Economic Impact of Tobacco Price Increases Through Taxation

A Community Guide Systematic Review

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Context: Tobacco use is a leading cause of preventable death in the U.S. and around the world. Increasing tobacco price through higher taxes is an effective intervention both to reduce tobacco use in the population and generate government revenues. The goal of this paper is to review evidence on the economic impact of tobacco price increases through taxation with a focus on the likely healthcare cost savings and improvements in employee productivity.

Evidence acquisition: The search covered studies published in English from January 2000 to July 2012 and included evaluations of national, state, and local policies to increase the price of any type of tobacco product by raising taxes in high-income countries. Economic review methods developed for The Guide to Community Preventive Services were used to screen and abstract included studies. Economic impact estimates were standardized to summarize the available evidence. Analyses were conducted in 2012.

Evidence synthesis: The review included eight modeling studies, with seven providing estimates of the impact on healthcare costs and three providing estimates of the value of productivity gains. Only one study provided an estimate of intervention costs. The economic merit of tobacco product price increases through taxation was determined from the overall body of evidence on per capita annual cost savings from a conservative 20% price increase.

Conclusions: The evidence indicates that interventions that raise the unit price of tobacco products through taxes generate substantial healthcare cost savings and can generate additional gains from improved productivity in the workplace.

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Context

Tobacco use is the leading preventable cause of premature death in the U.S.[1] Smoking causes several types of cancer as well as cardiovascular disease, respiratory disease, reproductive disorders, and many other ill health effects.[1] Despite recent declines, more than 19% of American adults continue smoking cigarettes,[2] with others using tobacco in other forms.

Legislative actions offer one set of public health tools to reduce tobacco use. Tobacco taxes are attractive for their dual effects of reducing tobacco use and generating revenue. From 2000 to 2012, states enacted 115 state cigarette tax increases,[3] along with federal tobacco tax increases in 2002 and 2009, and numerous local tax increases. Other fees on tobacco products, although

uncommon, may be levied as well, such as the Cigarette Litter Abatement Fee in San Francisco[4] or the Minnesota Health Impact Fee.[5] It should be noted that tobacco tax practices vary across nations with many high-income countries, including the U.S., opting for a specific excise tax, a fixed monetary value per quantity of tobacco product (e.g., pack or carton) rather than an ad valorem tax levied as a percentage of tobacco product prices. Although excise taxes have low administrative costs, they must be updated regularly to maintain their real value over time. Only two of 55 countries that rely solely on specific excise taxes (Australia and New Zealand) have automatic inflation adjustment mechanisms in place.[6]

The Community Preventive Services Task Force[7] recently reiterated its recommendation of legislative tobacco price increases on the basis of strong evidence of effectiveness in reducing tobacco use based on an updated effectiveness review by the Community Guide that built on an existing systematic review by the International Agency for Research on Cancer (IARC).[8] This follow-up paper considers evidence on the economic impact of policy interventions to raise the unit price of tobacco products through taxation in the U.S. and other high-income countries.[9]

Despite the addictive nature of tobacco, an inverse relationship exists between tobacco product prices and quantity demanded, the strength of which is captured in the price elasticity of demand for tobacco products, the percentage change in quantity demanded following a 1% price change. Increased prices encourage current smokers to quit or cut back and discourage non-smokers from starting, resulting in an overall drop in quantity demanded. The public health argument for increasing the price of tobacco products relies on this decrease. In theory, the tobacco industry or retail outlets could undercut legislative price increases by lowering their own prices in an attempt to keep demand high. However, evidence indicates that the price of cigarettes increases when new taxes are levied on them.[10] Other industry practices such as discounting and promotions may partially offset the effect of a tax increase, but do not generally cancel out the entire effect.

The economic benefits of price increases primarily include the monetary value of reduced healthcare utilization and increased workplace productivity owing to reduced tobacco-related illness. Decreased tobacco consumption reduces the risk of tobacco-related diseases among individuals who either quit smoking or never start. In turn, this has the effect of changing patterns of healthcare spending among these individuals. Spending on tobacco-related diseases unambiguously decreases as a result of lower tobacco use prevalence. Absent offsetting healthcare cost increases for other diseases (or simply increased longevity), this would tend to lower overall healthcare expenditure. The beneficiaries of lower healthcare spending are mainly healthcare payers, such as insurance companies, employers, and government programs like Medicaid and Medicare. Individuals with a cost-sharing component to their insurance plan and those who pay out of pocket also tend to see savings.

The improved health from decreased tobacco consumption can increase workplace productivity in many ways. Tobacco users are more likely to die prematurely,[11] cutting short their years of productivity. They also miss work for health-related reasons more often and, when present, underperform relative to non-users.[12,13] Therefore, lower tobacco use could lead to both higher revenues for firms and higher earnings for individuals.

The effect of tobacco price increases on overall government revenue is an important consideration for policymakers. Two effects compete: Reduced prevalence means fewer people pay the tax, but the higher tax means that each tax payment is larger. If the second effect dominates, then total revenues will increase. Given that demand for tobacco products is inelastic (i.e., a 1% price increase leads to less than a 1% drop in quantity demanded),[8] tobacco tax increases will generally increase government revenue.[10]

Against these benefits, there may be costs associated with interventions like tax increases. Given that most, if not all, high-income countries currently tax tobacco at some level, an infrastructure for collecting taxes already exists, as does one for detecting and punishing evasion. The incremental cost of enforcement is unclear, but substantial tax increases could raise the cost of enforcement by increasing incentives to evade (e.g., with organized cross-border transport and sale of tobacco products). Furthermore, it is difficult to quantify the cost of legislation that imposes price increases. Mounting a ballot initiative is costly, for example, as is the lobbying and counter-lobbying almost certain to accompany any proposed tobacco tax increase.

This review examines the economic impact of interventions that increase the unit price of tobacco products through taxation. It presents a synthesis of the existing evidence on healthcare cost savings, workplace productivity improvements, and government revenues. In addition, health outcomes such as life-years saved, quality-adjusted life-years (QALYs) saved, and disability-adjusted life-years (DALYs) averted are reported in the context of cost-effectiveness analysis, which provides a ratio of intervention costs (or net costs) to a single unit of health benefit gained.

Evidence Acquisition

This review followed the conceptual model (analytic framework) developed in the effectiveness review (Appendix Fig 1, available online) and considered evidence on implementation costs and resulting economic outcomes.

Conceptual Approach

Several considerations affect interpretation of economic results. First, perspective determines what gets counted as a cost or benefit. The societal perspective totals up: (1) intervention costs not incurred under the status quo; (2) post-intervention change in healthcare spending from the status quo; and (3) post-intervention worker productivity not realized under the status quo. These costs and benefits are considered regardless of who pays and who reaps the benefit.

The government perspective, by contrast, considers only the costs borne and benefits reaped by the government. For example, from the U.S. government perspective, the relevant healthcare costs are those paid by Medicaid, Medicare, TRICARE for active-duty military personnel and their dependents, and others (such as the Federal Employee Health Benefits Program or federal subsidies for personal health insurance purchased through insurance exchanges). Significantly, whereas taxes are treated as a simple transfer from individual smokers to the government from the societal perspective (leaving total wealth in society unchanged), they are counted as a benefit from the government perspective.

Second, estimated healthcare cost savings may depend on how increased longevity resulting from tobacco tax increases is treated. When individuals live longer because of reduced tobacco use, they will incur additional healthcare costs throughout their lives that could outweigh any savings from averted tobacco-related illnesses. If this were the case, lower tobacco use in the population could increase healthcare costs.

Authors of papers in this systematic review are divided over whether such "longevity costs" should be included in the economic impact of tobacco taxes (or indeed any other public health intervention). The argument for inclusion centers on providing a complete societal perspective about the intervention's economic impact. Including longevity costs also makes sense from the government perspective when the government, as a major funder of healthcare resources, is required to plan ahead for spending additional resources as an offshoot of a prevention program. The counterargument claims it is inappropriate to count extended life as a cost to society. This review takes no stand on the issue. Where researchers have included results on longevity costs, this review presents them as given. Obviously, in a budget impact analysis from the government perspective, such costs must be included. Furthermore, from this perspective, increased longevity can have important effects on government transfer payments such as social security retirement benefits.

Finally, research into economic effects of policy changes often involves modeling rather than empirics: Rather than directly evaluating economic outcomes of actual policy changes, effects of hypothetical policy changes are predicted using existing evidence. There are two main reasons for this methodologic approach. First, the outcomes of interest (e.g., healthcare savings) often are not realized for many years, but policymakers need timely information on the likely effects of their decisions. Second, policies like tax increases are frequently enacted as part of a larger schedule of policy changes. Modeling enables researchers to isolate the impact of a particular intervention.

Despite its strengths, the nature of modeling studies makes systematic review somewhat challenging. Researchers must select some features of the complex system being modeled, leaving others out. In addition, the parameters that govern the mechanics of the model must be chosen from available evidence (where possible) or assumed, requiring discretion and judgment from the researcher. Two models of the same policy intervention may therefore differ substantially, making it difficult to compare their predictions.

Because of the heterogeneity in modeling choices, steps have been taken to render the studies in this review comparable and present a coherent picture of evidence. Individual studies consider the impact of price increases of various magnitudes (from 5% to 50%) on populations of various sizes (from 15.3 million to 311.5 million) over various time horizons (from 1 year to 100 years). Therefore, benefit estimates have been standardized to savings per person per year (PPPY) for a 20% price increase (this assumes linear effects). Where population information for the study year was not reported, it was obtained from relevant national statistics. Furthermore, several studies included estimates for a variety of cases, providing results using a range of price elasticities or a range of possible price increases. The results presented here use the smallest policy changes or elasticities from all results reported in the original papers.

Even after standardization, it can be difficult to compare studies that use different measures of healthcare costs averted or different productivity measures. Where possible, a priori knowledge and expert opinion of the factors driving variation were used to provide general conclusions. All monetary outcomes are presented in 2011 U.S. dollars, using the U.S. Bureau of Labor Statistics' Consumer Price Index[14] and adjusting for purchasing power parity.

Search Strategy and Search Yield

The intervention definition and inclusion criteria for this search were identical to those for the effectiveness review,[15] with the added requirement that studies report some economic outcome. Studies that analyzed effects of price increases in isolation were included; those on comprehensive tobacco control programs were excluded. The search covered January 2000 to July 2012; the 2000 start date was to help ensure that elasticity estimates and healthcare cost metrics were applicable to the current policy environment. In addition to including relevant studies from the effectiveness review search, a supplementary search of the following sources was performed: Center for Reviews and Dissemination at the University of York, MEDLINE, Econlit, JSTOR, and Google Scholar. Additional papers were drawn from references cited in included studies and from suggestions of review team members. These searches returned 1,716 titles and abstracts for screening. In addition, relevant chapters of the existing systematic review by the IARC[8] yielded 129 more titles.

Evidence Synthesis

Of the 1,845 reviewed abstracts, eight studies[16–23] were included in the analyses (Fig 1), conducted in 2012. All included studies were modeling studies and assessed cigarette tax increases only, although the search criteria accommodated any type of tobacco price increase. Therefore, all results presented here are attributable to

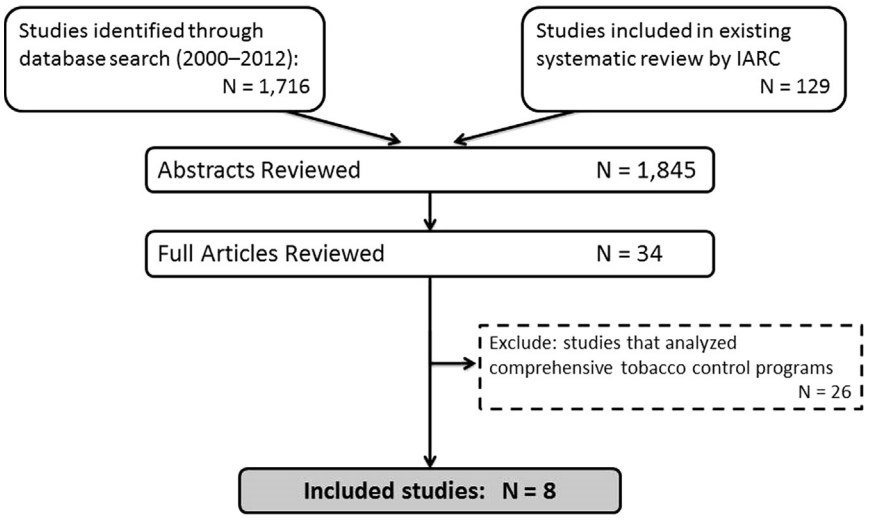

Figure 1. Flowchart showing the steps to obtain the number of included studies.
IARC, International Agency for Research on Cancer.

changes in cigarette smoking as opposed to any other type of tobacco use. Appendix Table 1 (available online) provides a general overview of the included studies in terms of setting (country and scale) and type of model used. Appendix Table 2 (available online) summarizes the type of economic information provided by the included studies. Only one[20] provided an estimate for intervention cost, and seven[16–19,21–23] gave estimates of healthcare costs averted.

Assumptions that go into the models are crucial for explaining variation in the outcomes in modeling studies. Several assumptions were common to all studies. Smoking was modeled as a set of three "states" among which individuals can transition: never smoker, current smoker, and former smoker. Movement between states corresponds to initiation, cessation, and relapse. The probability of each type of transition depends on the individual's age and gender, and these probabilities were either estimated from micro-level data or drawn from previous literature. The same is true of health outcomes and associated costs: they are realized probabilistically depending on the individual's age, gender, and smoking status.

A final common assumption was that tobacco price increases affected health only through changes in smoking prevalence (estimates of the revenue impact may account for decreased consumption through cutting back). Only quitting or failing to start has an impact on health outcomes in these models. Lacking definitive evidence on the health impact of "cutting back,"[24,25] all authors made the conservative assumption that reduced smoking intensity does not alter an individual's healthcare cost trajectory. The prevalence elasticities (percentage change in prevalence for a 1% price increase) used in the models were either estimated from individual-level data or drawn from previous literature, and were comparable in magnitude to those found in the effectiveness review, ranging from –0.15 to –1.20. In this review, the median prevalence elasticity input was –0.27 for adults and –0.40 for young people.

Most studies adopted a societal perspective. One study from the Congressional Budget Office (CBO)[19] considered the U.S. government perspective, and one gray literature study from the United Kingdom (UK)[21] contained two separate analyses: a societal benefit analysis and a public finance analysis from the government's perspective.

The following paragraphs provide a summary of the economic evidence, noting areas where assumptions are important in explaining heterogeneity in estimates.

Intervention Costs

Only one study[20] included intervention costs, which were assumed rather than observed, and were valued at 0.005% to 0.020% of gross national product (GNP). For the U.S., this assumption suggests exceedingly high costs (between $762 million and $3 billion each year) to enact and enforce a tobacco tax increase. An earlier estimate of the average cost of a bill enacted by a state government in the U.S. in 2008–2009 was $980,000, based on the cost of running legislative sessions only.[26]

Intervention Benefits

Estimates of benefits of tobacco price increases varied substantially depending on several factors, including measurement of healthcare costs, whether or not productivity gains were estimated, and whether or not elasticities varied by age, among others.

One of the most important drivers of variation was measurement of healthcare costs. Six studies[16,17,19,21–23] used static or dynamic cohort simulation to estimate changes in healthcare costs associated with tobacco tax increases. Healthcare costs were realized in each period of the model (corresponding to each year) and the difference between cumulative costs in the intervention and the status quo scenarios was calculated. Four studies[16,17,19,21] assigned to each individual in the model the average annual healthcare costs for a person of

his/her age, gender, and smoking status. The remaining two studies[22,23] estimated costs only for a subset of smoking-related diseases. Measuring healthcare costs only for diseases strongly linked with smoking tends to underestimate the healthcare expenditure attributable to smoking.[27] One study[18] used a compound measure of the total societal cost per pack of cigarettes, including both healthcare and productivity costs, and estimated the change in number of packs sold.

Estimating healthcare cost savings is complicated by the existence of a lag period between quitting and improvements in health risk. When adults quit smoking, their risk of smoking-related diseases declines, in some cases approximating that of a never smoker.[1,28] Importantly, many health benefits of quitting (hence economic benefits of quitting) take time to materialize. Four studies[19–22] attempted to account for this lag in their simulations, allowing the costs of healthcare utilization by former smokers to evolve in tandem with their risk profiles.

Only one study[18] modeled improved health and the resulting lower healthcare costs from reduced exposure to secondhand smoke. To the extent that secondhand smoke exposure contributes to healthcare costs, the results in the remaining studies would be expected to underestimate healthcare savings from increased tobacco prices.

Individuals in the model need to change their behavior before healthcare cost savings can be realized. The elasticities used strongly affect the degree to which simulated individuals quit or fail to initiate. In light of evidence that the price elasticity of demand for tobacco products varies with age, five studies[16,17,19,20,23] allowed for the tax increase to affect behavior differentially, with younger individuals more responsive to price changes than older individuals. One study[22] assumed that a price increase would affect the rate of cessation for 1 year only, and would not affect the rate of initiation at all. Ignoring effects on initiation is a conservative assumption that likely results in an underestimate of the change in smoking behavior.

As mentioned above, including longevity costs affects the estimated economic impact of tax increases. Three studies[16,19,22] included costs associated with increased longevity, either explicitly or by adopting a long time horizon and accumulating total healthcare costs over the entire duration (in 2012, the Congressional Budget Office incorporated longevity costs only in their long-term forecast. The 10-year forecast did not include them). One study[21] explicitly excluded end-of-life healthcare costs even though it used a 50-year time horizon.

Finally, whether or not future monetary benefits are discounted also affects the magnitude of estimates. Two studies[21,22] explicitly discounted future benefits and three[16,17,19] did not. One study[18] only considered a 1-year time horizon, making the discounting issue moot. The remaining study[23] did not explicitly discount future savings, but did allow the effect of the tax increase to taper away because of expected inflation.

Benefit estimates. From the societal perspective, estimates of healthcare cost savings from a 20% price increase ranged from –$0.13 to $86.72 PPPY (Table 1). After including other benefits such as productivity gains, the total estimated net savings ranged from –$0.13 to $90.98. U.S. studies[16–18] found higher savings than non-U.S. studies: an average of $72.52 PPPY. The highest estimate ($90.98) came from a U.S. study that used a unique model applying an estimate of the total societal burden per pack of cigarettes to the number of packs sold. European studies found lower savings owing to a combination of lower healthcare costs in those countries and certain modeling assumptions. For example, no U.S. study discounted benefits that accrue in the future, whereas European studies did.

On the low end were two Dutch studies, with estimated savings of –$0.13[22] and $0.19[23] PPPY. The first is likely low because the authors assumed that a price increase would affect behavior for just 1 year and not affect initiation. Also, the study included long-term care costs within healthcare costs of additional longevity for quitters, which partly contributed to negative savings. For the second, the authors only tracked savings from four smoking-related diseases (lung cancer, coronary heart disease, stroke, and chronic obstructive pulmonary disease), producing an underestimate of total healthcare savings.

The UK benefit analysis[21] found intermediate savings, at $20.52 PPPY, of which $11.49 was attributable to the monetized value of lives saved, with each life valued at just under £1 million (more than $1.5 million). Monetization of life saved is controversial, and no other reviewed studies included it.

Two studies from the government perspective also found savings (or net revenues) from tobacco tax increases (Table 2). A U.S. study[19] found government savings of $24.29 PPPY over the first 10 years, and a UK public finances analysis[21] found savings of $52.42 PPPY. The unexpected finding that the country with higher healthcare costs had lower savings is possibly explained by the fact that the UK government is responsible for the healthcare costs of nearly all its citizens, whereas the U.S. government pays for healthcare only for certain subpopulations.

Five studies[16–19,21] provided estimates of tax revenues that would accrue to the government from a tax increase

Table 1. Benefits of Tobacco Price Increases: Evidence From Included Studies (Societal Perspective)

Study	Price increase	Time (yrs)	Benefits (2011 US$)				Population size (millions)[a]	Annual savings per capita from 20% price increase ($)[b]
			Healthcare costs averted	Prod. gains and other costs averted	Value of lives saved	Total costs averted		
Ahmad (2005) (CA)[16]	20%	75	229.58b	—	—	229.58b	35.3	86.72
Ahmad (2008) (U.S.)[17]	20%	20	233.43b	—	—	233.43b	292.8	39.86
MacKillop (2012)[18]	$1 (~23%)	1	—	—	—	5.20b[c]	49.7	90.98
Reed (2010)[21d]	5%	50	3.08b	3.92b	8.98b	15.98b	62.3	20.52
van Baal (2007)[22]	10%	100	-109.92m	—	—	-109.92m[e]	16.4	-0.13
van Genugten[23] (2003)	50%	55	393.18m	—	—	393.18m	15.3	0.19

[a]Generated from publicly available data as part of this review.
[b]Study estimates were adjusted for purchasing power parity (where applicable) and inflation.
[c]Sum of healthcare costs averted and prod. gains and other costs averted.
[d]Benefit analysis.
[e]Includes long-term care costs as part of healthcare costs from extended longevity of quitters.
b, billion; m, million; Prod., productivity; yrs, years.

Table 2. Benefits of Tobacco Price Increases: Evidence From Included Studies (Government Perspective)

Study	Price increase	Time (yrs)	Benefits (2011 US$)				Pop. size (millions)[a]	Annual savings per capita from 20% price increase ($)[b]
			Healthcare costs averted	Prod. gains and other costs averted	Tax revenues	Net revenues		
CBO (2012)[19]	$0.50 (~10%)	10	990m	-166m	37b	37.82b	311.5	24.29
Reed (2010)[21c]	5%	1	42.83m	95.81m	677.86m	816.5m	62.3	52.42

[a]Generated from publicly available data as part of this review.
[b]Study estimates were adjusted for purchasing power parity (where applicable) and inflation.
[c]Public finance analysis: 5-year average.
b, billion; CBO, Congressional Budget Office; m, million; pop., population; prod., productivity; yrs, years.

Table 3. Estimates of Cost-Effectiveness of Tobacco Price Increases: Evidence From Included Studies

Study	Price increase	Time (yrs)	Intervention costs (2011 US$)	Intervention benefits (2011 US$)	Public health impact	Cost-effectiveness ratio
			Total annual costs	Total costs averted		
Ranson (2002)[20]	10%	1995–death of cohort	0.005%–0.02% GNP	—	0.5–2 million deaths averted	$116/DALY–$3,884/DALY
van Baal (2007)[22]	10%	100	—	-109.92m[a]	34,000 QALYs	$3,233/QALY

[a]Includes long-term care costs as part of healthcare costs from extended longevity of quitters.
DALY, disability-adjusted life-year; m, million; QALY, quality-adjusted life-year; yrs, years.

on cigarettes (Appendix Table 3, available online). All found revenue increases.

A few studies compared projected tax revenues to healthcare spending changes. In addition to the 10-year analysis discussed earlier, the study from the CBO included a long-term analysis through the year 2085 (because the report did not include exact values for the long-term simulation, only short-term results are reported). The authors found that a $0.50 federal excise tax increase per pack of cigarettes would increase total federal expenditures over the long term, but that the increase would account for less than 0.1% of total projected program outlays. The tax revenues the government would collect would substantially outweigh the increase in costs, resulting in positive net revenue over the long term. Likewise, the Dutch study that found net healthcare cost increases estimated that just 3% of the expected tax revenues would cover the increase in medical costs.[22]

Cost-effectiveness estimates. Two studies provided cost-effectiveness estimates from a societal perspective (Table 3). Considering all high-income countries as a group, assuming that the price increase intervention had an annual cost of 0.005%–0.02% of GNP,[20] and using two different discount rates (3% or 10%), one study estimated a cost-effectiveness ratio between $116 and $3,884 per DALY. The second was the Dutch study that found negative healthcare savings from the intervention,[22] but, using the simulated increase in healthcare expenditure as the "cost" component, estimated a cost-effectiveness ratio of $3,233 per QALY. Because they considered different types of cost and used different metrics, these two estimates are not comparable. It should be noted that, even with quite conservative assumptions on model inputs, both estimates satisfy common requirements for cost effectiveness.[29]

Conclusions

This review included eight studies that simulated the economic impact of increases in cigarette taxes. Despite considerable variation among included studies in terms of specific interventions and model construction, a clear picture emerges. The evidence indicates that interventions that increase the unit price of tobacco products generate substantial healthcare cost savings over the short to medium term and can generate additional gains from improved workplace productivity. The long-term picture of healthcare costs differs depending on perspective. However, excise tax increases on tobacco products are expected to generate large revenues for the governments enacting them, which greatly exceed any longevity-related increase in healthcare or pension costs. Finally, though it is difficult to make any definitive conclusion on cost effectiveness based on two disparate studies, cost effectiveness could be improved by lowering intervention costs using automatic annual rather than a one-time increase in taxes.

Considerations for Implementation

Distributional impacts may be important: Although low-income tobacco users quit at higher rates after price increases (with quitters benefiting from reduced spending on tobacco and lower out-of-pocket healthcare costs), some continue to use tobacco products, and the extra expense may be burdensome for those individuals. In addition, some opponents of legislative tobacco price increases believe price increases will adversely affect employment. Although employment was beyond the scope of this study, a 2011 systematic review[8] found little to no effect on employment.

Limitations

This review did not capture some economic effects of tobacco price increases addressed in a separate literature. If a tax is levied on only some types of tobacco (e.g., cigarettes), users may substitute tobacco products with lower tax rates but similar health effects (e.g., little cigars). This substitution affects the evolution of healthcare costs in individuals who switch, but is not captured in any of the models in this review. Also, the effects of

price increases on black market tobacco sales were not considered, although increased black market activity has consequences for the wider economy.

Evidence Gaps

Only three studies[18,19,21] considered productivity gains that would result from better health after quitting smoking (or never starting), with two[19,21] providing separate estimates for productivity gains, and one reporting a composite measure of total societal cost per pack of cigarettes (combining healthcare cost savings and productivity gains). Future economic research could expand this body of evidence on changes in productivity attributable to tobacco price increases.

Economic evaluations should also incorporate differential demand elasticity by SES. Because evidence indicates that elasticity of demand for tobacco products is greater for low-income than higher-income smokers,[30] existing models may underestimate the impact of price increases for the low-income group. Finally, more evidence is needed on the cost of policy or regulatory interventions.

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Appendix

Supplementary data

Supplementary data associated with this article can be found at http://dx.doi.org/10.1016/j.amepre.2015.04.026.