Acknowledgement

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The OMA also appreciates comments by observers at the meeting of the expert panel and members of the OMA Population Health Committee. The authors are especially grateful for outstanding research assistance by Pat Buczkowski and Karen Lee of the Ontario Medical Association.
INVESTING IN TOBACCO CONTROL: Good Health Policy, Good Fiscal Policy

Executive Summary

Each year, 12,000 Ontarians die prematurely because of smoking. Most started smoking as teenagers, developing the habit that would kill them long before they were able to make a fully rational decision about whether or not the health risks of smoking are justifiable.

After becoming addicted at an early age, the majority of smokers would like to quit, but find quitting tobacco much more difficult than starting.

Thus, tobacco use is not a choice in any meaningful sense of the word. Rather, it is the largest preventable health epidemic facing the province of Ontario.

The physicians of Ontario are deeply concerned for the health of smokers and those exposed to environmental tobacco smoke (ETS). Physicians are also concerned that treating smoking-attributable disease absorbs valuable health resources that are desperately needed to treat disease that cannot be prevented, or cannot be as easily prevented.

Each year, provincial health-care spending on disease directly caused by tobacco use exceeds $1 billion. Tobacco use results in over 64,000 hospital admissions totaling over 500,000 hospital days annually.

These figures do not include the costs of the complications arising from tobacco use when treating diseases not directly caused by smoking, or the costs of many of the diseases caused by ETS.

This paper will demonstrate that implementing a comprehensive tobacco control program in Ontario will:

- Save thousands of lives.
- Improve the Ontario government’s fiscal position by billions of dollars.
- Liberate scarce health-care resources, saving the Ontario government hundreds of millions of dollars in direct health-care costs.

In addition, reducing tobacco consumption will:

- Raise productivity in the province, and thereby generate new sales and income tax revenue for the province.

Finally a comprehensive tobacco control program will raise tobacco tax revenues. Ontario’s aging population will require even greater use of the province’s health-care resources. As a result, the government of Ontario must do everything in its power to slow the pace of rising health-care costs.

The OMA advocates improving the health of Ontarians, while at the same time practicing sound government budgeting.

The physicians of Ontario recognize that in order to ensure high-quality health care is available to Ontarians now and in the future, the government of Ontario must continue to follow responsible fiscal policy.
Reducing tobacco use is among the few strategies that data has repeatedly shown can simultaneously improve health outcomes while producing a net amelioration in government fiscal positions.

It is the position of the OMA that comprehensive tobacco control is crucial to protect the integrity of the province’s health-care system, and to ensure that Ontario can continue to afford high-quality health care in the face of growing health-care needs.

The OMA has reviewed the evidence from several jurisdictions on the efficacy of comprehensive tobacco control, and on the effectiveness of the individual measures included in comprehensive tobacco control programs.

Comprehensive tobacco control is a proven strategy for reducing both tobacco use, and the fiscal costs associated with smoking. For instance, California estimates it saves more than $3 for every $1 it spends on tobacco control,41 while Massachusetts estimates it saves $2 in state health-care spending for every $1 on tobacco control.44

The OMA recommends that Ontario implement a comprehensive tobacco control strategy based on evidence-based international best practices in tobacco control. To implement all of the required measures, such a program requires at least $90 million annually over each of the next five years.

The OMA has assessed the net fiscal impact of such a program for the Ontario government using standard capital budgeting techniques. Under the conservative assumption of a 15 per cent reduction in prevalence from the program, and using a discount rate of five per cent (approximately equal to the provincial government’s borrowing rate), the program will result in $1.3 billion in public health-care savings, $2.4 billion in increased sales and income tax revenue, and $7.5 billion in increased tobacco tax revenue.

The OMA conducted sensitivity analyses and found that, under any plausible scenario, such a program would have a positive net value for the Ontario government. If the program achieved even a five per cent reduction in prevalence in the next five years – a far smaller reduction than the relevant U.S. state programs have achieved – the provincial government’s health-care savings alone would justify its investment in the program.

Figure 1: Health Care Savings

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Health Care Savings, Present Discounted Value</th>
<th>Program Cost, Present Discounted Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benchmark - Prevalence Falls 15%</td>
<td>$1,000 million</td>
<td>$400 million</td>
</tr>
<tr>
<td>Case A - Prevalence Falls 20%</td>
<td>$1,200 million</td>
<td>$400 million</td>
</tr>
<tr>
<td>Case B - Prevalence Falls 10%</td>
<td>$1,100 million</td>
<td>$400 million</td>
</tr>
<tr>
<td>&quot;Breakeven&quot; Prevalence Decline, 5%</td>
<td>$700 million</td>
<td>$400 million</td>
</tr>
</tbody>
</table>
Introduction

Each year, 12,000 Ontarians die prematurely as a result of smoking. Most started smoking as teenagers, developing the habit that would kill them long before they were able to make a fully rational decision about whether the health risks were justifiable.

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This paper will:

- Review the evidence on international best practices on tobacco control, and the measures involved in a comprehensive tobacco control program consistent with these best practices. This examination of the evidence enables the OMA to recommend proven strategies to combat smoking.
- Review the results of comprehensive tobacco control programs in various jurisdictions that have found it to be the most effective way to reduce tobacco use.
- Assess the fiscal impact of comprehensive tobacco control.

**Comprehensive Tobacco Control: International Best Practices**

Three decades of experience with tobacco control, both in Canada and internationally, have produced a large body of evidence regarding the most effective policies.

The evidence demonstrates that to be effective, tobacco control must be comprehensive, sustained, and receive adequate funding. The large body of studies also indicates which specific tobacco control measures are most likely to reduce consumption and prevalence.

In 1999, the U.S. Centers for Disease Control and Prevention (CDC) thoroughly reviewed this literature and summarized it in a set of guidelines for “Best Practices on Tobacco Control.” The evidence-based, international guidelines set out the features that should be included in all successful tobacco control programs.

A subsequent CDC study showed that cigarette sales dropped more than twice as much in states that spend more on comprehensive tobacco control programs than in the United States as a whole.

Following the CDC’s guidelines, and the “Report to the Minister of Health from Her Expert Panel on the Renewal of the Ontario Tobacco Strategy,” the Ontario Tobacco Strategy Steering Committee tailored the CDC’s guidelines to the situation in Ontario, and produced a detailed template of what a comprehensive tobacco control program in Ontario should contain.

The OMA has reviewed the empirical evidence on the success of each of the measures in the program, measures that the OMA recommends be included in Ontario’s comprehensive tobacco strategy.

**Tax Increase**

There is strong agreement among researchers and the tobacco control community that tax increases have a major impact on tobacco use.

In a recent British Medical Journal review of the worldwide experience with tobacco control, Prabhat Jha and Frank Chaloupka conclude, “tax increases are the single most effective intervention to reduce demand for tobacco.”

The consensus among researchers is that a 10 per cent increase in the price of cigarettes results in a four per cent decline in consumption.
Certain groups of the population are more sensitive to price increase than others. In particular, researchers find that, in response to a 10 per cent increase in the price, prevalence among youth and pregnant women declines by seven per cent.\textsuperscript{10,11}

Currently, cigarette prices in Ontario are significantly below those in most adjacent U.S. states, and those in all other provinces, except Quebec. As of April 2003, the price of a carton of cigarettes in Ontario is $9.28 below the average price in adjacent jurisdictions, and $14.37 below the average price of a carton in Canada's other nine provinces.\textsuperscript{12}

Because of this price differential, the homogeneity of the product within Canada, and weak enforcement of measures to combat inter-provincial smuggling, Ontario has become a source of smuggled cigarettes to other provinces. The Criminal Intelligence Service of Alberta recently identified Ontario as “the main source of illegal smokes in Alberta.”\textsuperscript{13}

The OMA recommends that the Ontario government raise the tax on cigarettes by $14.37 a carton to raise the price of cigarettes in Ontario to the average price of the other nine provinces.

Many officials at all levels of government still believe that tax increases will create smuggling akin to that seen in the early 1990s.

Readers should bear in mind that the vast majority of the smuggling of the early 1990s was facilitated by the tobacco industry. At least one U.S. tobacco company plead guilty to aiding and abetting the smuggling\textsuperscript{14} and Canadian tobacco companies may end up being convicted of criminal behaviour in the matter\textsuperscript{15} — smuggling is not inevitable.

Despite the abetting of smuggling by the tobacco industry, tobacco taxes were a very effective tool to decrease cigarette consumption in Canada during that period — a 10 per cent price increase led to a decrease in consumption by about 4.5 per cent, after controlling for the impact of smuggling.\textsuperscript{16} Furthermore, total tobacco tax revenues rose at both the provincial and federal levels during the 1990s, indicating the tax increase was still an effective revenue-generating strategy.

Since the early 1990s, the federal government has also implemented a number of measures to combat smuggling. In April 2001, the federal government instituted an export tax of $10 per carton for exports of up to 1.5 per cent of a tobacco manufacturer’s production, and $22 per carton for exports above the 1.5 per cent threshold. This tax is designed to prevent the type of smuggling seen in the early 1990s, where Canadian tobacco exports to the U.S. increased dramatically only to be immediately smuggled back into Canada.

The export tax substantially reduces the profitability of smuggling for tobacco manufacturers, and thus acts as a disincentive for them to aid and abet smuggling. Because Canadian and U.S. cigarettes taste quite different, smokers see them as far from perfect substitutes such that smuggling between Canada and the U.S. is not a serious concern beyond that of Canadian exports destined for illegal re-entry at a later date.

The federal government has also established an anti-smuggling task force in co-operation with U.S. authorities.\textsuperscript{17} Finally, the federal government has launched legal action in both Canada and the U.S. to recoup its foregone tax revenues, making it clear to tobacco manufacturers that it will not be profitable to smuggle.

For these reasons, smuggling will not occur to anywhere near the degree seen in the early 1990s, particularly if the Ontario government takes additional steps to combat smuggling.
To maximize both the fiscal and health impact of the tax increase, comprehensive tobacco control should follow the guidelines set out by smuggling scholars Michelle Scollo and David Sweanor. According to these evidence-based guidelines, the Ontario government should:

- Require sophisticated covert and overt tax markings on all tobacco products.
- Ensure that product markings allow detailed tracing of any products (including exports) through the distribution chain.
- Increase and enforce penalties for smuggling. Smuggling must be seen as a clear loss-making business in order to discourage it.
- Hold tobacco companies and their executives liable for any involvement in activities that contribute to smuggling. 18

**Smoke-Free Public Places**

The primary motivation behind the push for smoke-free public places is to protect the health of non-smokers from environmental tobacco smoke, and reduce associated morbidity and mortality.

However, research published in peer-reviewed journals has also consistently found that smoke-free public places decrease tobacco consumption and prevalence in Canada, the United States, the United Kingdom and globally. 7,19,20,21,22,23,24 Research also demonstrates that smoke-free public places are effective in deterring young people from smoking. 25,26

Based on this evidence, and the growing body of literature on the effects of ETS, the OMA again recommends that Ontario make all public places smoke-free.

**Smoking Cessation Assistance**

A common misconception is that nicotine is the most harmful ingredient in tobacco products. In fact, most of the damage caused by tobacco use comes from the delivery mechanism: the cigarette.27

Ideally, smokers could stop using nicotine altogether. Unfortunately, many nicotine users are unable to completely stop. However, smokers can quit smoking much more easily than they can stop using nicotine, and nicotine replacement therapy (NRT) is highly preferred to a continuation of smoking.

The Ontario Medical Association26 reviewed dozens of published studies on the effectiveness of NRT and bupropion (brand names Zyban or Wellbutrin) and found that use of smoking-cessation tools approximately doubles smoking-cessation rates relative to control groups given placebos. Independent reviews of the evidence published in leading academic journals reach the same conclusion.28,29

Over the long run, smokers that use cessation tools to quit smoking will save themselves hundreds, or even thousands, of dollars annually by no longer incurring the cost of cigarettes. However, there is currently little immediate economic incentive for a nicotine user to switch from cigarettes to NRT, or to commence bupropion treatment, because the cost of smoking-cessation therapy is similar to that of smoking.

Evidence has also shown that interventions by the primary care team and community support programs are efficacious in increasing cessation. 26,27 Based on a review of almost 20 years of evidence, the most efficacious clinical cessation strategy is to have the primary care team:

a) Ask patients whether they smoke;

b) Advise all smokers to quit;
c) Assess patients’ readiness to quit;
d) Offer assistance if smokers indicate they are ready to quit; and,
e) Arrange follow up.\textsuperscript{30,31,32}

Importantly, clinical intervention is also a highly cost-effective health-care policy.\textsuperscript{29}

Since 1996, the OMA Clinical Tobacco Intervention (CTI) Program has helped to educate and encourage Ontario physicians to assist patients with their smoking-cessation efforts. CTI is an evidence-based program designed to recruit and mobilize physicians, pharmacists, and dentists to perform tobacco cessation and prevention interventions through the provision of educational programs, patient materials, ongoing support, and evaluation.

CTI focuses on the minimal contact intervention approach (brief patient interventions lasting three to five minutes), and the 5As model (ask, advise, assess, assist, arrange).

The OMA recommends the subsidization of NRT and buproprion. It also recommends ensuring the availability of a range of primary care cessation services, enhancements to the Clinical Tobacco Intervention Program, as well as funding for cessation-specific mass media campaigns, cessation-related research, and grants to community-based cessation programs.

Industry Advertising Ban and Education Programs

It is exceptionally difficult to convey the message that tobacco is neither socially acceptable to use, nor a legitimate business, if the province permits the tobacco industry to promote its product.

While Canada no longer permits the tobacco industry to use mass media or billboards to market tobacco, restrictions on tobacco promotions are most effective when they are comprehensive.\textsuperscript{33} Currently, tobacco manufacturers still “advertise” through distinctive packaging and display cases in variety stores and department stores, bars, gas stations, and other sites of tobacco sales.

The effects of advertising are a function of the cumulative effect, rather than the annual expenditure on advertising.\textsuperscript{34} That is, the effects of advertising are not felt in the year of the advertising; a consumer’s perception of a product depends on the level of advertising, which is determined by the sum of all previous advertising expenditures.

This implies that Ontario continues to suffer from the extensive mass media advertising by the tobacco industry of the last four decades, despite the recent prohibition on this form of advertising.

To accelerate the depreciation of the tobacco industry’s capital “stock” (i.e. the cumulative effects of their past advertising), mass media campaigns and school-based programs need to reiterate the messages that tobacco is harmful to smokers and non-smokers, that tobacco use is not glamorous, and that tobacco is exceptionally addictive.

A recent Canadian study found that an increase of $1 per capita in education spending would be sufficient to induce a 20 per cent decline in prevalence among men.\textsuperscript{21} Other academic work also finds that increased spending on anti-smoking advertising campaigns reduces tobacco use.\textsuperscript{8,32,35,36}

Based on the evidence, the OMA recommends that Ontario enact legislation eliminating display cases, requiring plain packaging, increased funding for the current mass media campaign, the planning and implementation of a centralized provincial cessation campaign, and funding for local advertising campaigns to support smoke-free workplaces, public places and homes.
The Ontario Tobacco Strategy Steering Committee (2003) developed a budget for all of these measures, and estimates that it will cost $90 million annually over each of the next five years. This is approximately $7.50(Cdn.) per capita, and is at the low end of the CDC’s estimation of the required funding level of $5-$13(U.S.) per capita for a jurisdiction the size of Ontario.

**Comprehensive Tobacco Control Works**

Evidence from several jurisdictions has shown that comprehensive tobacco control works. While the evidence-based CDC guidelines are relatively recent, they draw upon the experiences of the U.S. and New Zealand with comprehensive tobacco control. All of these programs achieved dramatic reductions in consumption as a result of their tobacco control programs.

**Success: California**

In 1988, California enacted Proposition 99, becoming the first U.S. jurisdiction to implement a comprehensive tobacco control program by raising tobacco taxes by 25 cents per pack, and earmarking 25 per cent of the new tax revenue for a state-sponsored tobacco control campaign.

The result has been a more than 50 per cent decline in per capita cigarette consumption since the program’s inception, and a 25 per cent reduction in prevalence.

Per capita consumption in California declined 50 per cent faster than in the rest of the U.S. in the first few years of the program.

Following the passage of Proposition 99, the rate of consumption decline tripled. Most of the decline in consumption and prevalence occurred in the first five years of the program, before substantial cuts to the program’s funding in 1993.

California estimates that it saves over $3 for every $1 spent on tobacco control. The program resulted in 33,000 fewer deaths from heart disease between 1989 and 1997, while cuts to the program were associated with 8,300 more deaths from cardiovascular disease than if the program’s initial aggressiveness had been maintained until 1997.

California achieved this success even though the program did not include all of the elements evidence has since demonstrated are helpful to comprehensive tobacco control, and without ever reaching the levels of funding recommended by the CDC.

Smoking prevalence in California has declined much less dramatically since the program’s funding was reduced and the tobacco industry increased its promotional expenditures. California has maintained the reductions in prevalence it initially achieved as a result of the program, and continues to see a slow decline in consumption.

**Success: Massachusetts**

In 1992, Massachusetts approved the Massachusetts Tobacco Control Program. This program involved a tax increase and increased spending on a wide range of prevention and cessation programs.

Tobacco consumption fell by 30 per cent in the first five years of the program. Adult prevalence declined by 10 per cent in the first five years of the program compared to no significant change in the remaining U.S. states, excluding California.
Prevalence among pregnant women fell by 29 per cent in the first year of the program, and almost 50 per cent in the first five years. The program has reduced total health-care spending by 0.3 per cent such that for every $1 the state of Massachusetts spends on tobacco prevention, it saves $2 in health-care spending.

The program’s first tax increase did not result in a sustained retail price increase because its effect on price was more than offset by an industry-wide price reduction in 1993. This demonstrates that non-price measures can have a powerful impact on tobacco use.

Unfortunately, in 2003 the program’s funding was cut to just 13 per cent of the CDC’s recommended minimum, suggesting that the program might not be able to achieve further reductions in prevalence in the coming years.

Success: Oregon

In 1997, Oregon implemented Ballot Measure 44, which increased tobacco taxes and earmarked 10 per cent of the revenues from the new tax to funding of public awareness and education programs.

In the first two years of the program, per capita cigarette consumption fell by 11 per cent, five per cent more than had the program consisted of a tax increase alone.

In the first five years of the program, per capita consumption fell 29 per cent, and prevalence declined by 12 per cent.

Oregon continues to see results from its comprehensive program as its funding has not been significantly reduced since the program began. However, it is important to note that Oregon has not implemented all of the components contained in the CDC’s Best Practices, and the program receives only 50 per cent of the minimum level of funding the CDC advises is necessary.

The Oregon program would likely be still more successful if it were implementing all of the international best practices.

Success: New Zealand

New Zealand has been on the leading edge of tobacco control among the OECD (Organization for Economic Co-operation and Development) countries since it first publicized its intention to begin comprehensive tobacco control efforts in 1985.

Between 1985 and 1998, New Zealand eliminated tobacco advertising, substantially raised taxes, and funded public information campaigns. The difference between New Zealand’s program and that of most of the U.S. states is that, rather than making a sudden change in tobacco policy, New Zealand gradually introduced the program elements. This factor makes it somewhat more difficult to evaluate the success of New Zealand’s program.

Nevertheless, between 1985 and 1998, New Zealand reduced per capita tobacco consumption by 45 per cent and reduced prevalence by 17 per cent. The program averted at least 1,400 premature deaths between 1985 and 1996.

Fiscal Savings: Avoided Health-Care Costs

(Note: this section relies on technical analysis detailed in the Ontario Tobacco Research Unit report, The Fiscal Impact of a Comprehensive Tobacco Control Program in Ontario. Appendix 1 summarizes...
the methodology for calculating the reductions in morbidity and mortality, and the discounted present value of the fiscal impacts.)

The health-care benefits from cessation begin to accrue rapidly after cessation (see Table 1), even though some former smokers will never be able to lower their risks for smoking-caused diseases to that of a person who has never smoked.

The province will immediately see a substantial reduction in the annual number of low birth-weight babies, and respiratory disease among infants and young children.

There will be a dramatic decline in preventable heart disease in the province — the portion of heart disease, stroke, and other cardiovascular disease caused by a substantial drop in smoking activity within the first five years of the program. Within 10 years of initiating the program, the province will see a noticeable fall in the annual number of cases of lung, lip, stomach, bladder, laryngeal, and renal cancers.

![Table 1 - Health Benefits from Time of Cessation](image)

<table>
<thead>
<tr>
<th>Time Since Quitting</th>
<th>Beneficial Health Changes that Take Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 minutes</td>
<td>Blood pressure and pulse rate return to normal</td>
</tr>
<tr>
<td>8 hours</td>
<td>Nicotine and carbon monoxide levels in blood reduce by half, oxygen levels return to normal</td>
</tr>
<tr>
<td>24 hours</td>
<td>Carbon monoxide will be eliminated from the body. Lungs start to clear out mucus and other smoking debris.</td>
</tr>
<tr>
<td>48 hours</td>
<td>There is no nicotine left in the body. Ability to taste and smell is greatly improved.</td>
</tr>
<tr>
<td>72 hours</td>
<td>Breathing becomes easier. Bronchial tubes begin to relax and energy levels increase.</td>
</tr>
<tr>
<td>2-12 weeks</td>
<td>Circulation improves.</td>
</tr>
<tr>
<td>3-9 months</td>
<td>Coughs, wheezing and breathing problems improve as lung function is increased by up to 10%.</td>
</tr>
<tr>
<td>1 year</td>
<td>Risk of heart attack falls to about half that of a smoker.</td>
</tr>
<tr>
<td>10 years</td>
<td>Risk of lung cancer falls to half that of a smoker.</td>
</tr>
<tr>
<td>15 years</td>
<td>Risk of heart attack falls to the same as someone who has never smoked.</td>
</tr>
</tbody>
</table>

Source: Action on Smoking and Health, United Kingdom.

These declines will result in permanent reductions in premature mortality and smoking-attributable morbidity. The elimination of thousands of disease cases will relieve the growing pressure on scarce human and physical health-care resources.

It will render unnecessary thousands of services performed by family physicians, oncologists, obstetricians, cardiologists, and other specialists to treat illnesses caused by smoking.

Through improving the health of Ontarians, the program will reduce the use of ambulances and home care, as well as lower pharmaceutical costs.

Most significantly, reducing smoking will reduce the number of hospital visits from smoking-caused disease.
Finally, it will lower the number of days spent in hospital for diseases not caused by smoking, but in which smoking often causes complications.

Based on its estimate for the reductions in disease cases, the OMA predicts that implementing a comprehensive program in Ontario will save over 1,100 lives, and free up over 60,000 hospital days over the next five years (see Table 2).

This figure conservatively assumes that the program results in no disease reductions in the first two years of the program. This figure also excludes any reductions in health-care costs from fewer complications in diseases not directly caused by smoking.

Over the next 10 years, the program will save 3,000 lives in Ontario, and avoid the use of 143,000 hospital days.

### Table 2 - Cumulative Mortality and Morbidity Reductions

<table>
<thead>
<tr>
<th></th>
<th>15% Fall in Prevalence</th>
<th>20% Fall in Prevalence</th>
<th>10% Fall in Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 5</td>
<td>1,177</td>
<td>61,156</td>
<td>1,569</td>
</tr>
<tr>
<td>Year 10</td>
<td>3,141</td>
<td>142,994</td>
<td>4,188</td>
</tr>
<tr>
<td>Year 15</td>
<td>5,109</td>
<td>266,683</td>
<td>6,812</td>
</tr>
<tr>
<td>Year 25</td>
<td>9,066</td>
<td>476,414</td>
<td>12,088</td>
</tr>
<tr>
<td>Year 50</td>
<td>19,649</td>
<td>1,040,541</td>
<td>26,199</td>
</tr>
</tbody>
</table>

Figures assume that morbidity reductions do not start until year 3 of the program.

Many of the health-care savings from the program will accrue rapidly as a result of reductions in maternal smoking and cardiovascular disease since many of the disease risks from smoking decline rapidly after cessation.

If the program induces just 15 per cent of pregnant women to quit smoking — far less a percentage than the programs in Massachusetts and California have achieved — it will result in $5.6 million in annual health-care savings from the reduction in low birth-weight infants, and other complications from maternal smoking. Other health-care savings, such as those from reductions in lung and other forms of smoking-attributable cancer, will take longer to materialize.

The health-care savings are discounted by how far off in time they occur. Savings occurring now are completely undiscounted (i.e. counted at face value), and savings occurring far into the future are valued at zero.

The technical Appendix II explains discounting in more detail. Because the health-care savings are discounted according to when they materialize, most of the health-care savings come from reductions in adult prevalence, rather than those from youth prevalence.

The total health-care savings from the reductions in morbidity have a present discounted value of $1.3 billion using an annual discount rate of five per cent (see Figure 1). If the program achieves a 20 per cent reduction in prevalence, the health-care savings rise to $1.7 billion.

To justify the investment in the program using only the health-care savings as the fiscal benefit, the program need only induce five per cent of Ontario smokers to quit.
Increased Income and Sales Tax Revenue

The program will also result in increases in income and sales tax revenue that will improve the Ontario government’s fiscal position.

The increases in income and sales tax revenue come from three sources:

- Ontarians will be spending less time in hospital and thus working and creating income.
- Fewer Ontarians will be dying before their productive years are over.
- Ontarians will be taking fewer smoke breaks at undesignated break times.

By far, the largest component of the savings comes from reductions in smoke breaks. Health Canada estimates that in 1995, “the average cost to employers due to the decreased productivity of employees smoking in non-break periods” was $2,175 (1995 dollars) annually per smoking employee.\(^{53}\) In 2003 dollars, this amounts to $1.7 billion in lost productivity to the entire province of Ontario each and every year.

Empirical research using 10 objective productivity measures shows that former smokers are five per cent more productive per hour worked than current smokers,\(^{54}\) corroborating the hypothesis that smoke breaks are directly lowering productivity.

By reducing the consumption of cigarettes, the program will result in fewer smoke breaks. The time smokers formerly spent smoking will then be spent on productive activities, raising the total output of Ontario and the incomes of employees. These employees will then pay a portion of their higher incomes back to the government in the form of income and sales tax revenue.

Assuming that only half of the reductions in consumption result in smoke-break reductions, the Ontario government would gain $2.4 billion in income and sales tax revenue as a result of the program if the program reduces consumption by 30 per cent (see Table 3).
Table 3 - Increase in Sales and Income Tax Revenue (Millions)

<table>
<thead>
<tr>
<th>PDV of Productivity Increase From:</th>
<th>Decrease in Prevalence</th>
<th>Decrease in Consumption</th>
<th>Lower Morbidity (Fewer Days Spent in Hospital)</th>
<th>Lower Mortality</th>
<th>Fewer Smoke Breaks on Company Time</th>
<th>Total</th>
<th>ONTARIO SALES AND INCOME TAX PORTION OF TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benchmark</td>
<td>15%</td>
<td>30%</td>
<td>$93</td>
<td>$4,039</td>
<td>$29,591</td>
<td>$33,723</td>
<td>$2,394</td>
</tr>
<tr>
<td>Alternate Case A</td>
<td>20%</td>
<td>40%</td>
<td>$124</td>
<td>$5,389</td>
<td>$39,454</td>
<td>$44,967</td>
<td>$3,193</td>
</tr>
<tr>
<td>Alternate Case B</td>
<td>10%</td>
<td>20%</td>
<td>$62</td>
<td>$2,691</td>
<td>$19,727</td>
<td>$22,480</td>
<td>$1,596</td>
</tr>
</tbody>
</table>

Note: Assumes a 5% discount rate, a 1% productivity growth rate, and a 2% inflation rate.

**Tobacco Tax Revenue**

The program involves a tax increase of $14.37 a carton because tobacco taxes have been found to be the most effective way to reduce tobacco use. However, the increase in the tobacco tax will also result in large and immediate increases in tobacco tax revenue.

Assuming consumption falls by 10 per cent in the first year of the program, the Ontario government will take in $800 million worth of new tax revenue in the first year (see Table 4).

The present discounted value of the total rise in tobacco tax revenue is $7.5 billion, assuming consumption falls by 30 per cent by the end of the program.

It is important that the new tobacco tax revenue not be seen as the key outcome of the program. The tobacco tax revenue, which accrues immediately, should be looked at as a financing mechanism for the program, not a goal in and of itself. It will fund the program until some of the medium-term benefits from the program come to fruition.

Within 10 years of implementing the program, the present discounted value of the health-care benefits and the productivity increases will have justified the initial investment.

Table 4 - Change in Tobacco Tax Revenue

<table>
<thead>
<tr>
<th></th>
<th>Decrease in Consumption</th>
<th>Tax Increase</th>
<th>Cartons (Millions)</th>
<th>Increase In Revenue From Tax Increase (Millions)</th>
<th>Existing Provincial Tax</th>
<th>Decrease in Revenue From Existing Tax (Millions)</th>
<th>Net Change in Tax Revenue (Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benchmark</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td>10%</td>
<td>$14.37</td>
<td>65.7</td>
<td>$921</td>
<td>$17.20</td>
<td>$(122)</td>
<td>$798</td>
</tr>
<tr>
<td>Year 2</td>
<td>20%</td>
<td>$14.37</td>
<td>58.4</td>
<td>$779</td>
<td>$17.20</td>
<td>$(233)</td>
<td>$546</td>
</tr>
<tr>
<td>Year 3 Onwards</td>
<td>30%</td>
<td>$14.37</td>
<td>51.1</td>
<td>$12,640</td>
<td>$17.20</td>
<td>$(6,484)</td>
<td>$6,156</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td>$14,340</td>
<td>$ (6,840)</td>
<td></td>
<td>$7,500</td>
</tr>
<tr>
<td>Alternate Case A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td>13%</td>
<td>$14.37</td>
<td>63.51</td>
<td>$890</td>
<td>$17.20</td>
<td>$(159)</td>
<td>$731</td>
</tr>
<tr>
<td>Year 2</td>
<td>26%</td>
<td>$14.37</td>
<td>54.02</td>
<td>$720</td>
<td>$17.20</td>
<td>$(303)</td>
<td>$417</td>
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<tr>
<td>Year 3 Onwards</td>
<td>40%</td>
<td>$14.37</td>
<td>43.8</td>
<td>$10,835</td>
<td>$17.20</td>
<td>$(8,646)</td>
<td>$2,189</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td>$12,445</td>
<td>$ (9,108)</td>
<td></td>
<td>$3,337</td>
</tr>
<tr>
<td>Alternate Case B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td>7%</td>
<td>$14.37</td>
<td>67.89</td>
<td>$952</td>
<td>$17.20</td>
<td>$(86)</td>
<td>$866</td>
</tr>
<tr>
<td>Year 2</td>
<td>14%</td>
<td>$14.37</td>
<td>62.78</td>
<td>$837</td>
<td>$17.20</td>
<td>$(163)</td>
<td>$674</td>
</tr>
<tr>
<td>Year 3 Onwards</td>
<td>20%</td>
<td>$14.37</td>
<td>58.4</td>
<td>$14,446</td>
<td>$17.20</td>
<td>$(4,323)</td>
<td>$10,123</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td>$16,235</td>
<td>$ (4,572)</td>
<td></td>
<td>$11,663</td>
</tr>
</tbody>
</table>

Note: Assumes a 5% discount rate.
Figure 2 summarizes the total fiscal impact of the program. Excluding the value of the increased tobacco tax revenue, the program’s fiscal benefits exceed its costs by a factor of nine, assuming prevalence falls by 15 per cent.

That is, for every $1 the government of Ontario spends on tobacco control, it will save $3 in avoided health-care costs, and see a $6 increase in income and sales tax revenue, leading to a $9 improvement in the provincial budget. Under more conservative assumptions, the fiscal benefits (excluding those from the tobacco tax revenue) are six-fold the costs; if consumption falls by 40 per cent (and prevalence by 20 per cent), the Ontario government’s fiscal position will improve by $12 for every $1 it spends on the comprehensive program. Including the increases in tobacco tax revenue, the program involves fiscal benefits 20 to 35 times the cost of the program.

**Figure 2: Net Fiscal Impact, Benchmark Model**

![Bar chart](chart.png)

**Macroeconomic Impacts**

Some might question the political impact of a decline in the tobacco industry on government tax revenues. Following is an explanation why any shift in resources away from the tobacco industry will likely be negligible, or have a neutral to slightly positive macroeconomic impact.

The fortunes of the Ontario tobacco industry should not be linked too closely with tobacco consumption in Ontario. Tobacco is a global commodity such that only a small portion of the Ontario tobacco industry’s production is consumed in this province.

As of 2001, 50 per cent of Canada’s tobacco production (the vast majority of which is produced in Ontario) is exported to other countries. Consumption of the remaining 50 per cent is distributed across the Canadian provinces, with Ontario consuming slightly more than one-third of the total, such that only about one-sixth of the Ontario tobacco industry’s output is consumed in Ontario. This implies that a 30 per cent reduction in consumption in Ontario will result in at most a five per cent drop in the demand for the Ontario tobacco crop, rather than a 30 per cent decline.

It would also be misleading to assume that any modest decline in industry output resulting from the program would translate into declines in aggregate output.
Any decrease in domestic tobacco consumption would result in either increased spending on other goods and services, or increased savings — the money smokers previously spent on tobacco would not disappear into a black hole.

Nor would the resources previously used in tobacco production vanish, never to be used again: other industries would expand, or personal savings would rise, such that the decrease in tobacco consumption would represent a redistribution of resources, rather than any reduction in the productive capacity of Ontario.

If savings rose, the effect would likely be stimulatory, as there would be more funds available for investment, investment that is crucial for growth.

If there were a contraction in the tobacco industry, there would be a transition period while resources were shifted out of the tobacco industry, and other industries were able to increase production to meet the rise in demand for their products.

Resources from the tobacco industry would not lay idle indefinitely. The issue is then one of how long resources would lay idle, rather than a matter of simply eliminating the economic value of the industry.

Most studies find that the macroeconomic impact of a decline in the tobacco industry will be either slightly beneficial, or neutral.

In their seminal work, Warner and Fulton designed a computer simulation of the Michigan economy for 1992-2005, with and without tobacco product sales. They found that a tobacco-free Michigan would have had 5,600 more jobs in 1992, with the net job gains declining to 1,500 by 2005.

In another U.S. study, Warner and his colleagues considered the effect of a doubling of the downward rate of decline in U.S. tobacco consumption and found that it would result in net employment gains in every one of the non-tobacco growing regions.

Warner and his colleagues did find that such a decline would result in fewer jobs in the tobacco growing southeastern region, but that these declines would be more than offset by increases in employment in the rest of the U.S.

Readers should bear in mind that, at the time of Warner’s analysis, the U.S. tobacco region employed almost 100 times more workers than its Canadian counterpart, such that it would be inaccurate to extrapolate from Warner’s results to suggest that a decline in tobacco consumption would result in job losses in Ontario.

It would be more accurate to recognize the counties of Brant, Elgin, Norfolk, and Oxford as the tobacco-growing region of Ontario, than Ontario as the tobacco-growing region of Canada. Research reported by the World Bank found that the elimination of all domestic tobacco consumption in Canada would result in a 0.1 per cent increase in employment.

One study has found that a 20 per cent decline in cigarette consumption would result in a net reduction in employment and output in Canada. However, the key assumption generating that result was that the government of Canada would reduce public spending in response to declining tobacco revenues because it did not assume any change in the tax rate on cigarettes. Importantly, the study found that gross domestic product at factor cost and total employment would rise if the government did not reduce its expenditures.

In the analysis presented above, total tobacco tax revenues rose as a result of a higher tax rate.
Conclusion and Recommendations

Investing in comprehensive tobacco control is vital to protect the integrity of Ontario’s health-care system. Comprehensive tobacco control programs are proven strategies for reducing tobacco use, and the fiscal costs associated with smoking.

The OMA recommends that Ontario invest in a comprehensive tobacco control strategy based on evidence-based international best practices in tobacco control.

Comprehensive tobacco control will improve health outcomes in Ontario, make the most efficient use of scarce funding for our health-care system, and improve the fiscal position of the Ontario government.

There are many non-pecuniary reasons to implement a comprehensive tobacco control program, such as protecting non-smokers from environmental tobacco smoke, reducing the pain and suffering to smokers and their loved ones, and increasing the quality of air.

The physicians of Ontario are concerned about these costs as well. We focus on the monetary costs here not to minimize the other less tangible costs; we do so only to show that the Ontario government’s investment in tobacco control is fiscally responsible.

There are many programs that benefit the citizens of Ontario, and clearly the provincial government cannot fund all good initiatives. In this case, the province is not forced to choose between social spending and responsible fiscal management — it can accomplish both goals through one policy.

References


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Appendix I — Economic Rationale for Tobacco Control

While economists are far from monolithic in their views on the appropriate role for government in a market economy, most agree that governments should intervene when the private market leads to an outcome where someone could be made better off without making anyone else worse off.

Smoking qualifies as such a situation because at least one of the microeconomic conditions necessary to achieve optimal welfare levels (i.e. economic well-being) through the free market does not hold for smoking.

The axioms of microeconomic theory hold that if: 1) smokers are fully aware of the consequences of their actions, and 2) they bear the full costs of smoking to themselves and to others, smokers choose to smoke because it maximizes their lifetime utility, even if smoking is addictive. If 1) and 2) hold, by choosing to spend their money on tobacco, smokers are revealing that they get more satisfaction from smoking tobacco than from anything else they could spend their money on.

It follows that government intervention would reduce individual welfare since it would distort the individual's decision toward choosing some good from which he or she receives less utility.

Are smokers fully informed about the health and addiction risks of their actions? An overview of the evidence on smokers in industrialized countries suggests that they "are generally aware of their increased risks of disease, but that they judge the size of these risks to be smaller and less well-established than do non-smokers."1

If just three per cent of global smokers are uninformed, there would be a net welfare gain from a 10 per cent price increase.2 Only three per cent to 23 per cent of smokers worldwide would need to be uninformed about the risks for tobacco to engender a global welfare loss.2

While these results may not be directly applicable to the Canadian case because of the greater availability of information on tobacco in developed countries than in developing countries, the findings do suggest that tobacco use probably involves a net welfare loss in Canada.

It is still more concerning that teenagers may not be able to process this information properly, and evidence shows that they underestimate their ability to become addicted.1,2

The vast majority of smokers start before the age of 20,1,3 and very few of them plan to be smokers for any significant period of time. The reality is that most smokers would like to quit after they start, but either find themselves unable to do so, or find it exceptionally addictive. This contradiction indicates that, for most people, smoking is not fully rational behaviour consistent with consumer sovereignty.

Most current smoking is not the result of an individual fully deciding to smoke based on an individual assessment of the lifetime costs and benefits. Some might argue that the appropriate way to address the market failure resulting from youth smoking is to target tobacco policies to prevent youth from obtaining tobacco. Unfortunately, measures to prevent youth from gaining access to tobacco have not proven to be effective, and are difficult to enforce.1

The second premise that must hold for government intervention to decrease welfare is that smokers internalize all of the costs and benefits of tobacco use. Economists call a situation in which an individual does not internalize the full consequences of his or her consumption or production behaviour an “externality.” An obvious example is the use of cars, because the user of the car does not bear all the consequences of air pollution.
Smoking involves at least two types of externalities: interpersonal and intra-personal. Interpersonal externalities are the costs smokers impose on other people. Such costs include health-care costs in publicly funded health-care systems such as Canada’s, and the health effects of environmental tobacco smoke (ETS).

Aside from the externality due to ETS, the limited Canadian evidence suggests that smokers may entirely, or nearly, cover their share of the direct health-care costs through tobacco taxes. However, it is more difficult to get an accurate measure of the externality due to ETS since many of these costs involve long-term developmental costs (see section VI of the Ontario Tobacco Research Unit’s report titled The Fiscal Impact of a Comprehensive Tobacco Control Program in Ontario – www.otru.org), and it is more difficult to quantify some of the health-care costs due to ETS than it is to obtain health-care costs from first-hand smoking.

One obvious way to reduce the welfare loss from this market failure is to ban smoking in public places. While this will not completely eliminate ETS, it will reduce the extent of the externality.

Finally, the value of the pain and suffering that smokers impose on friends and family likely exceeds the sum of all the other externalities.

The second type of externality arising from smoking is the intra-personal externality. These are future costs of smoking that the smoker does not internalize because of time-inconsistent behaviour.

There is evidence from the psychology literature that consumers choose different discount rates between time periods that are further away than between this time period and the next. That is, a smoker will tend to discount next year less heavily relative to this year than he or she will the year after next relative to next year. The result is that when the smokers reach next year, the decision they chose to make last year is no longer optimal because they now have a different discount rate for the next period than they did last year.

Time-inconsistency thus implies that there is an intra-personal externality where the smokers today impose costs on their future selves that they do not fully internalize in their decision-making process.

For smoking, time-inconsistency results in smokers not acting in their own best welfare, instead requiring an external mechanism to force them to choose the consumption path that will yield them the highest lifetime utility.

While it is currently difficult to attach a precise figure to the intra-personal externality from smoking, to reflect the value of life years lost (using a discount rate of four per cent), a pack of cigarettes would need to cost $30.45(U.S.), which is approximately 100 times the value of the interpersonal externalities estimated in U.S. literature.

Empirical work from the Massachusetts Institute of Technology confirms the existence of a substantial intra-personal externality. Using separate U.S. and Canadian survey data on smokers’ subjective well-being, the researchers found that smokers report greater well-being after a tobacco tax increase, indicating that total welfare is improved by tobacco control policies. This finding implies that smokers do in fact need an external mechanism to behave optimally.

This evidence reveals that the conditions that must hold for government intervention to reduce welfare do not hold for tobacco.
First, people usually start smoking before they can make a rational decision about whether it is in their own best interest.

Second, there is ample evidence that either young adults are not fully informed about the addictive potential of tobacco, or they cannot accurately estimate their own risk of becoming addicted.

Third, the presence of interpersonal externalities that are not yet fully quantified, and substantial intrapersonal externalities, indicate that leaving tobacco consumption up to individual choice will not yield the highest levels of utility for either smokers or non-smokers.

These facts should allay worries that some people might have that government intervention through taxes and regulations may reduce welfare through its distortion of private decisions.

References


Appendix II – Technical Appendix

The standard technique economists use to assess the value of an investment project is to compare the total value today of the future cash flows from the project to the total cost today of the project. In this case, the future cash flows of the project consist of the reduction in health care costs and the increased income and sales tax revenue from increased productivity associated with a permanent reduction of smoking prevalence. Because a dollar received next year is not as valuable today as a dollar received today, economists discount future cash flows. If I have a dollar today, I can invest it so that next year it is worth \(1 \times (1+r)\) where \(r\) is the annual interest rate. For example, suppose I had $100 that I invested at an interest rate of 5%. In a year, that $100 will be worth $105. Because I cannot invest the dollar until I receive it, the value today of a dollar received next year is \(1/(1+r)\); if I received \$1/(1+r)\ today, it would be worth \$(1/(1+r))^2\(1+r)\= \$1\tomorrow\ so that \$1/(1+r)\ is the correct valuation of \$1\ received next year.

Returning to our example, if instead of investing $100 today, I wanted to make sure that I had $100 next year, I need only invest $100/(1.05) = $95.24 today. Repeating this process for year two, we would find that the value of a $1 received two years from now would be \$1/(1+r)^2\. So if I wanted to ensure that I had $100 two years hence, I need only invest \$100/(1.05)^2\= \$90.70 today. This pattern would hold for any time period such that \$1 received in period \(t\) would be worth \$1/(1+r)^t\ today. Of course, the value of any cash flows received far into the future is very small because of the discount factor and is equal to 0 when time \(t\) is sufficiently large.

The value of all future cash flows from a project is the sum of the cash flows received in each period from the start of the accrual of benefits to the end of the benefits. In our case, a permanent reduction in prevalence entails a permanent reduction in health care costs and a permanent increase in productivity (and thus government taxes). The Present Discounted Value (PDV) of the cash flows from our project if it starts to pay off in period \(t\) is

\[
PDV\ (Benefit) = \sum_{t=0}^{\infty} \frac{(HealthCareCostDecreases(t) + TaxSavings(t))}{(1 + r)^t} - \sum_{t=0}^{\infty} \frac{HealthCareCostDecreases(t) - TaxSavings(t)}{(1 + r)^t}
\]

This sum is thus our total benefit from the project. As the size of the relevant time period goes to 0 (\(t \rightarrow 0\)), interest gets compounded continuously such that the discount factor becomes \(e^{-rt}\) and the sum becomes an integral. Our formula for calculating the benefit from the program is then

\[
PDV\ (Benefit) = \int_{0}^{\infty} (HealthCareCostDecreases(t) + TaxSavings(t))e^{-rt} \, dt
\]

The total cost of the program can be calculated the same way except that the limits of integration are 0 and 5. While the government should continue to invest in tobacco control after year 5 of the program, future expenditures on tobacco control will result in new reductions in tobacco prevalence; only a negligible fraction of the costs of future programs can be attributed to the maintenance of previous gains.
in prevalence reduction. Since the annual cost of the project is $90 million, the PDV of the cost of the project is

$$PDV\ (cost) = \int_0^5 90e^{-r} \, dt$$

The **Net Present Value** (NPV) of the program is PDV (benefit) – PDV (cost). If the NPV is negative, then the costs clearly outweigh the benefits and the project should not be undertaken from an economic perspective. Conversely, if the NPV is positive, the investment is profitable and should be undertaken.

5% is the nominal discount rate used. This is slightly higher than the average yield on a five-year Government of Ontario bond over the past two years, which is arguably the relevant borrowing rate for the government. This rate was chosen based on the guidelines by the Treasury Board of Canada, which stipulate that, “it is appropriate to use the actual cost of borrowing when the analysis is from the narrow fiscal point of view of the government”.

In sensitivity analyses (included in the technical background paper), we use 7% and 4% as discount rates. We assume a 2% inflation rate since this is the mid-point of the Bank of Canada’s inflation target band of 1-3%.

The relative risk methodology is used to calculate the reductions in morbidity and mortality. This is the method used in most of the studies in Canada to estimate the costs of smoking. It consists of first establishing how much smoking raises both current and former smokers’ risk of developing each smoking associated disease. These risks are called **relative risks** (RRs) with a RR of 1 corresponding to the case for a non-smoker. For instance, if the risk of a non-smoker developing lung cancer is 1 in 77, and the RR for a current smoker is 13, then the risk of current smoker developing lung cancer is $13 \times \frac{1}{77} \approx \frac{1}{6}$ or 1 in 6.

The relative risk data used in this study comes from a recent Ontario Tobacco Research Unit study. The authors of the study derived their relative risk data from a comprehensive metanalysis of hundreds of studies on relative risks from tobacco use. The studies the metanalysis included had to meet stringent criteria such that it only included studies that controlled for confounding factors, separated the risks of current and former smokers, and calculated age and sex-specific risks.

Using the relative risk methodology provides a simple way of reclassifying an adult smoker’s costs after he or she quits by simply moving that adult into the “Former Smoker” risk category. While this reclassification is crude, as the risk associated with a former smoker depends on many factors including how long the individual smoked for before quitting, how long it has been since he quit, and the age at cessation, the estimates should balance out on average. This simplification likely leads to an underestimate of the costs of smoking as the relative risks associated with former smokers in the data are relatively high and probably correspond to those in the first few years after cessation. For instance, the
decrease in the relative risk for myocardial heart infarction and stroke corresponds to that of a smoker who has quit for 1-2 years\textsuperscript{9,10,11}; most studies find that the risk of myocardial infarction and stroke five years after cessation are similar to that of a non-smoker or only slightly elevated\textsuperscript{9-12} Similarly, while the lung cancer risk for former smokers remains considerably higher than that of a non-smoker, at least one paper estimates that the relative risk for lung cancer after cessation of three years of cessation is less than a quarter of that for a smoker\textsuperscript{13}; indeed, the relative risk for lung cancer for a former smoker of approximately half that of a current smoker is much more conservative. Another study indicates that the relative risk for lung cancer used in this study approximately corresponds to that of a former smoker who smoked for 40-50 years and stopped 5 years earlier.\textsuperscript{14} The use of aggregate relative risk data is thus more likely to lead to an underestimate than an overestimate of the savings.

The relative risk methodology enables quantification of some of the health effects from ETS. It permitted assessment of the impact of maternal smoking on infants and thus calculation of the direct health care costs associated with more low birth weight infants and many other obstetric complications attributable to maternal smoking. However, it was not able to attach a numerical value to many of the health care costs from ETS due to spouses, coworkers, and other sources of exposure in this framework. To do so would require more detailed data on levels of exposure and the smoking status of spouses, workplaces, and family and friends.

Until the current youth category reaches the age of the cohort in question, the reductions in morbidity and mortality will be that of a switching of X\% of current smokers from the current to former smoker categories. After the current “youth” generation reaches that age, the annual reductions will be that of switching X\% of smokers from the current to the never smoker category; that is, a straightforward elimination of X\% of the mortality and morbidity associated with smoking. Reductions in youth prevalence result in greater annual savings because they eliminate the mortality and morbidity associated with former smokers.

For instance, suppose prevalence in all age categories falls by 15\% today. The reductions in morbidity and mortality in the 40-44 year old age group over each of the next 25 years would those associated with 15\% fewer current smokers net of the increase in morbidity and mortality from that 15\% of current smokers becoming former smokers. From year 26 onwards, the reductions in morbidity and mortality in that age group come from a 15\% decrease in youth prevalence; that is, simply the reduction in morbidity and mortality from 15\% fewer current smokers.