turkey - 25% Tax Increase



@tobacconomics Source: Adapted from Önder & Yürekli, 2014

Perhaps the most commonly used oppositional argument for tobacco tax increases is that they will lead to significant tax avoidance and evasion, undermining the health and revenue impact of the tax. Experiences with tobacco taxes in a wide range of countries provide several lessons. First, tobacco tax increases produce health and revenue benefits even in the presence of tax avoidance/evasion, albeit smaller than if there was full compliance.^{.lxxv} Second, other factors, particularly strength of governance, are as or more important than tax rates in explaining tax avoidance and evasion.^{.vi} In fact, countries with relatively low tobacco and alcohol taxes have larger problems with illicit trade than countries with relatively high taxes, as shown in Figure 16 for tobacco taxes.^{.vi,xci} Third, governments can curb illicit trade at the same time as they raise taxes, enhancing the health and revenue impact of the tax.^{.vi} Prioritizing efforts to reduce illicit trade, including strengthened tax administration, enhanced enforcement efforts, and strong penalties, have been shown to be effective in curbing illicit tobacco trade.^{.lxxv} Similar strategies are likely to be as or more effective in addressing avoidance and evasion of alcohol and sugary beverage taxes.

Figure 16: Illicit Cigarette Market Share & Cigarette Prices, 2012



www.tobacconomics.org Source: NCI & WHO Monograph

VIII. Summary & Conclusions

Experiences from around the world show that increasing excise taxes is a powerful tool for reducing tobacco use, excessive drinking, and consumption of sugary beverages. The demands for tobacco, alcohol and sugary beverages are sensitive to prices and countries and other jurisdictions that have raised or introduced taxes have seen reductions in consumption and, for tobacco and alcohol tax increases, improved health outcomes. The evidence of the impact of sugary beverage taxes beyond consumption to weight and other health outcomes is limited but simulation modeling based on demand studies and epidemiologic evidence on the impact of consumption on weight, diabetes, and other health outcomes supports such a link.

Several arguments are commonly used to oppose these taxes, including that raising existing tobacco and alcohol taxes or imposing new sugary beverage taxes will result in extensive tax avoidance and evasion, cause substantial job losses, and will harm poor consumers, and that raising existing taxes will reduce tax revenues. Evidence from around the world shows that these arguments are either false or greatly exaggerated.

Excise taxes, given that they can target specific products and raise their prices relative to other products, are the best option for taxing tobacco, alcohol, and sugary beverages. Uniform specific excise taxes have many advantages over *ad valorem* excises. Further, specific taxes based on ethanol content, for alcoholic beverages, and sugar content, for sugary beverages, are likely to also induce product reformulation and other supply side responses that can add to their health impact. Taxes also need to be comprehensively applied given that less than comprehensive taxes result in substitution that weakens the public health impact of the tax.

While most countries levy excise taxes on tobacco products, these taxes are generally below recommended levels and could be raised significantly. Most countries also levy excise taxes on alcoholic beverages, but these taxes

generally account for a small share of price, contributing to increased affordability in most countries. Few countries have taxes on sugary beverages and most existing sugary beverage taxes are low. The evidence shows that the implementation of new taxes and increases in existing taxes across all tobacco, alcohol and sugary beverage products are important fiscal policies that significantly reduce consumption and save lives.

References

- ⁱ Adam Smith (1776). Edwin, Canaan, ed. (1976). *An Inquiry into the Nature and Causes of The Wealth of Nations*, Book V, Chapter III, pp. 474-476.
- ⁱⁱ Hültschmidt N, Hempe EM (2016). The silent pandemic that threatens the global economy. World Economic Forum, <https://www.weforum.org/agenda/2016/02/the-silent-pandemic-that-threatens-the-global-economy/>
- ⁱⁱⁱ Bloom D, Cafiero E, Jané-Llopis E, Abrahams-Gessel S, Bloom L, Fathima S, Feigl A, Gaziano T, Hamandi A, Mowafi M, O'Farrell D, Ozaltin E, Pandey A, Rosenberg L, Seligman B, Stein A, Weinstein C, Weiss J (2012). The global economic burden of noncommunicable diseases. Working Paper Number 87, Program on the Global Demography of Aging. Cambridge: Harvard University Program on the Global Demography of Aging.
- ^{iv} United Nations (2015). *Transforming Our World: The 2030 Agenda for Sustainable Development, A/RES/70/1*. New York: United Nations. <https://sustainabledevelopment.un.org/post2015/transformingourworld>
- ^v World Health Organization (2014). *Global Status Report on Noncommunicable Diseases 2014*. Geneva CH: World Health Organization. <http://www.who.int/nmh/publications/ncd-status-report-2014/en/>
- ^{vi} National Cancer Institute and World Health Organization (2016). *The Economics of Tobacco and Tobacco Control, NCI Tobacco Control Monograph Series 21*. Bethesda MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute; and Geneva CH: World Health Organization.
- ^{vii} Sornpaisarn B, Shield KD, Österberg E, Rehm J (2017). *Resource Tool on Alcohol Taxation and Pricing Policies*. Geneva CH: World Health Organization.
- ^{viii} World Health Organization (2016). *Fiscal Policies for Diet and Prevention of Noncommunicable Diseases*. Geneva CH: World Health Organization.
- ^{ix} World Health Organization (2017). *Tackling NCDs – 'Best Buys' and Other Recommended Interventions for the Control and Prevention of Non-Communicable Diseases*. Geneva CH: World Health Organization.
- ^x Akerlof GA, Shiller RJ (2015). *Phishing for Phools: The Economics of Manipulation and Deception*. Princeton NJ: Princeton University Press.
- ^{xi} Sassi F, Belloni A, Capobianco C (2013). *The Role of Fiscal Policies in Health Promotion, OECD Health Working Papers Number 66*. Paris: OECD Publishing.
- ^{xii} Malik VS, Pan A, Willett WC, Hu FB (2013). Sugar-sweetened beverages and weight gain in children and adults: a systematic review and meta-analysis. *American Journal of Clinical Nutrition*. 98(4): 1084-102.
- ^{xiii} Malik VS, Popkin BM, Bray GA, Despres JP, Hu FB (2010). Sugar sweetened beverages, obesity, type 2 diabetes mellitus, and cardiovascular disease risk. *Circulation*. 121(11): 1356-1364.
- ^{xiv} Vartanian LR, Schwartz MB, Brownell KD (2007). Effects of soft drink consumption on nutrition and health: a systematic review and meta-analysis. *American Journal of Public Health*. 97(4): 667-675.
- ^{xv} Gruber J, Köszegi B (2008). *A Modern Economic View of Tobacco Taxation*. Paris: International Union Against Tuberculosis and Lung Disease.
- ^{xvi} U.S. Department of Health and Human Services (2014). *The Health Consequences of Smoking – 50 Years of Progress. A Report of the Surgeon General*. Atlanta GA: U.S. 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.
- ^{xvii} Goodchild M, Narqis N, Tursan d'Espaignet (2018). Global economic cost of smoking-attributable diseases" *Tobacco Control* 27:58-64.
- ^{xviii} Rehm J, Mathers C, Popova S, Thavorncharoensap M, Teerawattananon Y, Patra J (2009). Global burden of disease and injury and economic cost attributable to alcohol use and alcohol use disorders. *Lancet* 373:2223-2233.
- ^{xix} McKinsey Global Institute (2015). *Overcoming Obesity: An Initial Economic Analysis*.
- ^{xx} International Diabetes Federation (2017). *IDF Diabetes Atlas, 8th Edition*. <http://diabetesatlas.org/resources/2017-atlas.html>
- ^{xxi} Pigou A (1920). *The Economics of Welfare*. London: Macmillan and Company.
- ^{xxii} International Agency for Research on Cancer (2011). *Effectiveness of Tax and Price Policies for Tobacco Control – IARC Handbooks of Cancer Prevention, Tobacco Control, Volume 14*. Lyon France: International Agency for Research on Cancer.
- ^{xxiii} Jawad M, Leet JT, Glantz S, Millett C (2018). Price elasticity of demand for non-cigarette tobacco products: a systematic review and meta-analysis. *Tobacco Control* doi:10.1136/tobaccocontrol-2017-054056.
- ^{xxiv} John RM, Rao RK, Rao MG, Moore J, Deshpande RS, Sengupta J, Selvaraj S, Chaloupka FJ, Jha P (2010). *The Economics of Tobacco and Tobacco Taxation in India*. Paris: International Union Against Tuberculosis and Lung Disease.

- ^{xxxv} Salti N, Chaaban J, Nakkash R, Alaouie H (2015). The effect of taxation on tobacco consumption and public revenues in Lebanon. *Tobacco Control* 24:77-81.
- ^{xxxvi} Nargis N, Thompson ME, Fong GT, Driezen P, Ghulam Hussain AKM, Ruthbah UH, Quah ACK, Abdullah AS (2015). Prevalence and patterns of tobacco use in Bangladesh from 2009-2012: Evidence from International Tobacco Control (ITC) Study. *PLoS One* doi.org/10.1371/journal.pone.0141135.
- ^{xxxvii} Community Preventive Services Task Force (2012). *Tobacco Use and Secondhand Smoke Exposure: Interventions to Increase the Unit Price of Tobacco Products*. <https://www.thecommunityguide.org/findings/tobacco-use-and-secondhand-smoke-exposure-interventions-increase-unit-price-tobacco>
- ^{xxxviii} Bowser D, Canning D, Okunogbe A (2016). The impact of tobacco taxes on mortality in the USA, 1970-2005. *Tobacco Control* 25:52-59.
- ^{xxxix} Ho V, Ross JS, Steiner CA, Mandawat A, Short M, Ku-Goto MH, Krumholz HM (2017). *Medical Care Research and Review* 74(6):6870704.
- ^{xxx} Hatoun J, Davis-Plourde K, Penti B, Cabral H, Kazis L (2018). Tobacco control laws and pediatric asthma. *Pediatrics* 141:5130-5135.
- ^{xxxi} Ringel JS, Evans WN (2001). Cigarette taxes and smoking during pregnancy. *American Journal of Public Health* 91:1851-1856.
- ^{xxxii} Evans WN, Ringel JS (1999). Can higher cigarette taxes improve birth outcomes? *Journal of Public Economics*, 72:135-154.
- ^{xxxiii} Markowitz S (2008) The effectiveness of cigarette regulations in reducing cases of Sudden Infant Death Syndrome. *Journal of Health Economics* 27:106-133.
- ^{xxxiv} Wagenaar AC, Salois MJ, Komro KA (2009). Effects of beverage alcohol price and tax levels on drinking: a meta-analysis of 1003 estimates from 112 studies. *Addiction* 104:179-190.
- ^{xxxv} Elder RW, Lawrence B, Ferguson A, Naimi TS, Brewer RD, Chattopadhyay SK, Toomey TL, Fielding JE and the Task Force on Community Preventive Services (2010). The effectiveness of tax policy interventions for reducing excessive alcohol consumption and related harms. *American Journal of Preventive Medicine* 38(2):217-229.
- ^{xxxvi} Sornpaisarn B, Shield K, Cohen J, Schwartz R, Rehm J (2013). Elasticity of alcohol consumption, alcohol-related *International Journal of Drug and Alcohol Research* 2:1-14.
- ^{xxxvii} Meng Y, Brennan A, Purshouse R, Hill-McManus D, Angus C, Holmes J, Meier PS (2014). Estimation of own and cross price elasticities of alcohol demand in the UK – A pseudo-panel approach using the Living Costs and Food Survey 2001-2009. *Journal of Health Economics* 34:96-103.
- ^{xxxviii} Srivastava P, McLaren KR, Wohlgenant M, Zhao X (2014). Econometric Modelling of Price Response by Alcohol Types to Inform Alcohol Tax Policies. Working Paper 05/14, Department of Econometrics and Business Statistics, Monash University, Australia.
- ^{xxxix} Wagenaar AC, Tobler AL, Komro KA (2010). Effects of alcohol tax and price policies on morbidity and mortality. *American Journal of Public Health* 100(11):2270-2278.
- ^{xl} Andreyeva T, Long MW, Brownell KD (2010). The impact of food prices on consumption: a systematic review of research on the price elasticity of demand for food. *American Journal of Public Health*, 100(2):216-222.
- ^{xli} Powell L, Chriqui JF, Khan T, Wada R, Chaloupka FJ (2013). Assessing the potential effectiveness of food and beverage taxes and subsidies for improving public health: a systematic review of prices, demand, and body weight outcomes. *Obesity Reviews* 14(2):110-128.
- ^{xlii} Escobar MAC, Veerman JL, Tollman SM, Bertram MY, Hofman KJ (2013). Evidence that a tax on sugar sweetened beverages reduces the obesity rate: a meta-analysis. *BMC Public Health* 13:1072.
- ^{xliii} Colchero MA, Salgado JC, Unar-Munguía M, Hernández-Ávila M, Rivera-Donmarco JA (2015). Price elasticity of the demand for sugar sweetened beverages and soft drinks in Mexico. *Economics & Human Biology* 19:129-137.
- ^{xliv} Paraje G (2016). The effect of prices and socio-economic level on the consumption of sugar-sweetened beverages (SSBs): The case of Ecuador. *PLoS One*, doi.org/10.1371/journal.pone.0152260.
- ^{xlv} Guerrero-Lópe CM, Unar-Munguía M, Colchero MA (2017). Price elasticity of the demand for soft drinks, other sugar-sweetened beverages, and energy dense food in Chile. *BMC Public Health*, doi.org/10.1186/s12889-017-4098-x
- ^{xlvi} Chaco V, Paraje G, Barnoya J, Chaloupka FJ (2018). Own-price, cross-price, and income elasticities on milk and soft drinks in Guatemala. Under review.
- ^{xlvii} Stacey N, Tugendhaft A, Hofman K (2017). Sugary beverage taxation in South Africa: Household expenditure, demand system elasticities, and policy implications. *Preventive Medicine* 105:S26-S31.
- ^{xlviii} Basu S, Vellakkal S, Agrawal S, Stuckler D, Popkin B, Ebrahim S (2014). Averting obesity and Type 2 diabetes in India through sugar-sweetened beverage taxation: an economic-epidemiologic modeling study. *PLoS Medicine* doi.org/10.1371/journal.pmed.1001582.
- ^{xlix} Smith TA, Lin BH, Lee JY (2010). *Taxing Caloric Sweetened Beverages: Potential Effects on Beverage Consumption, Calorie Intake, and Obesity*. Washington DC: United States Department of Agriculture.
- ^l Fletcher JM, Frisvold DE, Tefft N (2010). The effect of soft drink taxes on child and adolescent consumption and weight outcomes. *Journal of Public Economics* 84(11-12):967-974.
- ^{li} Finkelstein EA, Zhen C, Bilger M, Nonnemaker J, Farooqui AM, Todd JE (2013). Implications of a sugar-sweetened beverage (SSB) tax when substitutions to non-beverage items are considered. *Journal of Health Economics* 32(1):219-239.
- ^{lii} Zhen C, Finkelstein EA, Nonnemaker JM, Karns SA, Todd JE (2014). Predicting the effects of sugar-sweetened beverage taxes on food and beverage demand in large demand systems. *American Journal of Agricultural Economics* 96(1):1-25.
- ^{liii} Finkelstein E, Zhen C, Nonnemaker J, Todd JE (2010). Impact of targeted beverage taxes on higher- and lower-income households. *Archives of Internal Medicine* 170(22):2028-2034.
- ^{liv} Wada R, Han E, Powell LM (2015). Associations between soda prices and intake: Evidence from 24-h dietary recall data. *Food Policy* 55:54-60.

-
- ^{lv} López-Olmedo N, Popkin BM, Taillie LS (2018). The socioeconomic disparities in intakes and purchases of less-healthy foods and beverages have changed over time in urban Mexico. *The Journal of Nutrition* 148(1):109-116.
- ^{lvi} Colchero MA, Salado JC, Unar-Mungula M, Molina M, Ng S, Rivera-Donmarco JA (2015). Changes in prices after an excise tax to sweetened sugar beverages was implemented in Mexico: evidence from urban areas. *PLoS One* doi.org/10.1371/journal.pone.0144408.
- ^{lvii} Colchero MA, Guerrero-López CM, Molina M, Rivera JA (2016). Beverage sales in Mexico before and after the implementation of a sugar sweetened beverage tax. *PLoS One* doi.org/10.1371/journal.pone.0163463.
- ^{lviii} Colchero MA, Popkin BM, Rivera JA, Ng SW (2016). Beverage purchases from stores in Mexico under the excise tax on sugar sweetened beverages: observational study. *British Medical Journal* doi.10.1136/bmj.h6704.
- ^{lix} Colchero MA, Rivera-Donmarco J, Popkin BM, Ng SW (2017). In Mexico, evidence of sustained consumer response two years after implementing a sugar-sweetened beverage tax. *Health Affairs* 36(3):doi.org/10.1377/hlthaff.2016.1231.
- ^{lx} Colchero MA, Molina M, Guerrero-Lopez CM (2017). After Mexico Implemented a Tax, Purchases of Sugar-Sweetened Beverages Decreased and Water Increased: Difference by Place of Residence, Household Composition, and Income Level. *The Journal of Nutrition*. 2017;147(8):1552-1557.
- ^{lxi} Ng SW, Rivera J, Popkin B, Colchero MA (2017). Did high purchasers respond differently to the excise tax on sugar-sweetened beverages in Mexico? Under review.
- ^{lxii} Silver LD, Ng SW, Ryan-Ibarra S, Taillie LS, Induni M, Miles DR, Poti JM, Polkin BM (2017). Changes in prices, sales, consumer spending, and beverage consumption one year after a tax on sugar-sweetened beverages in Berkeley, California, US: A before-and-after study. *PLoS Medicine*. 2017;14(4):e1002283.
- ^{lxiii} Sánchez-Romero LM, Penko J, Coxson PG, Fernández A, Mason A, Moran AE, Ávila-Burgos L, Odden M, Barquera S, Bibbins-Domingo K (2016). Projected impact of Mexico's sugar-sweetened beverage tax policy on diabetes and cardiovascular disease: a modeling study. *PLoS Medicine* doi.org/10.1371/journal.pmed.1002158.
- ^{lxiv} Manyema M, Veerman LJ, Chola L, Tuggendhaft A, Sartorius B, Labadarios D, Hofman KJ (2014). The potential impact of a 20% tax on sugar-sweetened beverages on obesity in South African adults: a mathematical model. *PLoS One* doi.org/10.1371/journal.pone.0105287.
- ^{lxv} Long MW, Gortmaker SL, Ward ZJ, Resch SC, Moodie ML, Sacks G, Swinburn BA, Carter RC, Wang YC (2015). Cost-effectiveness of a sugar-sweetened beverage excise tax in the U.S. *American Journal of Preventive Medicine* 49(1):112-123.
- ^{lxvi} World Health Organization (2010). *WHO Technical Manual on Tobacco Tax Administration*. Geneva CH: World Health Organization.
- ^{lxvii} Chriqui JF, Chaloupka FJ, Powell LM, Eidson SS (2013). A typology of beverage taxation: multiple approaches for obesity prevention and obesity prevention-related revenue generation. *Journal of Public Health Policy* 34(3):403-423.
- ^{lxviii} World Health Organization (2017). *WHO Report on the Global Tobacco Epidemic 2017: Monitoring Tobacco Use and Prevention Policies; Appendix IX*. Geneva CH: World Health Organization.
- ^{lxix} Chaloupka FJ, Swenor D, Warner KE (2015). Differential taxes for differential risks – toward reduced harm from nicotine yielding products. *New England Journal of Medicine* 373(7):594-597.
- ^{lxx} Blecher E (2015). Taxes on tobacco, alcohol, and sugar sweetened beverages: linkages and lessons learned. *Social Science & Medicine* 136-137:175-179.
- ^{lxxi} Blecher EH, van Walbeek CP (2009). Cigarette affordability trends: an update and some methodological comments. *Tobacco Control* 18:167-175.
- ^{lxxii} Jha P, Chaloupka FJ (1999). *Curbing the Epidemic: Governments and the Economics of Tobacco Control*. Washington DC: The World Bank.
- ^{lxxiii} World Bank (2017). *Tobacco Tax Reform at the Crossroads of Health and Development – A Multisectoral Perspective*. Washington DC: The World Bank.
- ^{lxxiv} World Health Organization (2015). *WHO Report on the Global Tobacco Epidemic, 2015 – Raising Taxes on Tobacco Products*. Geneva CH: World Health Organization.
- ^{lxxv} Chaloupka FJ, Edwards SM, Ross H, Diaz M, Kurti M, Xu X, Pesko M, Merriman D, DeLong H (2015). *Preventing and Reducing Illicit Tobacco Trade in the United States*. Atlanta GA: U.S. 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.
- ^{lxxvi} National Research Council and Institute of Medicine (2015). *Understanding the U.S. Illicit Tobacco Market: Characteristics, Policy Context, and Lessons from International Experiences*. Washington DC: The National Academies Press.
- ^{lxxvii} World Health Organization. (2014). Secretariat Study of the Basic Requirements of the Tracking-and-Tracing Regime to be Established in Accordance with Article 8 of the Protocol to Eliminate Illicit Trade in Tobacco Products. Geneva, CH: Secretariat, WHO Framework Convention on Tobacco Control, World Health Organization.
- ^{lxxviii} Ross H (2017). Tracking and tracing tobacco products in Kenya. *Preventive Medicine* 105(Supplement):S15-S18.
- ^{lxxix} World Health Organization (2018). Global Information System on Alcohol and Health. <http://www.who.int/gho/alcohol/en/>
- ^{lxxx} Kenkel DS (2005). Are alcohol tax hikes fully passed through? Evidence from Alaska. *American Economic Review* 95(2):273-277.
- ^{lxxxi} Young DJ, Bielinska-Kwapisz A (2002). Alcohol taxes and beverage prices. *National Tax Journal* 55(1):57-73.
- ^{lxxxii} Cawley J, Frisvold DE (2017). The pass-through of taxes on sugar-sweetened beverages to retail prices: the case of Berkeley, California. *Journal of Policy Analysis and Management* 36(2):303-326.
- ^{lxxxiii} Falbe J, Rojas N, Grummon AH, Madsen KA (2015). Higher retail prices of sugar-sweetened beverages 3 months after implementation of an excise tax in Berkeley, California. *American Journal of Public Health* 105(11):2194-2201.
- ^{lxxxiv} Wada R, Chaloupka FJ, Powell LM, Jernigan DH (2017). Employment impacts of alcohol taxes. *Preventive Medicine* 105(Supplement):S50-S55.

^{lxxxv} Powell LM, Wada R, Persky JJ, Chaloupka FJ (2014). Employment impact of sugar-sweetened beverage taxes. *American Journal of Public Health* 104(4):672-677.

^{lxxxvi} Guerrero-López CM, Molina M, Colchero MA (2017). Employment changes associated with the introduction of taxes on sugar-sweetened beverages and nonessential energy-dense food in Mexico. *Preventive Medicine* 105(Supplement):S43-S49.

^{lxxxvii} Yürekli A, Önder Z, Elibol M, Erk N, Cabuk A, Fisunoglu M, Erk SF, Chaloupka FJ (2010). *The Economics of Tobacco and Tobacco Taxation in Turkey*. Paris: International Union Against Tuberculosis and Lung Disease.

^{lxxxviii} Önder Z, Yürekli A (2016). Who pays the most cigarette tax in Turkey? *Tobacco Control* 25:39-45.

^{lxxxix} Fuchs A, Meneses FJ (2017). Are Tobacco Taxes Really Regressive? Evidence from Chile. World Bank Policy Research Working Paper No. 7988. Washington DC: The World Bank.

^{xc} Fuchs A, Meneses F (2018). Tobacco Price Elasticity and Tax Progressivity in Moldova. Washington DC: The World Bank.

^{xc} Joossens L, Merriman D, Ross H, Raw M (2009). *How Eliminating the Global Illicit Cigarette Trade Would Increase Tax Revenues and Save Lives*. Paris: International Union Against Tuberculosis and Lung Disease.

Background Paper