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Economic Evaluation of Health Canada's Proposal to Amend the Tobacco Product Information Regulations

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Prepared for:

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CHAPTER 1 | INTRODUCTION AND SUMMARY

INTRODUCTION

Health Canada's *Tobacco Product Information Regulations* (TPIR or "the Regulations") establish labelling requirements for tobacco products available for retail sale in Canada. The Regulations were promulgated under the authority of section 17 of the *Tobacco Act* ("the Act"). The Act, which Parliament enacted in 1997, gives the federal government the authority to regulate the manufacture, sale, labelling, and promotion of tobacco products in Canada. Consistent with this authority, the Regulations set out specific requirements for the design, size, location, and content of information that tobacco products must display, including health warning messages, health information messages, and information about each product's toxic emissions or constituents. The Regulations first came into effect in June 2000.

The goal of the Regulations is to increase awareness of the health hazards and health effects associated with tobacco use. Research to date shows significant progress toward that goal. For example, surveys funded by Health Canada indicate that most cigarette smokers are attentive to the health warning messages that product labels currently convey; more than half of respondents say that the warnings help them understand health effects and encourage them to smoke less around others. A substantial percentage of respondents also indicate that the warnings are influential in motivating them to smoke less or quit.[1]

While the current requirements have had a beneficial impact, recent research suggests that certain refinements would enhance their effectiveness. First, surveys and focus groups indicate that individuals have imperfect recall of the toxic substances listed in the warnings and may prefer more detailed health impact information on individual substances. Second, the warning messages may not sufficiently influence individuals with low literacy levels. Finally, after several years of the same warning messages being in place, research suggests that smokers may be beginning to overlook them, and that the impact and effectiveness of the health messages may be diminishing.

For the reasons noted above, Health Canada is proposing several changes to the labelling requirements for tobacco products. The department is proposing a new regulatory scheme that incorporates several key features to be applied, in stages, to all tobacco products.

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[1] See *Wave 8 Surveys: The Health Effects of Tobacco and Health Warning Messages on Cigarette Packages – Survey of Adults and Adult Smokers (Draft)*, prepared by Environics Research Group Limited, prepared for Health Canada, 2004; and *Wave 8 Surveys: The Health Effects of Tobacco and Health Warning Messages on Cigarette Packages – Survey of Youth (Draft)*, prepared by Environics Research Group Limited, prepared for Health Canada, 2004.

The labelling requirements under the proposed scheme are more comprehensive than the current requirements under the TPIR and address several aspects of the previous regulations that appear to have limited their effectiveness. The key improvements include:

- Revising the current health warning messages, health information messages, and toxic emission or constituent statements on tobacco products to better inform a wider range of audiences, including adults with low literacy, persistent smokers, and people considering quitting;
- Incorporating coloured images into health information messages, making these messages more noticeable and easier to recall, and revising toxic emission or constituent statements to include coloured text and backgrounds, with clearer and more concise messages about the harmful substances contained in tobacco smoke or products;
- Adding new information on tobacco cessation assistance services (i.e., requiring the display of a pan-Canadian toll-free quitline number directly on tobacco packages); and
- Introducing more than one set of each type of message – health warnings, health information, and toxic emission or constituent statements – to be displayed during specified rotation periods.

In accordance with the World Health Organisation Framework Convention on Tobacco Control, Health Canada also intends to expand the scope of the regulations to cover all tobacco products sold in Canada that are smoked, chewed, sucked, or sniffed. These changes are designed to increase awareness of the health hazards and health effects associated with tobacco use. The proposed regulations would be developed in two phases. During Phase I, the new requirements would apply only to cigarettes and little cigars. Subsequently, the scope would be broadened to include all tobacco products intended for retail sale in Canada. The current requirements would remain in effect and would be applicable to tobacco products other than cigarettes and little cigars during the transition to the second phase. At the end of Phase II, all remaining tobacco products would be regulated under the new scheme and the current regulations would be eliminated.

PURPOSE OF REPORT AND SUMMARY OF FINDINGS

Before promulgating new regulations, Health Canada must prepare an economic analysis of the regulations' effects. This report presents that analysis, providing additional detail on the regulatory changes under consideration and evaluating their potential costs, benefits, and economic impacts. The report's key findings are summarised below.

- The proposed regulations would impose additional costs on the tobacco products industry. To estimate these costs, the analysis assumes that the new regulations will remain in effect for ten years, roughly equivalent to the period of time that the

current labelling requirements have been in force. The analysis evaluates costs over this period assuming a real annual discount rate of 8 percent.[2] Based on these assumptions, it estimates that the incremental costs of complying with the regulations ranges from $9.3 million to $10.7 million per year. The present value of these costs is $62.4 million to $71.7 million. The costs attributable to Phase I of the regulations, addressing cigarettes and little cigars, account for 74 percent to 80 percent of this total. The analysis estimates that the incremental costs of compliance with Phase I range from $7.4 million to $8.0 million per year. The present value of these costs is $49.6 million to $53.4 million.

- The changes in the labelling standards would also increase Health Canada's administrative costs. This increase in costs is attributable both to an initial investment in compliance assistance activities and to the service impacts of introducing a pan-Canadian toll-free quitline number on tobacco packages. On an annualised basis, the analysis estimates that these costs will total approximately $1.7 million. Over ten years, the present value of these costs, assuming an 8 percent discount rate, is approximately $11.7 million.
- The proposed change in tobacco labelling requirements is likely to increase the effectiveness of the labels in encouraging current tobacco users to quit, and to discourage others from beginning to use tobacco. Similarly, the introduction of a pan-Canadian toll-free quitline number on tobacco packages is likely to increase the rate at which those who attempt to quit succeed. Based on a review of the literature, the analysis estimates that the new requirements will increase the number of individuals who successfully quit over the ten-year period analysed by approximately 13,380 to 40,740. This constitutes a relatively modest incremental effect, representing a reduction of 0.3 percent to 0.8 percent in the number of Canadians – approximately 4.9 million – who currently smoke.
- Although the estimated impact of the proposed regulations on tobacco use is relatively modest, the value of the associated health benefits is significant. The analysis employs a cost-of-illness approach to calculate the economic value of potential reductions in tobacco-related morbidity. It estimates a mean lifetime reduction in direct health care and short-term disability costs of approximately $8,500 for those who successfully quit smoking; this figure represents the present value of averted health care costs for the average individual at the time quitting is achieved, calculated at an annual discount rate of 8 percent. On this basis, the analysis estimates that reductions in tobacco-related morbidity attributable to the new labelling requirements would have a present value of approximately $80 million to $240 million.

[2] The report includes a sensitivity analysis that evaluates costs assuming a 3 percent annual discount rate. It also examines the effect of this alternative discount rate on the estimated benefits of the regulations.

- In addition, smoking cessation is likely to reduce the risks of premature death. The analysis relies on data obtained from the literature to compare the mortality risks faced by those who smoke to the risks faced by those who successfully quit. It combines this information with an estimate of the value of a statistical life (VSL) to calculate the present value of the change in mortality risks. Assuming a VSL of $6.5 million and an annual discount rate of 8 percent, the analysis estimates a mean mortality benefit of approximately $413,000 for those who successfully quit smoking; this figure represents the present value of reduced mortality risks for the average individual at the time quitting is achieved.[3] On this basis, the analysis estimates that the reductions in tobacco-related mortality attributable to the new labelling requirements would have a present value of approximately $3.8 billion to $11.7 billion.

In aggregate, the estimated present value of the costs of the new regulations ranges from $74.1 million to $83.3 million, while the estimated present value of the benefits ranges from $3.9 billion to $12.0 billion. Overall, the estimate of benefits exceeds the estimate of costs by a factor of 47 or more. Exhibit 1-1 shows the present value of the net benefits (i.e., benefits minus costs) of the regulatory proposal, based on the estimates cited above. As the exhibit indicates, this value ranges from $3.8 billion to $11.9 billion.

EXHIBIT 1-1. PRESENT VALUE OF THE NET BENEFITS OF PROPOSED CHANGES TO TOBACCO PRODUCTS LABELLING REGULATIONS (2007 $CAD, MILLIONS)

BENEFITS ESTIMATE	ANNUAL DISCOUNT RATE: 8 PERCENT	
	LOW COST ESTIMATE	HIGH COST ESTIMATE
Low Benefits Estimate	$3,855.9	$3,846.7
High Benefits Estimate	$11,905.9	$11,896.6

ORGANISATION OF REPORT

The remainder of this report is organised as follows:

- Chapter 2 provides additional detail on the current labelling regulations and the changes that Health Canada is proposing;
- Chapter 3 presents an overview of the Canadian tobacco market and Canada's tobacco products industry;
- Chapter 4 analyses the costs the tobacco products industry is likely to incur in complying with the proposed changes to the labelling regulations;

[3] The report includes a sensitivity analysis that calculates mortality benefits employing two alternative VSL estimates: $3.5 million and $9.5 million.

- Chapter 5 estimates the potential impact of the proposed changes on Health Canada's administrative costs;
- Chapter 6 analyses the potential benefits of the new requirements, focusing on potential reductions in the adverse health effects associated with tobacco use; and
- Chapter 7 evaluates the potential effect of the new regulations on various sectors of the economy. Chapter 7 also includes a brief discussion of the potential distribution of health benefits among consumers, and notes a number of second-order benefits, such as reduced demand on Canada's health care system, that may be associated with reductions in tobacco use.

CHAPTER 2 | CURRENT REGULATIONS AND PROPOSED CHANGES

INTRODUCTION

Health Canada's *Tobacco Products Information Regulations* (TPIR) require all tobacco products for retail sale in Canada to comply with the labelling requirements set forth in June of 2000 under the *Tobacco Act* (the "Act"), which gives the federal government the authority to regulate the manufacture, sale, labelling, and promotion of tobacco products in Canada. The TPIR dictate the specific requirements for displaying warnings and other messages on tobacco product packaging. These consist of health warnings (usually occupying the main panels of most tobacco product packages); health information messages (mostly displayed on leaflet inserts or displayed on the inside back panel of some types of packaging); and toxic emissions/constituents statements (usually featured on a side panel of a package of certain prescribed tobacco products).

The messages mandated under the TPIR are considered to have attained their maximum impact. Health Canada has conducted research that suggests that the current health warnings, although effective overall, have been less effective in reaching people with low literacy skills, older smokers, and heavily-addicted (hard-core) smokers. As well, the current health information messages have been found not to be sufficiently noticed or read by smokers. Toxic emissions/constituents statements, which display levels of a list of substances to which tobacco users are exposed, are not always well understood or recalled.

Health Canada is considering changes that will make the regulations more comprehensive and the messages more informative and noticeable. The size, number, and length of time to display the messages under the current regime will be altered. In addition, several changes will be made to the design of the health labels to make the warnings and messages more prominent and easily noticeable. These changes will be implemented in two phases: Phase I will establish new requirements for cigarettes and little cigars, while Phase II will extend the requirement to other tobacco products.

OVERVIEW OF CURRENT REQUIREMENTS

The regulations currently in force identify certain health-related information to be displayed on the packaging of various tobacco products. Health warnings provide information about the adverse health consequences of smoking to the consumer. Prescribed warnings are required to be prominently displayed on the main panels of a package and include coloured images and graphics and explanatory text. Health information messages and toxic emissions/constituents statements complement the display of health warnings under the current regulations. Health information messages

focus on cessation and provide facts and tips about reducing or quitting smoking. Under the current regulations, packages of cigarettes and similar products must also display a list outlining the levels of six toxic substances smokers are exposed to, known as toxic emissions statements (smokeless products display levels of selected toxic constituents in the product). Manufacturers obtain the required messages and images from Health Canada and must reproduce them in a manner that meets TPIR display requirements (described below). All health warnings and health information must be reproduced clearly in colours as close as possible to those of the source file except for toxic emissions or constituents statements, which currently do not contain colour or images. The current regulations also specify the contents and technical display requirements. If a manufacturer attributes the required information, the source must be cited as either "Health Canada" or "Santé Canada" (depending on the language of the message) in the same colour, and no greater in pitch than the smallest used in the attributed information.

DISPLAY OF HEALTH WARNINGS

The formats for the health warnings are provided by Health Canada and vary for different types of packages. Currently there are 16 health warnings in distribution for cigarettes and cigarette-like products; there are fewer for other tobacco products. The warnings for cigarettes and similar products contain both graphics and text, and must be printed in English on one side and French on the other, with the warning occupying 50 percent of the main panel(s) (i.e., the principal display surface) of a package; Exhibit 2-1 provides an example.[4] The regulations also specify additional details regarding placement of text for maximum impact. The specifications for message contents, size, and manner of display vary for products other than cigarettes, depending on the product and the type of package used. For example, pipe tobacco pouches and cigars contained in a box are required to display, on one whole surface of the package, one of four bilingual messages provided by Health Canada, on a space of 20 cm^2 or at least 40 cm^2 depending on the surface area available. Packages of bidis, chewing tobacco, and snuff, on the other hand, must display one of the bilingual health warnings specific to the product (see Exhibit 2-2) on 60 percent to 70 percent of the area on which they are displayed. In addition, tobacco products contained in a carton or kit must display the prescribed health warning on 50 percent of each of the four largest panels, with additional health warnings or a toxic emissions or constituents statement on the remaining sides, as specified by product.

[4] Principal Display Surface: the side or surface of a container that is most predominately displayed or visible under normal or customary conditions of sale or use.

EXHIBIT 2-1. CURRENT HEALTH WARNING FOR CIGARETTES AND SIMILAR TOBACCO PRODUCTS

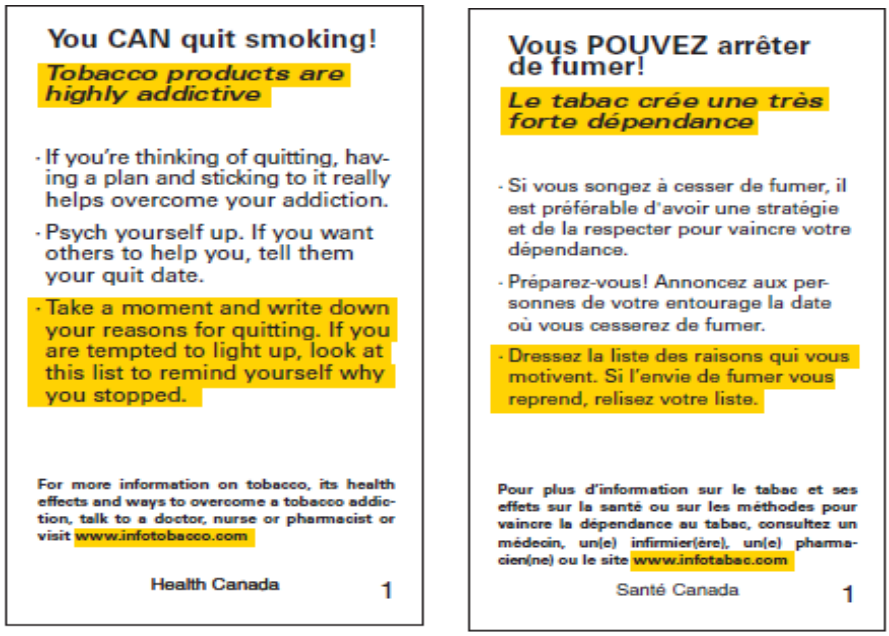
EXHIBIT 2-2. CURRENT HEALTH WARNINGS FOR BIDIS, CHEWING TOBACCO, AND SNUFF

PRODUCT	WARNINGS (all have French translations)
Bidis	USE OF THIS PRODUCT CAN CAUSE CANCER TOBACCO SMOKE HURTS CHILDREN TOBACCO SMOKE CAN CAUSE FATAL LUNG DISEASE TOBACCO SMOKE CONTAINS HYDROGEN CYANIDE
Chewing Tobacco and Oral Snuff	THIS PRODUCT IS HIGHLY ADDICTIVE THIS PRODUCT CAUSES MOUTH DISEASE THIS PRODUCT IS NOT A SAFE ALTERNATIVE TO CIGARETTES USE OF THIS PRODUCT CAN CAUSE CANCER
Nasal Snuff	THIS PRODUCT IS NOT A SAFE ALTERNATIVE TO CIGARETTES THIS PRODUCT CONTAINS CANCER CAUSING AGENTS THIS PRODUCT MAY BE ADDICTIVE THIS PRODUCT MAY BE HARMFUL

DISPLAY OF HEALTH INFORMATION

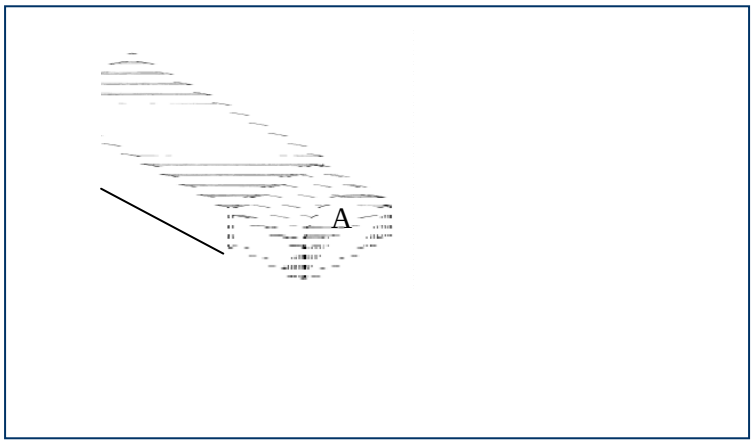
The current regulations specify 16 black-and-white text-only health information messages for cigarettes and similar products (cigars and smokeless products are not currently required to display such information). Exhibit 2-3 provides an example. The display requirements for cigarettes and cigarette-like products vary with the packaging used. Cigarettes (other than those in soft packages) and cigarette tobacco (other than that sold in pouches), kreteks, leaf tobacco, and tobacco sticks must display a health information message on both sides of a leaflet insert or on designated areas. Specifically:

EXHIBIT 2-3. CURRENT HEALTH INFORMATION MESSAGE



- For slide and shell cases, health information may be displayed in one of two ways: (1) on the surface of the slide not next to the tobacco product, with both English and French text together occupying 60 percent to 70 percent of the surface; or (2) on a leaflet inserted into the package, with information in English on one side and French on the other occupying 60 percent to 70 percent of each side. These leaflets must be approximately 50 mm by 88 mm and readily visible to anyone who opens the package.
- Cigarettes, cigarette tobacco, kreteks, leaf tobacco, and tobacco sticks in slide and shell packages must display health information on 50 percent of the upper slide-flap. This is the portion of the end of the package which is folded in when closed and readily visible to the consumer when the package is opened (see Exhibit 2-4).
- Cigarettes, cigarette tobacco, kreteks, leaf tobacco, and tobacco sticks in packages other than slide and shell packages must display health information in such a way that the English and French texts are side by side, centred, and together occupy between 60 percent and 70 percent of the side on which the information is displayed. This information may be displayed anywhere on the package other than the principal display surface or the bottom.
- Tubs may display health information on any exterior surface except the bottom, on the interior surface of the lid, or on the freshness seal. Health information may also be placed on a leaflet as described above.

EXHIBIT 2-4. UPPER SLIDE-FLAP



A: Upper slide-flap

(Image © Counts, Mary Ellen, Smith, Barry S., Pham, Xuan M.)

INFORMATION ON TOXIC EMISSIONS AND TOXIC CONSTITUENTS

In accordance with the requirements of Health Canada's *Tobacco Reporting Regulations,* information on toxic emissions or constituents may be displayed on any side of the packaging except the surface already containing the health warning. The emissions currently required to be listed on labels for cigarettes, cigarette tobacco, kreteks, leaf tobacco, and tobacco sticks are tar, nicotine, carbon monoxide, formaldehyde, hydrogen cyanide, and benzene. These are listed as toxic emissions per unit or toxic emissions per gram, as applicable.[5] Emissions per unit or emissions per gram are determined under the conditions for data collection set out by the International Organization for Standardization (ISO) and under modified ISO conditions. Chewing tobacco and snuff are required to list the mean amount of three toxic constituents – nitrosamines, lead, and nicotine – on the bottom of the container. These are listed on the package as "Toxic constituents/gram" in both English and French. The information must take up at least 50 percent of the bottom using the pitch specifications.

EQUAL DISPLAY

For each brand of a product, all warnings and health information must be distributed evenly among units produced in a year. Specifically, each health warning and health information message must be displayed on between 3.25 percent and 9.25 percent of each brand of cigarette, cigarette tobacco, kretek, leaf tobacco, and tobacco stick; and on 22 percent to 28 percent of bidis, cigars, pipe tobacco, chewing tobacco, and snuff.

[5] Unit: a cigarette, a cigar, a bidi, a tobacco stick, or a kretek.

PROPOSED CHANGES TO THE CURRENT REGULATIONS

Health Canada is proposing changes to the current regulations governing the labelling of tobacco products to make them more comprehensive and to address identified shortcomings. The changes will expand the scheme covering the labelling of tobacco products sold in Canada, introducing new requirements that adjust the number of warnings and messages, the space required for these displays, the length of the display period, and the design and contents of current tobacco messages and statements.

PRODUCTS

The products covered by the regulations will not be changed significantly. Bidis, cigarettes, cigarette tobacco, cigars (in boxes or bundles), kreteks, leaf tobacco, pipe tobacco, tobacco sticks, chewing tobacco, and snuff (oral and nasal) will all still be included under the two-phased proposal. The regulations will also establish requirements for the labelling of blunts, snus (as well as other forms of smokeless tobacco), and water pipe (hookah) tobacco.

WARNINGS AND MESSAGES

The proposed regulations will introduce renewed health warnings that incorporate messages designed to be more effective in reaching youth, older smokers, severely-addicted (hard-core) smokers, and people with low literacy skills. To further enhance visibility and impact, the proposal for most products includes an increase in the size of the health warnings, expanding them from 50 percent to 75 percent of the front and back panels of the tobacco package. This increase in size would allow the display of additional information about cessation assistance services available to smokers. Negotiations are underway to include a pan-Canadian toll-free quitline number that will seamlessly direct callers to provincial or territorial smoking cessation services, such as counselling support. Health information messages under the new standard will include colour images, backgrounds, text, and/or graphics. These features are designed to make the messages more noticeable, informative, and relevant to smokers. Current research has revealed that the toxic emission/constituent statements required by the TPIR are unclear, due, in part, to the use of numerical values of toxic substance that are difficult to interpret. The statements under consideration would replace this quantitative information with more readable and easily understandable text-only statements about the hazardous chemicals found in tobacco and tobacco smoke.

To maintain the effectiveness of the information presented over a longer period of time, the new standards will also introduce the rotation of messages. Each rotation would include a different set of health warnings, health information messages, and toxic emissions or constituents statements, which will be distributed equally among each brand of a tobacco product and alternatively displayed for a specified period.

PHASED-IN DEVELOPMENT

Health Canada is proposing to introduce the new labelling requirements in two phases, based on product type. Phase I will introduce requirements for cigarettes and little cigars, which accounted for approximately 85 percent of all tobacco products sold in Canada in 2007. Phase II will finalize requirements for tobacco products other than cigarettes and little cigars. It will involve amending the proposed regulations to include specific rules for labelling other tobacco products. Phase II will build on Phase I and is expected to commence immediately following completion of Phase I, the implementation of the proposed regulations for cigarettes and little cigars.

PHASE I: CIGARETTES AND LITTLE CIGARS

The new requirements for cigarettes and little cigar products will include 32 different health warnings, compared to the 16 currently in use. These health warnings will be divided into two sets of 16 messages to be rotated every three years. The distribution of the warnings will remain the same. The design will include a larger, more prominent colour warning, as well as the telephone number and website for a national cessation assistance program.

Under the new standards, health information messages will contain colour images, backgrounds, text, and/or graphics. Two sets of eight health information messages (16 in total, a reduction to 8 per display period compared to 16 currently) will be rotated every three years. Although there will be no change in size for these messages, there will be additional specifications for placement on various types of packages:

- Hinged top packages will be required to display this information on a leaflet, the size of which will vary with the size of the package;
- Slide and shell packages will be required to display health information messages on the upper slide-flap as well as the back of the sliding part of the package;
- Soft packages will not be required to include inserts, except that a leaflet must be inserted in any carton of soft packages.
- Packages other than cylindrical packages, two-sided packages, three-sided packages, and cartons (except cartons of soft packages) will also be required to carry health information messages on a leaflet.

The emissions statements will also be changed under the new regulations for cigarettes and little cigars. Instead of text-only black and white statements, messages will be in colour, may include a graphic component to attract attention, and will be provided in sample form as part of the source document. There will be two statements about different emissions in two rotations (four emissions statements in total), rather than a single list of six emissions on every package. The size and placement of the emissions statements will generally stay the same; however, they will now also be required on products in bags.

Exhibit 2-5 summarises the changes to the labelling standards for cigarettes and cigarette-like products proposed under Phase I.

PHASE II: TOBACCO PRODUCTS OTHER THAN CIGARETTES AND LITTLE CIGARS

Phase II will establish new labelling requirements for cigars, smokeless forms of tobacco, and all other tobacco products excluded from Phase I. These standards will take effect approximately one to two years after the implementation of new requirements under Phase I.

Health Canada's preliminary assessment for Phase II indicates that the number of health warnings would increase for most products, with up to 10 messages for cigars, eight for chewing tobacco, and other changes specific to newly included products. The proposed number of warnings on other currently prescribed products, such as oral or nasal snuff, would be modified as well. For the most part, these warnings will follow rotation, size, and equal distribution requirements similar to those set in place for Phase I products.

Phase II will also add health information messages to a wider variety of tobacco products, including cigars. The current Phase II draft specifies up to five messages, including colour images to be placed on boxes and bundles. The requirements for these products will be finalized when development resumes at the end of Phase I.

As currently envisioned, Phase II would specify four toxic emissions or constituents statements for cigars and most smokeless tobacco products, respectively (nasal snuff would only be required to list two). These statements would be text-only but may include the use of colour and a graphic symbol. As with the other messages envisioned under Phase II, the exact nature of these requirements will be determined in the coming months.

EXHIBIT 2-5. COMPARISON OF CURRENT TPIR AND PROPOSED CHANGES FOR CIGARETTES AND LITTLE CIGARS (PHASE I)

LABEL ELEMENT	PARAMETER	CURRENT TPIR	PROPOSED REGULATIONS	NET CHANGE
Health Warnings	Placement/Coverage	50% of principal display surface	75% of prescribed display area	Prescribed display area on packages increased by 50%
	Number of Warnings	16	32	Number of warnings doubled; period of display limited by rotation
	Distribution	For each brand/product, distribute evenly among units produced	For each brand/product, distribute evenly among units produced	No change
	Rotation	n.a.	Two sets of 16 warnings rotated every 3 years	New requirement
	Design	As specified in source document; CYMK colour scheme	CYMK colour scheme, although design (colours, text) will change; new images and warnings; messages include testimonials; will include a national cessation assistance telephone number and website	More prominent warning, text and message; use of testimonials
Health Information Messages	Placement/Coverage	Not on principal display surface or bottom; 60-70% of side, slide, or leaflet on which placed	Placement depends on type of cigarette package: (1) Hinged top requires leaflet insert which varies with size of package; (2) Slide and shell requires message on upper slide flap and back of sliding panel; (3) Soft packages have no leaflet insert except in cartons; (4) Certain other packages require leaflet insert	Little change in size or placement. Minor change for slide and shell pack (expansion of message on upper slide flap); requirement for certain other packages is new
	Number of Messages	16	16	No change
	Distribution	For each brand/product, distribute evenly among units produced	For each brand/product, distribute evenly among units produced	Distribution ratios depend on the number of messages to distribute. Each new message must now be found on approx 1/8 of each package type of each brand per rotation (instead of 1/16)
	Rotation	n.a.	Two sets of 8 messages rotated every 3 years	Introduces rotation of messages (new requirement)
	Design	As specified in source document; B/W, text only	Colour images or graphic elements included; better and more relevant motivational messages	Introduction of colour images, text, and graphics
Emissions Statement	Placement/Coverage	60-70% of side	10 sq cm or 60% of prescribed display area, whichever is greater[1]	No significant change for most cigarette package types; requirement for certain other packages is new
	Number of Emissions Reported	6	4	4 qualitative statements replaces 6 numerical ranges for toxic chemicals
	Distribution	n.a., 6 constituents presented together	For each brand/product, distribute evenly among units produced	Introduces distribution of statements; range of 47%-53% per rotation
	Rotation	n.a., 6 constituents presented together	Constituent statements will be presented individually and rotated	Individual presentation of constituents with rotation
	Design	Text only; Helvetica, black on white background	Colour, text-only; design to be specified in source document	Introduction of colour; image of message to be made available as part of source document

Notes:

1. For smaller packages with less than this space available, statement will take up to 100% of surface and can use 2 instead of 1 side. No packages are currently affected by this requirement.

CHAPTER 3 | PROFILE OF THE TOBACCO PRODUCTS SECTOR

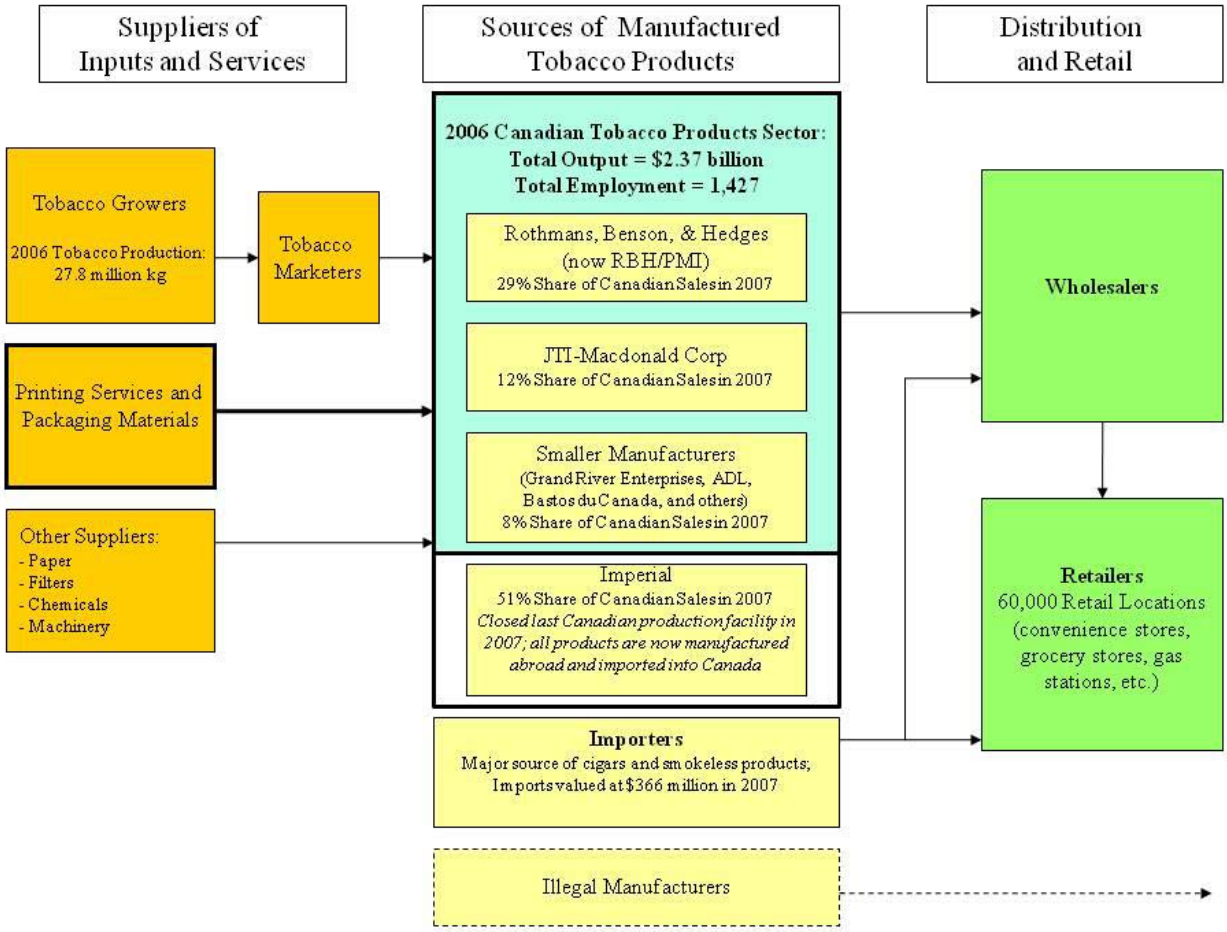
INTRODUCTION

To provide a foundation for the economic analyses in this report, this chapter characterises Canada's tobacco products sector. As summarised in Exhibit 3-1, the industry consists of manufacturers of cigarettes and other finished tobacco products; industries supplying inputs to manufacturers, including tobacco growers, printing/packaging firms, and suppliers of other inputs (e.g., chemicals, paper); import operations; and establishments involved in the sale of tobacco products (wholesale and retail). The discussion below characterises all of these components, with particular attention given to the two key industry sectors directly affected by the Tobacco Products Information Regulations (TPIR): the tobacco products manufacturing sector and the printing and packaging sector, which provides services to the tobacco manufacturing sector. The response of these industries to the regulations will play a major role in assessing the incremental cost of the revised product labelling requirements.

The following discussion is organised in four sections:

- First, we provide an overview of the Canadian tobacco products manufacturing sector, describing production trends, major firms, and other economic parameters.
- Second, we present information on the printing and packaging sector as well as tobacco growers, focusing on their role as suppliers to tobacco products manufacturing.
- Third, we review other sources of tobacco products, with a focus on imports.
- Finally, we provide a brief summary of tobacco product retailing in Canada, examining key actors, sales trends, and prices.

EXHIBIT 3-1. CANADIAN TOBACCO INDUSTRY



Sources: Statistics Canada, Annual Survey of Manufactures - 2103, Table 301-0006; Statistics Canada, Extraction System of Agricultural Statistics; Health Canada's Wholesale Database; Health Canada, A Proposal to Regulate the Display and Promotion of Tobacco and Tobacco-Related Products at Retail, Consultation Document, December 2006.

TOBACCO PRODUCTS MANUFACTURING SECTOR

The following discussion characterises the key elements of the tobacco products manufacturing industry in Canada. We first examine output trends and identify the major firms involved in the market. We then describe other sources of tobacco products, including imports and illegal manufacturing. Finally, we consider the profitability of the major firms and summarise available information on the cost structure associated with tobacco products manufacturing. The focus is on domestic manufacturing and other sources of tobacco products; information on product sales is provided in our discussion of retailing.

OUTPUT AND MARKET STRUCTURE

The tobacco products manufacturing industry (NAICS 31222) comprises establishments producing cigarettes, cigars, loose tobacco (smoking and chewing), and tobacco leaf. Exhibit 3-2 summarises key characteristics of the sector, focusing on 2006, the last year for which complete data are available. In 2006, tobacco products manufacturing was a $2.4 billion dollar industry in Canada, employing approximately 1,400 individuals. This output and employment was distributed among 21 establishments. Consistent with decreasing production and sales of tobacco products (see below), the industry has contracted significantly in recent years. As recently as 2001, the sector realised revenues of $2.8 billion and employed 2,135 people.

Tobacco products manufacturing is a small component of Canada's manufacturing activity. Exhibit 3-2 shows that employment in tobacco products manufacturing accounted for less than one-tenth of one percent of total manufacturing employment in 2006. However, tobacco products manufacturing is a high value-added business with relatively well-paid employees. Production workers in the industry earned average annual wages of more than $75,000, approximately 76 percent more than the average manufacturing worker. Non-manufacturing employees in the tobacco product industries earned more than $158,000 on average, more than double the average for manufacturing industries as a whole.

In Canada, the tobacco products industry is dominated by the manufacture of cigarettes, which account for over 90 percent of the industry's sales.[6] Exhibit 3-3 summarises recent data on the production of tobacco products. In 2008, manufacturers produced approximately 18.6 billion cigarettes. Production in 2008 also included approximately 844,600 kilograms of loose tobacco. In 2006 (the last year for which data are available), Canadian firms produced roughly 8.8 million cigars.[7] Figures for non-manufactured leaf tobacco are suppressed due to confidentiality restrictions.

[6] Statistics Canada, Input-Output Structure of the Canadian Economy, Table 381-0009.

[7] Imports account for the majority of cigars sold in Canada (see discussion below).

EXHIBIT 3-2. 2006 TOBACCO PRODUCT MANUFACTURING PRINCIPAL STATISTICS ($CAD IN THOUSANDS, UNLESS OTHERWISE NOTED)

DATA ELEMENT	TOBACCO PRODUCT MANUFACTURING (1)	TOTAL MANUFACTURING (2)
Number of establishments	21	83,596
Total revenue (x 1,000)	$2,374,063	$645,222,102
Revenue from goods manufactured (x 1,000)	$1,626,712	$598,237,407
Total expenses (x 1,000)	$909,444	$599,486,221
Total salaries and wages, direct and indirect labour (x 1,000)	$134,256	$84,930,151
Production workers wages, direct labour (x 1,000)	$82,907	$55,414,809
Non-manufacturing employees salaries, indirect labour (x 1,000)	$51,349	$29,515,342
Cost of energy and water utility (x 1,000)	$8,754	$17,111,480
Cost of vehicle fuel (x 1,000)	$747	$947,927
Cost of materials and supplies (x 1,000)	$407,416	$369,166,603
Total number of employees, direct and indirect labour (persons)	1,427	1,764,928
Number of production workers, direct labour (persons)	1,103	1,312,281
Number of non-manufacturing employees, indirect labour (persons)	324	452,647
Manufacturing value added (x 1,000)	$1,222,619	$212,774,940
Source: Statistics Canada, Annual Survey of Manufactures - 2103, Table 301-0006 for Canada in 2006; (1) NAICS 312220; (2) NAICS 31-33.		

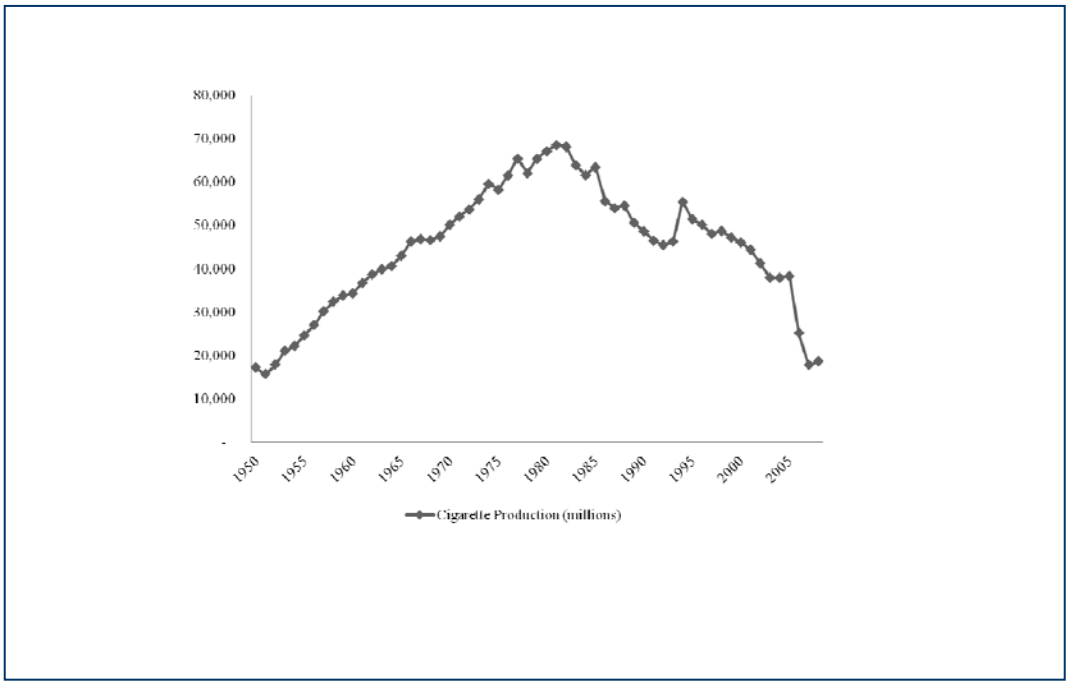
EXHIBIT 3-3. PRODUCTION OF TOBACCO PRODUCTS

PRODUCT	2004	2005	2006	2007	2008
Cigarettes (number x 1,000)	37,911,388	38,283,103	25,144,683	17,771,802	18,622,803
Cigars (number x 1,000)	n.a.	4,842	8,810	n.a.	n.a.
Manufactured tobacco, fine cut (kg)	2,798,108	2,238,410	1,750,489	1,070,190	844,586
Non-manufactured tobacco, leaf (kg)	n.a.	n.a.	n.a.	n.a.	n.a.
Source: Statistics Canada, Production and Disposition of Tobacco Products – 2142, Table 303-0062.					

Exhibit 3-3 shows a marked decrease in tobacco products manufacturing in recent years. For instance, between 2004 and 2008, cigarette production decreased by nearly 51 percent. Exhibit 3-4 illustrates the longer-term cigarette production trend. As shown,

production peaked in the early 1980s at about 68 billion cigarettes per year, and generally has decreased since.

EXHIBIT 3-4. CIGARETTE PRODUCTION



To some extent, the decline in cigarette production reflects the long-term reduction in the number of Canadians who smoke. The decline, however, also reflects major changes in the market structure of the Canadian tobacco products industry. Historically, three manufacturers dominated Canada's cigarette market:

- Imperial Tobacco Canada Limited (Imperial);
- Rothmans, Benson & Hedges Inc.; and
- JTI-Macdonald Corporation.[8]

Until recently, these firms accounted for nearly all domestic cigarette production and sales in Canada. For example, as recently as 2001, the three firms accounted for 98 percent of cigarette sales. That year, Imperial was the largest manufacturer, holding close to a 70-percent share of the market. Rothmans, Benson & Hedges Inc., and JTI-Macdonald Corporation had market shares of approximately 17 percent and 12 percent, respectively.[9]

[8] All three cigarette manufacturers have foreign parent companies. Imperial is owned by British American Tobacco; Rothmans is owned by Philip Morris; and JTI-Macdonald is owned by Japan Tobacco International.

[9] Health Canada, Canadian Tobacco Company Market Share in Canada (in percent), 1980-2001.

During the past decade, two major changes have altered production patterns as well as the structure and size of the tobacco products market. First, in October 2005, Imperial announced that it was discontinuing operations at its Canadian manufacturing facilities and relocating all production to Monterey, Mexico.[10] British American Tobacco, Imperial's parent company, indicated that the actions were taken in response to an "ongoing decline in sales industry-wide." These changes affected cigarette production, tobacco processing, and loose tobacco facilities, all located in south-western Ontario.[11] The shutdowns are the primary factor explaining the sharp decrease in domestic tobacco products output in 2006 and 2007.

A second factor affecting the tobacco market in Canada is growth in the market share of small and medium-sized manufacturers. These firms have penetrated the cigarette market through the growing popularity of discount (or value-for-money) brands, which compete directly with more established "premium" brands. Health Canada reports that sales of discount cigarettes began in 2001, and that recently discount brands accounted for about 44 percent of cigarette sales.[12] While the large manufacturers produce many discount brands, smaller firms have benefitted from this market shift. The sales data that manufacturers and importers submitted to Health Canada for 2007 indicate that smaller firms accounted for about eight percent of tobacco product sales in Canada. These relatively new competitors include Grand River Enterprises, Tabac ADL Tobacco, and Bastos du Canada.

These and other developments have altered the market share of tobacco products manufacturers in recent years. The most recent sales data available (2007) suggest that Imperial's market share has dropped to about 51 percent, while RBH's has increased to roughly 29 percent. The remainder of the market is split between JTI (12 percent) and smaller producers (eight percent).[13] The section on retailing of tobacco products (see below) provides more detailed information on sales.

PROFITABILITY

Available data suggest that the three major tobacco products firms are profitable. As shown in Exhibit 3-5, all three firms posted profits in 2007. In the case of Imperial and Japan Tobacco, these figures are influenced significantly by profits and sales outside Canada; in contrast, the Rothmans figures reflect profits on sales primarily in Canada. Furthermore, available information suggests that profits have been trending upward over time. Most notably, Rothmans has reported successive net income increases each year from 2003 through 2007.

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[10] It should be noted that Imperial Tobacco Canada continues to maintain its corporate offices in Montreal.

[11] British American Tobacco, "News release: Imperial Tobacco Canada to close manufacturing plants," 21 October 2005, obtained online at http://www.bat.com/group/sites/uk__3mnfen.nsf/vwPagesWebLive/DO6P3HFA?opendocument&SKN=1.

[12] Health Canada, "Report to the Conference of the Parties on the Implementation of the Framework Convention on Tobacco Control," accessed online at http://www.hc-sc.gc.ca/hc-ps/pubs/tobac-tabac/cop-cdp/part-section2-eng.php#part2-g.

[13] Based on sales data submitted to Health Canada by tobacco product manufacturers in accordance with the requirements of the Tobacco Reporting Regulations.

EXHIBIT 3-5. PROFITS OF THE THREE MAJOR TOBACCO PRODUCTS MANUFACTURERS

PERFORMANCE INDICATOR	IMPERIAL	ROTHMANS, INC.	JAPAN TOBACCO INTERNATIONAL
2007 Profit	$2,891,000,000[1]	$99,800,000[2]	$7,931,000,000[3]
2007 Global Sales Volume	200.3 billion cigarettes	10.8 billion cigarettes	385.6 billion cigarettes
Trends	Profits up 9% relative to 2006.	Net income has increased in each year from 2003 to 2007.	n.a.

Notes:
- Adjusted profit from operations, converted from British pounds to Canadian dollars using 2007 exchange rate of 1.96.
- Net income stated in 2007 Annual Report.
- Net sales for international tobacco unit, converted from U.S. dollars to Canadian dollars using 2007 exchange rate of 0.9881.

Sources: Imperial Tobacco Group PLC, Annual Report and Accounts, 2007; Rothmans, Inc., Annual Report, 2007; and Japan Tobacco International, "JT Reports International Tobacco Business Results for January – December 2008," press release, obtained online at http://jt.com/investors/results/tobaccobusiness/index.html.

MANUFACTURING COST STRUCTURE

Models of tobacco products manufacturing can provide useful context for understanding the economic structure of the industry. While they only approximate actual operations, they may support subsequent analyses by indicating how compliance with labelling requirements will affect manufacturing costs and the pricing of tobacco products.

Health Canada's analysis of cigarette ignition propensity standards included a baseline model of the cost structure of a representative cigarette manufacturer.[14] The original model was developed using international survey data; hence, the cost structure reflects an international industry average. Summarised in Exhibit 3-6, the model suggests several basic features of cigarette manufacturing:

- Cigarette production is a materials-intensive process, with labour, energy, and equipment depreciation making up smaller shares of total costs.
- The cost of purchasing, transporting, and storing raw tobacco represents over half the total manufacturing cost.
- Packaging costs (the focal component affected by the TPIR proposal) are a significant element, representing roughly 20 percent of manufacturing costs.

[14] Health Canada, Economic Evaluation of Health Canada's Regulatory Proposals for Reducing Fire Risks from Cigarettes, prepared by Industrial Economics, Incorporated, March 2004.

EXHIBIT 3-6. CIGARETTE MANUFACTURING COST STRUCTURE (2002 CANADIAN DOLLARS PER CARTON OF 200 CIGARETTES)

COST ELEMENT	LABOUR	ENERGY	MATERIALS	DEPRECIATION	TOTAL
Purchased Leaf Tobacco			$1.152		$1.15
Handling, Transport and Storage					$0.98
Tobacco Processing					$0.22
Plug Making[1]	$0.081	$0.007	$0.326	$0.004	$0.42
Cigarette Making[2]	$0.148	$0.014	$0.253	$0.036	$0.45
Packaging/Shipping[3]	$0.220	$0.020	$0.511	$0.015	$0.77
Total Manufacturing Cost =					**$3.99**

Notes:
1. Materials cost includes filter materials, adhesives, paper wraps and flavourings.
2. Materials cost includes paper, tipping materials, starch, adhesives and ink.
3. Materials cost includes packets, foil, plastic wrap, tear tape, adhesives, cartons and cases.

Sources: Health Canada, *Economic Evaluation of Health Canada's Regulatory Proposals for Reducing Fire Risks from Cigarettes*, prepared by Industrial Economics, Incorporated, March 2004; adapted from Sumner, et al., *Economic Sector Data for Modeling the Impact of Less Ignition-Prone Cigarettes*, Technical Study Group on Cigarette and Little Cigar Fire Safety, Center for Fire Research, National Bureau of Standards, 59, 1987.

These figures generally are consistent with available data characterising the overall tobacco products sector in Canada. First, the manufacturing principal statistics presented earlier (see Exhibit 3-2) demonstrate the primacy of materials costs. Second, Statistics Canada publishes data on the input/output structure of various industries, including the tobacco products sector (NAICS 4122).[15] The profile presented in Exhibit 3-7 illustrates the distribution of inputs to tobacco products manufacturing in 2003 (the last year for which complete data are available). The inputs profile again demonstrates the major role that raw tobacco plays in the structure of operating costs. Other commodity categories in the inputs profile are difficult to align with specific cost elements. The input profile also suggests the profitability of tobacco products manufacturing. The final category "other operating surplus" represents over 40 percent of the total value of goods sold by the industry.[16]

[15] Statistics Canada, Input-Output Structure of the Canadian Economy, Table 381-0009.

[16] "Other operating surplus" is the income left over after accounting for the cost of all intermediate inputs. The figure ensures that the total value of inputs equals the total value of outputs in the model. See Statistics Canada, *The Input-Output Structure of the Canadian Economy 2003/2004*, 2008.

EXHIBIT 3-7. INPUTS TO TOBACCO MANUFACTURING SECTOR (2003)

INPUT	VALUE ($ MILLIONS)
Total value of all input commodities	$3,738
Raw tobacco	$228
Natural gas, excluding liquefied	$4
Unmanufactured tobacco	$317
Paper bags and containers and plastic bags	$59
Coated paper products, including wallpaper	$25
Diesel and fuel oil, aviation fuel	$-
Other custom work	$40
Recordings, musical instruments, and artists' and smokers' supplies	$28
Repair construction	$1
Truck transportation	$2
Pipeline transportation	$1
Storage and warehousing	$1
Telephone and other telecommunication services	$5
Postal and courier services	$2
Electric power	$10
Gas distribution	$1
Water and other utilities	$-
Wholesaling margins	$23
Repair service for machinery and equipment	$10
Rental and leasing of office equipment	$-
Imputed service charge, banks and other deposit accepted intermediaries	$16
Other financial intermediary and real estate (non-rent) services	$76
Insurance	$11
Other rent	$13
Architect, engineering, legal and accounting services	$16
Dry cleaning and laundry services	$1
Services to buildings and dwellings	$5
Computer and related services	$8
Other professional, scientific, technical, administrative, support and related services	$515
Rental and leasing of automotive equipment	$4
Membership organisation dues (excluding religious)	$1
Rental and leasing of consumer goods and commercial and industrial machinery and equipment	$1
Spare parts and maintenance supplies	$18
Office supplies	$9
Transportation margins	$8
Laboratory supplies	$2
Travelling and entertainment	$25
Advertising and promotion	$179

INPUT	VALUE ($ MILLIONS)
Indirect taxes on products	$5
Subsidies on products	$(2)
Other subsidies on production	$(1)
Other indirect taxes on production	$29
Wages and salaries	$392
Supplementary labour income	$87
Other operating surplus	$1,528
Source: Statistics Canada, Input-Output Structure of the Canadian Economy, Table 381-0009.	

SUPPLIERS TO TOBACCO PRODUCTS MANUFACTURING

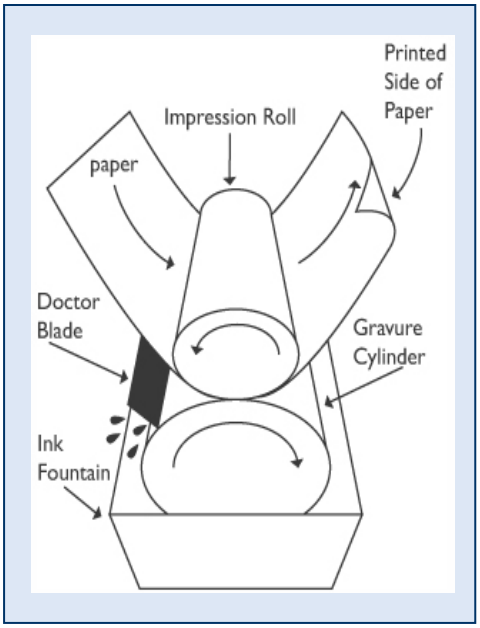
This section characterises two industries supplying essential inputs to tobacco products manufacturing: (1) the printing and packaging sector; and (2) growers of tobacco. In addition to raw tobacco and packaging, tobacco products manufacturing requires a range of other production inputs, including papers, filters, chemical additives, flavourings, and machinery. Because changes in labelling standards are unlikely to have a significant effect on these suppliers, we do not describe them in detail.

PRINTING AND PACKAGING

The printing and packaging industry plays a pivotal role in helping tobacco products manufacturers comply with labelling requirements. Most tobacco products are sold in packages that incorporate a mix of materials, including cardboard, paper, and foil. The packaging is typically printed with product information (logos, text) as well as the current set of warnings and information required under the 2000 TPIR rules. Most of the packaging is produced through the rotogravure process, whereby the desired text and images are engraved to a cylinder. The cylinder is dipped in ink and rotated in combination with rolls of receiving material (paper, cardboard, plastic, foil, etc.) to produce the printed packaging (see Exhibit 3-8). A small portion (roughly five percent) of packaging for the tobacco products industry is produced using lithographic printing methods.[17]

[17] Blair Consulting Group, *Business Impact Assessment: Proposed Tobacco Products Information & Reporting Regulations*, prepared for Health Canada, April 2000.

EXHIBIT 3-8. ROTOGRAVURE PROCESS



The Canadian tobacco industry contracts with a relatively small set of firms for the design and production of packaging. In a joint industry submission to Health Canada, requested as part of the original TPIR rulemaking, industry representatives indicated that three companies supply approximately 95 percent of the packaging used by Canadian tobacco manufacturers:

- Algroup Lawson Mardon, which has plants in Lachine, Quebec and Toronto, Ontario;
- FPC Flexible Packaging Corporation, which has a plant in Toronto; and
- Shorewood Packaging, which operates a plant in Smiths Falls, Ontario.

Industry sources suggest that tobacco products make up a large share of these firms' client base.[18] Furthermore, stakeholder surveys conducted in anticipation of the proposed change in labelling requirements suggest that one cylinder engraver (Southern Graphics) supplies all the gravure cylinders used by these packaging firms.[19] This relatively concentrated industry structure may affect how quickly tobacco products manufacturers can comply with the changes in labelling standards.

TOBACCO GROWERS AND MARKETERS

Canadian growers are the primary supplier of unprocessed tobacco to the nation's tobacco manufacturing industry. Today, virtually all Canadian tobacco is grown on farms in south-central Ontario, although small amounts are also grown in Quebec and other provinces. For instance, in 2006, Quebec farms produced 0.05 percent of the total tobacco harvest.[20]

Canadian tobacco farming is an industry in decline. As shown in Exhibit 3-9, the total harvest from Canadian farms has fallen from about 71 million kg in 1998 to about 28 million kg in 2006. Likewise, the number of farms growing tobacco has dropped from

[18] Hara Associates, *Benefit/Cost Analysis of Proposed Tobacco Products Information Regulations*, prepared for Health Canada and Consulting & Audit Canada, June 5, 2000; and Blair Consulting Group, *Business Impact Assessment: Proposed Tobacco Products Information & Reporting Regulations*, prepared for Health Canada, April 2000.

[19] PriceWaterhouseCoopers, Summary of Stakeholder Survey and Interview Responses Re: Proposed Amendments to the Tobacco Product Information Regulations, prepared for Health Canada, no date.

[20] Ontario Flue-Cured Tobacco Growers' Marketing Board, 2006 Annual Report, obtained online at http://www.ontarioflue-cured.com/documents.php?catID=10http://www.ontarioflue-cured.com/documents.php?catID=10.

over 3,000 in the 1970s to about 600 today. This decline reflects the decreasing demand for tobacco as well as general consolidation and movement to larger, industrial agricultural operations.[21]

While the downward trend in tobacco harvests is consistent with the reduction in domestic production of tobacco products, several factors underlie the trend. Clearly, reduced smoking rates play a role in limiting the overall demand for tobacco. In addition, a shorter growing season contributes to high production costs on Canadian farms, making it difficult for them to compete with imported tobacco. Simultaneously, as cigarette manufacturers in Canada face decreasing demand and become more cost-conscious, they are bidding down the price of tobacco and narrowing profit margins for farmers.[22]

Tobacco marketing boards act as intermediaries between Canadian tobacco growers and tobacco products manufacturers. The Ontario Flue-Cured Tobacco Growers Marketing Board (OFCTGMB) is the largest of these organisations, representing most of the producers in Ontario. Two other organisations – The Ontario Black Tobacco Growers Association and L'Office des Producteurs de Tabac Jaune du Québec– represent a small number of additional producers. The marketing boards regulate production of tobacco and provide a legal avenue via which growers may sell their crops.[23] At the beginning of each growing season, these intermediaries agree upon a desired production level along with a target price for domestic sales.

EXHIBIT 3-9. TOBACCO PRODUCTION ON CANADIAN FARMS, 1997-2006

MEASURE	1998	1999	2000	2001	2002	2003	2004	2005	2006
Harvest (KGx1000)	71,295	66,700	62,290	56,860	44,675	44,620	45,100	33,590	27,850
Number of Farms	1,160	1,175	1,120	980	840	900	780	670	555

Source: Statistics Canada, Extraction System of Agricultural Statistics, accessed online at http://cansim2.statcan.gc.ca/cgi-win/cnsmcgi.pgm?Lang=E&CANSIMFile=ESAS/ESAS_SESA-eng.htm.

OTHER SOURCES OF TOBACCO PRODUCTS IN CANADA

IMPORTS OF TOBACCO PRODUCTS

In addition to domestic manufacturing, imports account for a significant source of many tobacco products sold in Canada. The importers of tobacco products include firms with

[21] Ian J. Irvine and William A. Sims, 1997, *Tobacco Control Legislation and Resource Allocation Effects*, Canadian Public Policy - Analyse de Politiques, 23(3); and Physicians for a Smoke-Free Canada, *Recent Trends in Tobacco Agriculture in Canada*, June 2008.

[22] Physicians for a Smoke-Free Canada, *Recent Trends in Tobacco Agriculture in Canada*, June 2008.

[23] Agriculture and Agri-Food Canada, 2002, *Special Crops: Canada's Tobacco Industry*, available online at http://www.agr.gc.ca/misb/spcrops/tobacco_e.phtml#N_1.

manufacturing operations in Canada; firms that manufacture tobacco products abroad and maintain Canadian import operations; and firms that are exclusively importers and do no manufacturing.

Changes in the Canadian tobacco manufacturing sector have influenced imports of tobacco products. Most notably, Imperial continues to supply the Canadian market despite moving manufacturing to Mexico. As a result, imports of cigarettes to Canada have increased sharply. As shown in Exhibit 3-10, the number of cigarettes imported to Canada increased by over a factor of 20 in 2006, and nearly doubled again the following year.

In some cases, imports represent the primary source of products for which domestic production is limited or non-existent. For instance, the production of cigars in Canada (about 8.8 million units in 2006) is far outweighed by cigar imports. These imports have increased notably in the last five years, exceeding 500 million units in 2008. Similarly, smokeless tobacco products (i.e., chewing tobacco, snuff) appear to be entirely imported (although available production data may withhold figures on small amounts of domestic manufacturing due to confidentiality).

By value, cigarettes and cigars represent the most significant imported products (see Exhibit 3-11). This was true even prior to the shift of Imperial's manufacturing to Mexico. Imports of snuff are also noteworthy, exceeding $16 million in 2007.

EXHIBIT 3-10. IMPORTS OF TOBACCO PRODUCTS

PRODUCT	UNITS	2003	2004	2005	2006	2007	2008
Cigarettes	Number, thousands	709,738	594,225	364,518	7,792,049	14,730,522	n.a.
Cigars	Number, thousands	287,967	309,907	391,209	409,109	476,615	519,226
Pipe Tobacco	KG	105,075	85,001	89,352	110,078	84,658	92,137
Loose Cigarette Tobacco	KG	276,140	728,960	106,689	1,766,874	746,685	n.a.
Other Loose Tobacco	KG	6,511	3,999	1,627	322,089	127,745	n.a.
Chewing Tobacco	KG	46,300	33,706	33,765	31,661	29,550	n.a.
Snuff	KG	226,208	234,912	233,091	255,687	269,918	n.a.

Source: Statistics Canada, Canadian International Merchandise Trade, data obtained online at http://www.statcan.gc.ca/trade/scripts/trade_search.cgi.

EXHIBIT 3-11. VALUE OF IMPORTED TOBACCO PRODUCTS

PRODUCT	2003	2004	2005	2006	2007	2008
Cigarettes	$22,328,496	$23,214,175	$18,394,846	$162,887,533	$291,087,237	n.a.
Cigars	$32,899,353	$38,155,783	$45,888,596	$41,682,556	$46,295,115	$43,687,998
Pipe Tobacco	$3,504,501	$3,110,536	$3,398,858	$4,300,960	$3,113,602	$2,104,900
Loose Cigarette Tobacco	$3,758,676	$6,465,411	$3,546,506	$10,798,600	$7,558,692	n.a.
Other Loose Tobacco	$71,487	$47,223	$18,367	$3,221,939	$1,314,445	n.a.
Chewing Tobacco	$972,998	$703,221	$687,765	$669,173	$612,443	n.a.
Snuff	$13,088,901	$13,201,302	$13,300,363	$16,042,167	$16,230,103	n.a.
Source: Statistics Canada, Canadian International Merchandise Trade, data obtained online at http://www.statcan.gc.ca/trade/scripts/trade_search.cgi.						

The data on imports, particularly cigarettes, should be interpreted carefully. While imported cigarettes historically accounted for only one to two percent of the Canadian market, the relocation of Imperial's production facilities to Mexico has given imported products a significant share (roughly half) of the cigarette market. Despite the relocation of its manufacturing operations, Imperial Tobacco Canada remains a Canadian firm (headquartered in Montreal) with its earnings realised in Canada. The increase in imports reflects the shift in Imperial's manufacturing base, but does not represent a radical change in the distribution of products sold in the Canadian cigarette market.

ILLEGAL TOBACCO

Another factor shaping the market for tobacco products is illegal supply. A report issued by the Royal Canadian Mounted Police (RCMP) characterises the current contraband issue as one of "organised crime networks exploiting Aboriginal communities…". Specifically, the RCMP attributes the contraband supply to several manufacturing operations in Aboriginal communities (Kahnawake, Akwesasne, Tyendinaga, and Six Nations) that straddle the U.S./Canada border near Ontario and Quebec. These facilities operate with modern equipment and are capable of producing tens of millions of cigarettes each year. The cigarettes are sold through smoke shops/shacks at a fraction of the price of legal cigarettes ($6 per 200, as compared to about $70 to $100 per carton for legal cigarettes). Non-Aboriginal traffickers access the smoke shops/shacks and channel the cigarettes to underground markets. A study financed by the Canadian tobacco industry found that about 22 percent of all smokers purchased illegal tobacco products in 2007, up from 16.5 percent in 2006. In all, the RCMP study indicates that annual sales of illegal tobacco are in the hundreds of millions of dollars.[24]

[24] Royal Canadian Mounted Police, *Contraband Tobacco Enforcement Strategy*, 2008.

The major tobacco products firms operating in Canada see illegal tobacco as a major threat to their operations. For instance, the Rothmans 2007 annual report states that the company "remains keenly interested in supporting government initiatives that will return us to a Canadian tobacco market solely comprised of regulated tax-paid product."[25]

The contraband tobacco problem is a law enforcement issue and, as such, is not a central consideration in Health Canada's efforts to develop and implement appropriate regulations for legal tobacco products. Nonetheless, the existence of a parallel and unregulated market for illegal tobacco products may influence responses to the proposed labelling regulations in the legal market. In particular, the availability of contraband cigarettes may increase the elasticity of demand for legal products; thus, to the extent that regulations increase production costs and product prices, demand for cheap contraband cigarettes may increase.[26] Subsequent sections of this report assess the likelihood of this occurring under the proposed regulations.

SALES AND PRICES OF TOBACCO PRODUCTS

RETAIL OF TOBACCO PRODUCTS

Health Canada estimates that tobacco products are sold from approximately 60,000 locations in Canada. The locations include convenience stores, grocery stores, gas stations, pharmacies, tobacconists, restaurants, and bars. The figure also includes establishments such as hotel and sports facilities that sell tobacco products in vending machines.[27] Research indicates that gas/service stations account for the greatest share of sales. Specifically, 44.1 percent of all 2006 tobacco sales (cigarettes, cigars, and smoking tobacco) were associated with gas/service stations; 19.4 percent with supermarkets; 15.2 percent with tobacconists; 15.1 percent with convenience stores; and the remainder with other types of establishments.[28]

PRICE AND SALES TRENDS

The percentage of Canadians who smoke has declined steadily over the last 40 years. While nearly 50 percent of the population smoked in 1965, the overall smoking rate had decreased to 19 percent in 2007.[29]

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[25] Rothmans, Inc., *Annual Report*, 2007.

[26] Tobacco products manufacturers raised this point in their responses to the recent survey conducted by PriceWaterhouseCoopers; see PriceWaterhouseCoopers, *Summary of Stakeholder Survey and Interview Responses Re: Proposed Amendments to the Tobacco Product Information Regulations*, prepared for Health Canada, no date.

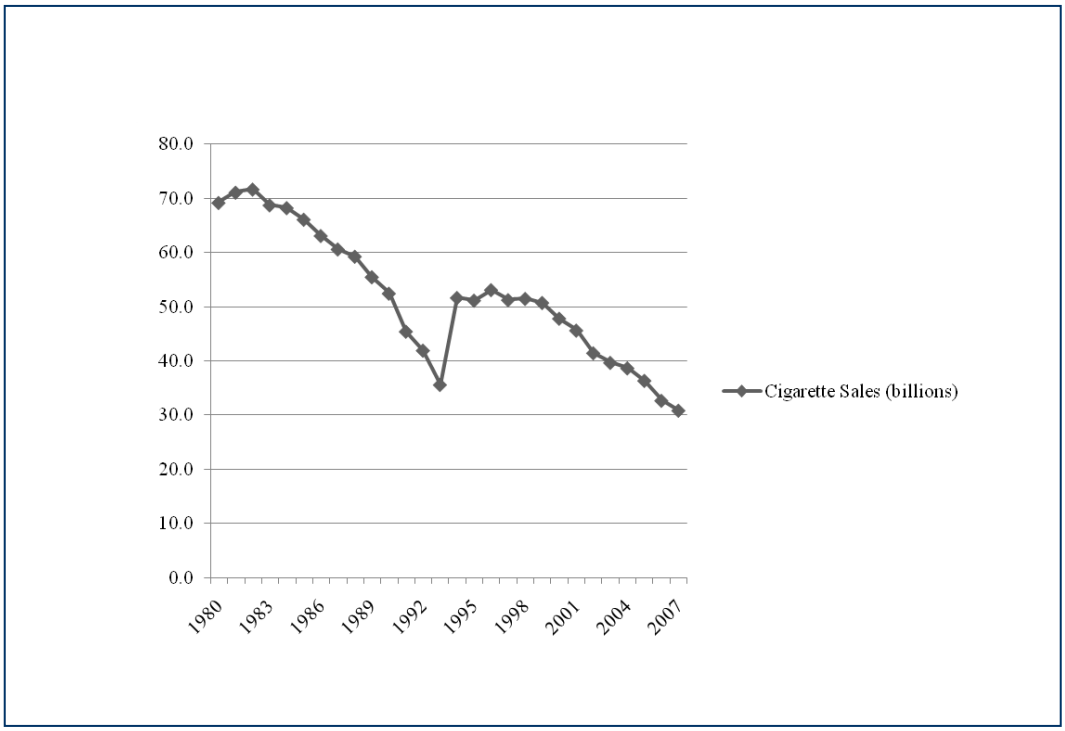
[27] Health Canada, A Proposal to Regulate the Display and Promotion of Tobacco and Tobacco-Related Products at Retail, Consultation Document, December 2006.

[28] Euromonitor International, "Tobacco in Canada," February 2008.

[29] Health Canada, Canadian Tobacco Use Monitoring Survey, obtained online at http://www.hc-sc.gc.ca/hl-vs/tobac-tabac/research-recherche/stat/index-eng.php.

Cigarette sales have declined with reduced smoking rates. Sales peaked in the early 1980s at over 70 billion pieces, compared to sales of about 31 billion pieces (including regular and fine-cut cigarette sales) in 2007. Exhibit 3-12 summarises these trends. It should be noted that these figures exclude sales of contraband cigarettes, which likely account for a greater share of cigarette sales today than was the case in the 1980s.[30]

EXHIBIT 3-12. SALES OF REGULAR AND FINE-CUT CIGARETTES (BILLIONS)



[30] Physicians for a Smoke-Free Canada, Per Capita Consumption 1990-2007, Fact Sheet, May 2008, obtained online at http://www.smoke-free.ca/factsheets/.

Data on sales of other tobacco products show somewhat less definitive trends. As shown in Exhibit 3-13, sales of cigars have more than doubled in the past several years, consistent with the import trends discussed above. In contrast, sales of smokeless products (snuff, chewing tobacco) have been largely steady, while sales of pipe tobacco have declined.[31]

Overall sales of tobacco products by manufacturers and importers totalled approximately $5.3 billion in 2007. Consumer expenditures on tobacco products, however, are significantly higher, due both to the mark-up that retailers apply to tobacco products and to provincial and federal taxes (see below). This effect is illustrated by the disparity between wholesale and retail sales figures for cigarettes in 2006, the most recent year for which an estimate of retail sales is available.[32] In that year, manufacturers and importers reported total cigarette sales in Canada of approximately $4.8 billion.[33] In contrast, retail sales of cigarettes in 2006 are estimated at $13.5 billion (including applicable taxes). [34]

[31] We report data from the Wholesale Database assembled by Health Canada. The figures represent initial sales in Canada, as reported by manufacturers and importers. In some cases, these entities sell to distributors; in other cases, they sell directly to retailers. Therefore, the data do not reflect sales by entities that fit the traditional definition of wholesale establishments (i.e., intermediate firms involved in distributing products to retailers).

[32] Estimates of retail sales in Canada are limited to a subset of tobacco products. An estimate of total tobacco product sales is not available.

[33] Wholesale Database, Health Canada.

[34] Euromonitor International, "Tobacco in Canada," February 2008.

EXHIBIT 3-13. SALES OF TOBACCO PRODUCTS, AS REPORTED TO HEALTH CANADA BY TOBACCO PRODUCTS MANUFACTURERS AND IMPORTERS

	PRODUCT	UNITS	2001	2002	2003	2004	2005	2006	2007
Number Sold	Cigarettes	Number, millions	42,000	37,000	36,000	35,000	33,000	30,000	29,000
	Cigars	Number, millions	200	210	230	300	350	370	500
	Pipe Tobacco	Thousands Kg	135	105	95	85	80	65	65
	Fine Cut Cigarette Tobacco	Thousands Kg	2,500	2,700	2,700	2,400	2,000	1,500	1,300
	Kreteks	Number, millions	n.a.	n.a.	1.3	1.7	2.4	2.6	1.2
	Combined Smokeless Products	Thousands Kg	310	270	240	250	260	270	280
Value of Sales	Cigarettes	CAD, millions	$4,900	$5,400	$5,800	$5,300	$5,100	$4,800	$5,000
	Cigars	CAD, millions	$70	$80	$105	$125	$145	$160	$220
	Pipe Tobacco	CAD, millions	$14	$14	$13	$12	$12	$12	$12
	Fine Cut Cigarette Tobacco		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Kreteks	CAD, millions	n.a.	n.a.	$0.270	$0.395	$0.530	$0.600	$0.275
	Combined Smokeless Products	CAD, millions	$38	$39	$45	$50	$51	$54	$57

Source: Wholesale Database, Health Canada.

The decline in cigarette sales shown in Exhibit 3-13 is partially attributable to increasing retail prices. Prices have increased primarily due to tax increases, although production cost increases have played a role as well. For example, the average total price (including provincial and federal taxes) of 200 cigarettes in Ontario has increased from $29.44 in 1998 to $74.49 in 2009. Exhibit 3-14 shows the current (2009) price of 200 cigarettes in each of the provinces. Prices range from a low of about $70 in Quebec to a high of nearly $105 in the Northwest Territories, with most of this variation attributable to differences in provincial sales and tobacco taxes.

EXHIBIT 3-14. CIGARETTE PRICES (AS OF APRIL 2009)

PROVINCE/TERRITORY	FULL RETAIL PRICE OF 200 CIGARETTES
Yukon Territory	$92.65
British Columbia	$87.40
Northwest Territories	$104.83
Alberta	$90.55
Saskatchewan	$91.12
Nunavut	$92.65
Manitoba	$93.23
Ontario	$74.49
Quebec	$70.18
New Brunswick	$78.81
Nova Scotia	$89.59
Prince Edward Island	$95.70
Newfoundland and Labrador	$92.93
Source: Non-Smokers' Rights Association, obtained online at http://www.nsra-adnf.ca/cms/page1435.cfm.	

CHAPTER 4 | COMPLIANCE COST ANALYSIS

INTRODUCTION

This chapter examines the costs that tobacco products manufacturers are likely to incur in order to comply with the proposed changes to Health Canada's tobacco labelling regulations. The discussion is divided into several sections:

- We first describe the data sources and methods underlying the cost analysis.
- Next, we present our estimates of the cost of complying with the new regulations, placing them in a context that allows assessment of their magnitude and significance.
- We then note potential uncertainties in the analysis and discuss how these uncertainties may affect interpretation of our findings.

Like the current tobacco labelling standards, the revised regulations would apply to both domestically manufactured and imported tobacco products. Thus, both domestic and foreign manufacturers are likely to incur costs associated with revising their labels to meet the new requirements. Either or both may respond to the increase in costs by raising their prices, passing along at least a portion of the economic impact of the regulations to Canadian retailers and, ultimately, Canadian consumers. In light of this dynamic, the analysis of compliance costs presented in this chapter does not differentiate between costs borne by domestic or foreign manufacturers. Chapter 7 provides this information, along with an assessment of the potential indirect impact of the regulations on tobacco product retailers and consumers.

DATA SOURCES AND METHODOLOGY

DATA SOURCES

The primary source of information for the cost analysis is a survey performed for Health Canada by PricewaterhouseCoopers LLP (PWC). In preparation for changes in the current regulations, PWC surveyed tobacco products manufacturers and importers to collect data on several topics, including the following:

- **General Information** – Information on the company's product lines and sales.
- **Incremental Costs** – Anticipated expenditures on new equipment (e.g., printing cylinders for rotogravure operations) necessitated by the labelling revisions; the cost of redesigning packaging to accommodate the new labels; ongoing costs of new materials; and recurring costs associated with modifying equipment for each new label series.

- **Inventory Obsolescence Costs** – Anticipated replacement costs and disposal fees on inventory that would be discarded (1) in the transition to the new regulations or (2) each time a new label series is introduced.

The survey requested this information separately for two major groups of products: (1) cigarettes, cigarette tobacco, leaf tobacco, tobacco sticks, kreteks, and little cigars; and (2) cigars, pipe tobacco, water pipe tobacco, bidis, blunts, and smokeless products. As part of the general information to be provided, each respondent was asked to identify the specific products manufactured or imported.

As the foundation for the cost analysis, Health Canada provided us with completed survey responses from two major tobacco products manufacturers. As discussed below, we use the data from these responses to extrapolate costs to the larger universe of manufacturers.

METHODOLOGY

Exhibit 4-1 presents a general characterisation of the compliance cost information that manufacturers provided in response to the PWC survey. As shown, the responses indicate that many costs would be incurred in three-year cycles, consistent with the label series rotation period specified in the regulatory options that the survey asked respondents to address. Each of the two responses provided to us specified costs associated with the manufacturer's cigarette line; one or the other also provided information associated with the labelling of cigars, loose cigarette tobacco, and tobacco sticks. Together, the two responses represent a significant share of the industry, accounting for more than half of all tobacco products sales in Canada.

EXHIBIT 4-1. COST ELEMENTS ADDRESSED IN SURVEY RESPONSES

PRODUCTS	COST COMPONENT	COSTS REPORTED	WHEN INCURRED
Cigarettes, cigars, loose tobacco, tobacco sticks	Incremental, One-Time	Printing tools; one-time package redesign; cylinder purchase, engraving, and embossing; design costs	Year 1
	Incremental, Recurring	Raw materials; tools and package redesign associated with each rotation; engraving and embossing associated with each rotation; inserts and setting costs	Years 1, 4, and/or 7
	Incremental, On-going	Additional storage and maintenance costs	Annual
	Up-Front Inventory Obsolescence	Value of lost inventory in switch to new label system; obsolete in-plant product and packaging; obsolete retail product	Year 1
	Recurring Inventory Obsolescence	Value of lost inventory with each rotation	Every three years after Year 1 (i.e., Years 4, 7,etc.)

We made two adjustments to the data provided:

- First, one respondent treated three cost elements – design costs, inserts, and setting costs – as general costs, not assigning them to particular products. We distribute these costs to products based on the distribution of the respondent company's brands, by product. For instance, if half of the brands a company produces are cigarette brands, we would assign half of its estimate of design costs to the cigarette product category. The costs distributed in this manner are a relatively minor component of the overall costs reported.
- Second, one company produces loose cigarette tobacco, but did not provide separate compliance costs for this product, instead combining the cigarette and loose tobacco costs. To account for costs associated with labelling of loose tobacco products, we convert the company's loose tobacco production to cigarette equivalents, assuming 0.75 grams of tobacco per cigarette. This represents roughly seven percent of the company's total cigarette production. Therefore, we adjust the compliance costs for cigarettes downward by seven percent to eliminate costs associated with the production of loose tobacco from the cigarette compliance cost calculation.

The cost analysis comprises five basic steps:

- **Discount**: First, we adjust future expenditures to the current year. Specifically, any costs that are incurred in years four or seven of the regulation are discounted back to year one using a standard present value calculation that incorporates a discount rate of eight percent.[35]
- **Annualise**: The costs reported by survey respondents represent a mix of one-time capital costs and costs that recur periodically over time. Annualising allows us to integrate these capital and recurring costs into an equivalent annual cost, facilitating comparison to benefits and other annual measures. To annualise capital costs we assume that purchased equipment has a 10-year useful life. This assumption is based on statements submitted by printing and packaging firms affected by tobacco labelling requirements in Australia.[36] The amortisation calculation incorporates a discount rate of eight percent, consistent with the rate used in the present value calculations (see above).
- **Standardise**: Annualising costs also allows us to develop estimates of compliance costs per unit of production. In turn, these unit cost estimates allow us to assess the relative burden of regulatory compliance costs in the context of other figures, such as product prices and average production costs.
- **Scale up**: Next, the analysis scales up from the two survey responses to the overall tobacco products sector. We perform this scale-up individually for each

[35] The Canadian government's guidance on regulatory analysis recommends an eight percent discount rate for any programs affecting entities that extract money from capital markets. See "Canadian Cost-Benefit Analysis Guide: Regulatory Proposals," obtained online at http://www.regulation.gc.ca/documents/gl-ld/analys/analys10-eng.asp. The analysis also includes an appendix that examines the impact of employing a 3 percent discount rate in estimating compliance costs.

[36] Applied Economics, *Cost-Benefit Analysis of Proposed New Health Warnings on Tobacco Products*, prepared for Australia Commonwealth Department of Health and Ageing, December 2003.

product addressed by a survey respondent, i.e., cigarettes, cigars, loose cigarette tobacco, and tobacco sticks. The calculation is based on the percent of total physical units accounted for by the survey respondent. For example, if the company sells 20 percent of all cigarettes sold in Canada (a hypothetical figure), the scale-up calculation would divide the company's annualised compliance costs by 0.2 to estimate total compliance costs for all cigarette producers. The data used for the scale-up are taken from the reported production figures furnished by the respondents and from Health Canada's Wholesale Database.

- **Extrapolate**: Several minor tobacco products are not addressed in the survey responses. We estimate annualised compliance costs for these products using annualised unit costs associated with similarly packaged products, making adjustments as necessary. Exhibit 4-2 summarises the assumptions employed. We make several adjustments to account for the fact that these products may not enjoy the same economies of scale realised by cigarette and loose cigarette tobacco manufacturers. First, for little cigars, pipe tobacco, and smokeless products, we double the analogous unit cost in the upper bound. Second, for kreteks, we apply per-brand (rather than per-stick) costs, an approach that attempts to account for the small volume of sales in this product category. Finally, for smokeless products, we further adjust upper-bound unit costs (again by a factor of two) to account for the fact that these products are typically sold in small (10- to 25-gram) packages rather than the 200-gram packages typical for loose cigarette tobacco.

EXHIBIT 4-2. UNIT COST ASSUMPTIONS FOR PRODUCTS NOT ADDRESSED IN SURVEY RESPONSES

PRODUCT	LOWER BOUND SCENARIO	UPPER BOUND SCENARIO
Little Cigars	Unit costs equal to cigarette unit costs	Unit costs equal to twice cigarette unit costs to account for differences in economies of scale
Pipe Tobacco	Unit costs equal to loose tobacco unit costs (per kilogram)	Unit costs equal to twice loose tobacco unit costs to account for differences in economies of scale
Kreteks	Unit costs equal to per-brand costs for cigarettes to account for differences in economies of scale	Unit costs equal to twice per-brand costs for cigarettes to account for differences in economies of scale
Smokeless Products	Unit costs equal to loose tobacco unit costs (per kilogram)	Unit costs equal to four times the loose tobacco unit costs to account for differences in economies of scale and smaller size of smokeless containers relative to loose tobacco containers

RESULTS AND DISCUSSION

Our analysis indicates that the incremental cost of complying with Health Canada's new tobacco product labelling regulations equates to an annual expenditure of $9.3 million to $10.7 million over a ten-year period. At an annual discount rate of eight percent, the present value of these costs ranges from $62.4 million to $71.7 million.[37] Exhibit 4-3

[37] Appendix A presents alternative cost estimates incorporating a three percent discount rate.

summarises the estimated cost of compliance by product. As shown, costs incurred in cigarette production represent approximately 70 to 80 percent of the estimated total, with costs for loose tobacco also representing a significant share. The estimated costs for products not addressed in the survey responses represent a smaller share of total compliance costs; however, the range of potential costs reported for these products is wider, reflecting greater uncertainty about the magnitude of the costs and the lack of comparable economies of scale for these small-volume products.

EXHIBIT 4-3. COMPLIANCE COST ESTIMATES FOR TOBACCO PRODUCTS INDUSTRY

		ANNUALISED COSTS		PRESENT VALUE (10 YEARS, 8%)	
		LOWER-BOUND SCENARIO	UPPER-BOUND SCENARIO	LOWER-BOUND SCENARIO	UPPER-BOUND SCENARIO
Products Addressed in Survey Responses	Cigarettes	$7,296,722	$7,734,982	$48,961,602	$51,902,356
	Cigars	$224,609	$224,609	$1,507,146	$1,507,146
	Loose Tobacco	$1,070,947	$1,070,947	$7,186,143	$7,186,143
	Tobacco Sticks	$262,186	$262,186	$1,759,289	$1,759,289
	SUBTOTAL	$8,854,465	$9,292,724	$59,414,179	$62,354,934
Products Not Addressed in Survey Responses[1]	Little Cigars[2]	$102,434	$217,172	$687,338	$1,457,242
	Pipe Tobacco	$55,896	$111,792	$375,066	$750,133
	Kreteks	$54,725	$116,025	$367,212	$778,535
	Smokeless Products	$235,754	$943,015	$1,581,927	$6,327,708
	SUBTOTAL	$448,809	$1,388,004	$3,011,543	$9,313,618
TOTAL COSTS		**$9,303,274**	**$10,680,728**	**$62,425,723**	**$71,668,551**

Note:

1. Estimates of compliance costs for leaf tobacco and bidis are not included due to lack of production data.
2. Health Canada's Wholesale Database does not track unit and dollar sales for little cigars and other cigars separately. To estimate costs of compliance for these two product categories, we rely on an analysis performed by Health Canada suggesting that 403 million of the roughly 500 million cigars sold are little cigars. This assumption may affect the accuracy of the scale-up procedure, as well as the accuracy of the costs attributed to the two categories of cigars.

Health Canada is considering introducing the revised tobacco product labelling requirements in two phases. The first phase would apply to cigarettes and little cigars. The second phase would extend the revised requirements to cigars, smokeless products, and various cigarette-related products (tobacco sticks, kreteks, and loose tobacco). Because of the inclusion of cigarettes, the first phase of the regulations would impose greater costs. On an annualised basis, phase one compliance costs (including cigarettes and little cigars) would range from approximately $7.4 million to $7.9 million.

An analysis of unit costs suggests that the direct cost of complying with the revised labelling requirements would impose a limited economic burden on the tobacco products industry. Exhibit 4-4 summarises the annualised compliance cost figures for four products (i.e., those addressed in the survey responses), expressed on a unit cost basis. As shown, estimated unit costs for cigarettes range from $0.00025 to $0.00027 per cigarette produced (about five cents per carton). This translates to an increase in production costs of approximately one percent. Likewise, the cost increase represents less than one-tenth of one percent of retail prices.

Contextual information for other products is less complete. For cigars, the estimated unit costs are less than one-tenth of one percent of retail prices. Incremental costs per unit of loose cigarette tobacco sold represent about one-half of one percent of retail prices. We are unable to identify reliable price information for tobacco sticks. Likewise, our research yielded no production cost analyses for tobacco products other than cigarettes, precluding assessment of compliance costs as a percentage of production costs.

Our discussion of economic impacts (see Chapter 7) provides a more detailed analysis of how compliance costs may affect manufacturers and other stakeholders.

EXHIBIT 4-4. SURVEY-BASED ANNUALISED COMPLIANCE COST ESTIMATES

	CIGARETTES		TOBACCO STICKS	LOOSE TOBACCO	CIGARS
Unit Cost	$0.00025	$0.00027	$0.0014	$0.8431	$0.0022
Unit Cost Basis	Per cigarette	Per cigarette	Per stick	Per kg	Per cigar
Average Retail Price	$77.74 per carton[1]	$77.74 per carton	n.a.	$30-$74 per 200 grams[3]	$70-$200 per box of 25[4]
Compliance Cost as Percent of Retail Price	0.065%	0.069%	n.a.	0.23%-0.56%	0.028%-0.080%
Production Cost	$4.55 per carton[2]	$4.55 per carton	n.a.	n.a.	n.a.
Compliance Cost as Percent of Production Cost	1.12%	1.18%	n.a.	n.a.	n.a.

Notes:

1. Average retail price for a carton of cigarettes in January 2008, as reported in Statistics Canada's "Average Retail Prices for Food and Other Selected Items." Available online at http://www40.statcan.gc.ca/l01/cst01/econ155a-eng.htm.
2. Health Canada, *Economic Evaluation of Health Canada's Regulatory Proposals for Reducing Fire Risks from Cigarettes*, prepared by Industrial Economics, Incorporated, March 2004; adapted from Sumner, et al., *Economic Sector Data for Modeling the Impact of Less Ignition-Prone Cigarettes*, Technical Study Group on Cigarette and Little Cigar Fire Safety, Center for Fire Research, National Bureau of Standards, 59, 1987. Adjusted to 2008 CAD using the Canadian Consumer Price Index.
3. Lower price represents an approximate average of information provided by Non-Smokers Rights Association, "Tobacco Taxes and Prices in Canada," January 2003. Available online at http://www.nsra-adnf.ca/cms/index.cfm?group_id=1199. Upper price is average retail price per 200 grams of smoking tobacco, as reported in Euromonitor International, "Tobacco in Canada," February 2008.
4. Lower price is based on average retail price per cigar as reported in Euromonitor International, "Tobacco in Canada," February 2008. Upper price reflects higher end of range developed through review of vendor websites and random sampling of 34 brands.

SUMMARY

Our analysis suggests that the cost of complying with the proposed changes to Health Canada's tobacco product labelling regulations would range from approximately $9.3 million to $10.7 million per year. The analysis is primarily based on survey responses from two major tobacco products manufacturers, which together account for over half of the sector's annual sales. From these data, we extrapolate to the remainder of the tobacco products industry. Several considerations introduce uncertainty into the analysis. Most notably, survey respondents were asked to assess costs for a regulatory scenario with details that differ somewhat from the proposal currently under consideration. Nonetheless, the degree of confidence in the estimates is high given that they are based upon information provided directly by industry experts, limiting the analytic conjecture required.

The cost estimates summarised above are presented on an annualised basis. To calculate the present value of these costs, the analysis assumes that they would remain constant for ten years. While it is not clear how long the proposed labelling standards will be in effect, the declining effectiveness of health warning messages over time (see Chapter 6) suggests that Health Canada may continue to revisit the standards periodically. Using the Treasury Board's recommended discount rate of eight percent, we estimate 10-year present value compliance costs of between $62.4 million and $71.7 million.

IMPACT OF UNCERTAINTY ON ESTIMATES

Our cost estimates are based on survey responses provided by industry. These data were used "as is" without secondary interpretation or adjustments (beyond those noted above). The minimal range in the resulting unit costs is noteworthy. Despite the fact that the compliance cost estimates for cigarettes are derived from data provided by two different manufacturers, the annualised unit costs are remarkably similar. This consistency increases confidence in the compliance cost estimates for cigarettes, the major product driving overall costs.

Nonetheless, all of the cost estimates presented here are subject to uncertainties. The following discussion details the nature of these uncertainties and how the analysis has attempted to minimize their impact on the calculations.

AGGREGATE COMPLIANCE COSTS MAY BE OVER-ESTIMATED

Aggregate compliance costs may be over-estimated due to uncertainties with the data and specific methodological assumptions inherent in the analysis. First, Health Canada has continued to refine its proposed requirements since administration of the survey. While the scenarios presented in the draft proposal had fundamental features consistent with the final proposal (e.g., multiple label series subject to periodic rotation), some details differ. For instance, while the options analysed by respondents called for 48 different cigarette health warning messages to be divided into three series, the final proposal calls for 32 messages to be divided into two series. Likewise, the respondents analysed costs associated with 18 health information messages split into three series of six messages each; the final proposal calls for 16 health information messages split into two series of eight messages each. These examples suggest that compliance with the requirements

listed in the survey may be more costly than compliance with the current proposal, leading the analysis to overstate costs. The magnitude of this bias is difficult to characterise. For example, cost elements linearly related to the number of health warning messages – e.g., expenditures on new printing cylinders – may be overstated by approximately 50 percent (the difference between 48 versus 32 health warning messages). Other costs, such as package redesign, will have a less systematic relationship to the number of messages or series. Overall, the survey responses are not sufficiently detailed to allow adjustment of individual cost parameters to correct for the inconsistencies in regulatory scenarios.

Second, the development of annualised costs assumes that the useful life of printing equipment is 10 years. This is a relatively short useful life, especially considering that label series rotation will result in extended periods during which some equipment is not actively used. As such, the analysis may overstate costs (i.e., a longer useful life assumption would yield lower annualised costs). This concern, however, is offset to some degree by the possibility that Health Canada may continue periodically to revisit and revise its labelling requirements. Given the period of time over which the current regulations remained in effect before consideration of significant changes, the assumption of a ten-year useful life for cylinders and other printing equipment may be appropriate.

Finally, the analytic approach makes the simplifying assumption that all manufacturers will incur the costs associated with revised labelling requirements and continue producing and selling the same products. In practice, manufacturers have a variety of management options for reducing compliance costs. For instance, some producers may choose to consolidate the number of brands they market, thereby reduce packaging configurations and associated printing costs. Likewise, foreign manufacturers selling products into the Canadian market may find it more cost-effective to forgo the market rather than comply with revised labelling requirements. While such decisions would affect both firm profitability and the range of products available to consumers (see Chapter 7), they would serve to reduce direct expenditures on compliance with the proposed regulations.

UNIT COSTS MAY BE UNDERESTIMATED FOR SMALLER MANUFACTURERS

Both survey respondents are large manufacturers. As such, they enjoy economies of scale smaller manufacturers may not. In particular, their compliance costs per unit of production may be lower than those faced by smaller firms or producers of products that are sold in relatively small volumes. In developing compliance cost estimates for products that the survey respondents did not address (i.e., little cigars, pipe tobacco, kreteks, and smokeless products), we have attempted to account for the economies-of-scale issue with several adjustments, particularly in the upper-bound scenario. These adjustments may not fully capture the potential variation in unit compliance costs, leading us to underestimate compliance costs for these products. This uncertainty, however, should not have a marked effect on the overall estimate of compliance costs, which is driven primarily by the costs large manufacturers are likely to incur in changing the labelling of high-volume products (i.e., cigarettes).

APPENDIX A

SENSITIVITY ANALYSIS ASSUMING A 3 PERCENT ANNUAL DISCOUNT RATE

EXHIBIT A-1. ESTIMATE OF COMPLIANCE COSTS FOR TOBACCO PRODUCTS MANUFACTURERS (3 PERCENT DISCOUNT RATE)

		ANNUALISED COSTS	
		LOWER-BOUND SCENARIO	UPPER-BOUND SCENARIO
Products Addressed in Survey Responses	Cigarettes	$6,188,377	$6,507,710
	Cigars	$186,257	$186,257
	Loose Tobacco	$893,553	$893,553
	Tobacco Sticks	$218,953	$218,953
	SUBTOTAL	$7,487,140	$7,806,473
Products Not Addressed in Survey Responses	Little Cigars	$86,874	$182,714
	Pipe Tobacco	$46,637	$93,274
	Kreteks	$46,413	$97,616
	Smokeless Products	$196,703	$786,812
	SUBTOTAL	$376,627	$1,160,416
TOTAL ANNUALISED COSTS		**$7,863,767**	**$8,966,889**
PRESENT VALUE OVER TEN YEARS		**$67,079,529**	**$76,489,385**

CHAPTER 5 | GOVERNMENT ADMINISTRATIVE COSTS

INTRODUCTION

In addition to imposing costs on the private sector, implementation of the proposed modifications to the tobacco products labelling regulations would require an investment of public sector resources. In particular, the introduction of revised labelling requirements would affect the costs that Health Canada incurs to monitor and enforce compliance with the regulations. In addition, a key feature of the new regulations is a requirement that health warning messages include information on a pan-Canadian toll-free quitline. The public sector would bear the incremental costs associated with any increase in quitline calls attributable to this requirement. The discussion below provides further information on the nature and potential magnitude of these costs.

MONITORING AND ENFORCEMENT COSTS

Health Canada's tobacco products labelling regulations are administered under the Controlled Substances and Tobacco Directorate's Tobacco Control Compliance and Enforcement Policy. This policy incorporates compliance activities (compliance promotion, inspection, and investigation) and enforcement actions to encourage and ensure compliance with the requirements of the *Tobacco Act* and its associated regulations. Departmental inspectors visit manufacturers, importers, and retailers to ensure that the labelling standards are respected. Firms failing to comply are subject to possible enforcement action, ranging from a warning letter to formal prosecution. Due in part to Health Canada's efforts in this area, rates of compliance with the labelling standards historically have been high (about 90 percent). Much of the effort focuses on the four largest cigarette manufacturers, which together account for more than 95 percent of cigarette sales and over 90 percent of all tobacco product sales in Canada (see Chapter 3).

Exhibit 5-1 summarises the ongoing costs of administering the current labelling regulations, as well as the incremental costs associated with the proposed modifications to these requirements. Health Canada's baseline expenditures include both personnel and other costs attributable to compliance and enforcement activities; these baseline annual costs are not likely to change under the revised labelling regulations.[38] The introduction of new labelling requirements, however, will impose some additional costs in both human resources and operations over the first three years that the new regulations are in effect. These include the cost of labour allocated to informing industry representatives and

[38] Note that the baseline costs estimated for monitoring and enforcement assume a compliance rate of roughly 90 percent. If the labelling changes result in lower compliance rates, the costs incurred in the future could be higher.

educating Health Canada inspectors about the new standards, as well as the cost of developing and distributing factsheets and other guidance documents that explain the new requirements. These costs, which Health Canada estimates would total approximately $870,000 over the three years immediately following implementation of the new labelling requirements, would be directly attributable to the proposed changes in the regulations. Afterwards, Health Canada anticipates that the costs associated with compliance monitoring and enforcement would return to baseline levels.

EXHIBIT 5-1. ESTIMATED MONITORING AND ENFORCEMENT COSTS ASSOCIATED WITH THE LABELLING REGULATIONS

CATEGORY	FULL TIME EQUIVALENT (FTE) PERSONNEL	OTHER COSTS	TOTAL COSTS
Baseline Costs	• 4-6 FTEs for inspectors • 1 FTE for investigations	$20,000-$50,000 annually for inspector travel	$404,000-$578,000 annually[1]
Incremental Costs	• 3 FTEs for industry/inspector training and coordination; FTEs allocated each year for three years following introduction of new TPIR requirements	$5,000-$10,000 for factsheets and guidance documents	$869,000-$874,000[a]

Source: Personal communication with Joseph Given, Manager, Office of Regulations and Compliance, Controlled Substances and Tobacco Directorate, Health Canada, September 2009.

Notes:

1. Total cost calculation assumes cost per FTE (salary and benefits) of $72,000 or $96,000, depending on labour category.

The estimate provided above assumes that new labelling requirements for all tobacco products are introduced simultaneously. If instead some requirements are phased in at a later date, Health Canada estimates that the increase in its monitoring and enforcement costs could be as much as 70 percent greater.

PAN-CANADIAN TOLL-FREE QUITLINE NUMBER AND CESSATION WEB PORTAL

The second major administrative cost attributable to the proposed changes to the tobacco labelling regulations is the cost associated with the pan-Canadian toll-free quitline initiative.[39] The proposed health warning messages would offer a phone number (and web portal) that tobacco users could consult for smoking cessation support. All ten provinces, the Northwest Territories and Yukon are currently operating toll-free smoking cessation services; the pan-Canadian quitline number would seamlessly direct calls to the appropriate provincial or territorial service.

Incorporating a pan-Canadian toll-free number into health warning messages is expected to increase the volume of calls placed to quitline services. Experience in other countries that have placed a quitline number on tobacco packaging indicates that the volume of calls initially could increase by 25 to 200 percent. That experience also suggests that call

[39] Information on the pan-Canadian toll-free quitline initiative provided by Louise Bertrand, Manager, Director General's Office, Controlled Substances and Tobacco Directorate, Health Canada, September 2009.

volume is likely to peak in year one, diminish in years two and three, and eventually settle at a lower, steady-state level. The expected increase in call volume is likely to increase the number of counsellors required to handle calls, as well as administrative and management costs, long distance charges, mailing costs, and infrastructure costs.

Health Canada has performed detailed analyses to estimate the funding necessary to meet the additional demand for quitline services. These analyses attempt to capture the high degree of uncertainty associated with the potential increase in calls. Based on these assessments, Health Canada estimates a total cost of $12 million, to be incurred primarily in the years immediately following the launch of the pan-Canadian toll-free quitline number. This includes an increase in annual costs of $3.5 million in years one and two, when the volume of additional calls is expected to be at its peak, and $2.5 million in years three and four, when the surge in volume is likely to begin to subside. Health Canada expects minimal additional costs to be incurred after this period, when the volume of calls is likely to return to a level that can be managed with current staffing and resources.

SUMMARY

The administrative costs attributable to the proposed changes in the tobacco products labelling regulations include incremental compliance monitoring and enforcement costs, as well as the costs associated with the pan-Canadian toll-free quitline initiative. The analysis employs the following assumptions to annualise and calculate the present value of these costs:

- The estimated increase in monitoring and enforcement costs is spread evenly over the three years immediately following implementation of the new labelling standards, after which incremental costs are zero.
- The incremental costs associated with the pan-Canadian quitline initiative total $3.5 million in each of the two years immediately following implementation of the new regulations, $2.5 million in each of the subsequent two years, and zero thereafter (see above).

The analysis discounts costs in future years to year one and calculates an annualised cost over ten years, assuming an annual discount rate of 8 percent. As shown in Exhibit 5-2, the estimated increase in administrative costs totals approximately $1.7 million on an annualised basis; the quitline accounts for over 93 percent of this total. The present value of these costs over a 10-year period is approximately $11.7 million. Appendix A provides analogous figures employing a three percent annual discount rate.

EXHIBIT 5-2. SUMMARY OF ADMINISTRATIVE COSTS ASSOCIATED WITH PROPOSED CHANGES TO LABELLING REGULATIONS (8 PERCENT DISCOUNT RATE)

CATEGORY	LOWER	UPPER
Total Incremental Monitoring and Enforcement Costs (over three years)	$869,000	$874,000
Total Quitline Costs (over 10 years)	$12,000,000	$12,000,000
Annualised Monitoring and Enforcement Costs	$120,150	$120,842
Annualised Quitline Costs	$1,619,752	$1,619,752
Total Annual Cost	$1,739,903	$1,740,594
Present Value over 10 Years	$11,674,887	$11,679,526

APPENDIX A

SENSITIVITY ANALYSIS ASSUMING A 3 PERCENT ANNUAL DISCOUNT RATE

EXHIBIT A-1. SUMMARY OF ADMINISTRATIVE COSTS ASSOCIATED WITH PROPOSED CHANGES TO LABELLING REGULATIONS (3 PERCENT DISCOUNT RATE)

CATEGORY	LOWER	UPPER
Total Incremental Monitoring and Enforcement Costs (over three years)	$869,000	$874,000
Total Quitline Costs (over 10 years)	$12,000,000	$12,000,000
Annualised Monitoring and Enforcement Costs	$98,935	$99,504
Annualised Quitline Costs	$1,353,122	$1,353,122
Total Annual Cost	$1,452,057	$1,452,626
Present Value over 10 Years	$12,386,337	$12,391,193

CHAPTER 6 | BENEFITS ANALYSIS

INTRODUCTION

The changes to the tobacco products labelling regulations currently under consideration are designed to help inform the public about the adverse health effects of tobacco use and to encourage cigarette smokers and users of other tobacco products to quit. This chapter analyses the potential benefits of the proposed regulations. It first provides background information on the effects of smoking on public health. It then discusses the potential impact of the proposed regulations on tobacco use, estimating the number of individuals who are likely to successfully quit smoking as a result of the new requirements. Based on these figures, the chapter then estimates the economic value of the health benefits resulting from reduced tobacco use, relying on projected reductions in smoking-related illnesses and the risk of premature death due to smoking.

HEALTH EFFECTS ASSOCIATED WITH TOBACCO USE

Concern over tobacco's harmful effects on the health of Canadians underlies Health Canada's interest in increasing the effectiveness of tobacco warning labels. The health effects associated with tobacco use include cancer, respiratory illness, cardiovascular disease, and other serious health conditions, many of which are potentially fatal. A study conducted by Rehm et al. (2006) found that tobacco-related deaths accounted for about 17 percent of all Canadian deaths in 2002, for a total of 515,607 potential years of life lost.[40] The discussion below provides information on the number of Canadians who use tobacco and the adverse consequences of tobacco use, including estimates of the number of illnesses and deaths attributable to smoking in a single year. This information serves as context for subsequent discussion of the potential benefits of the proposed *Tobacco Products Labelling Regulations*.

SMOKING RATES IN CANADA

Health Canada and its partners sponsor the Canadian Tobacco Use Monitoring Survey (CTUMS) to track changes in tobacco use nationwide. According to this survey, 17.9 percent of the population aged 15 years and older (4.9 million individuals) were smokers in 2008.[41] Approximately 75 percent of smokers smoked daily, averaging 14.9 cigarettes per day; the remaining smokers smoked less frequently. Smoking rates were slightly

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[40] Rehm, J., D. Baliunas, S. Brochu, B. Fischer, W. Gnam, J. Patra, S. Popova, A. Sarnocinska-Hart, and B. Taylor. 2006. *The Costs of Substance Abuse in Canada 2002.* Prepared for the Canadian Centre on Substance Abuse in collaboration with E. Adlaf, M. Recel, E. Single, and the Members of the Steering Committee.

[41] All CTUMS data are taken from: http://www.hc-sc.gc.ca/hc-ps/tobac-tabac/research-recherche/stat/_ctums-esutc_2008/ann-eng.php, as viewed October 2, 2009 (site last updated August 13, 2009). Unless otherwise noted, the data reported are best estimates from CTUMS Table 1; the CTUMS tables also report 95 percent confidence intervals.

higher among men than women: 20.1 percent of Canadian males (2.7 million individuals) aged 15 and older smoked, compared to 15.7 percent of females (2.2 million individuals) in the same age range.

Exhibit 6-1 summarizes CTUMS data on the distribution of smokers by age. As this exhibit shows, the smoking rate for the youngest group tracked, those 15 to 19 years old, was 14.8 percent. The rate rose to 27.3 percent for those 20 to 24 years of age. The rate was slightly lower for most of the older groups, with the lowest percentage of smokers in the 55 and above category.

EXHIBIT 6-1. DISTRIBUTION OF CURRENT SMOKERS BY AGE GROUP (2008)

AGE GROUP	PERCENT CURRENT SMOKERS	NUMBER OF CURRENT SMOKERS[1]
15-19	14.8 percent	0.3 million
20-24	27.3 percent	0.6 million
25-34	21.0 percent	1.0 million
35-44	18.9 percent	0.9 million
45-54	20.7 percent	1.1 million
55 and above	12.0 percent	1.0 million
Total, all ages	*17.9 percent*	*4.9 million*

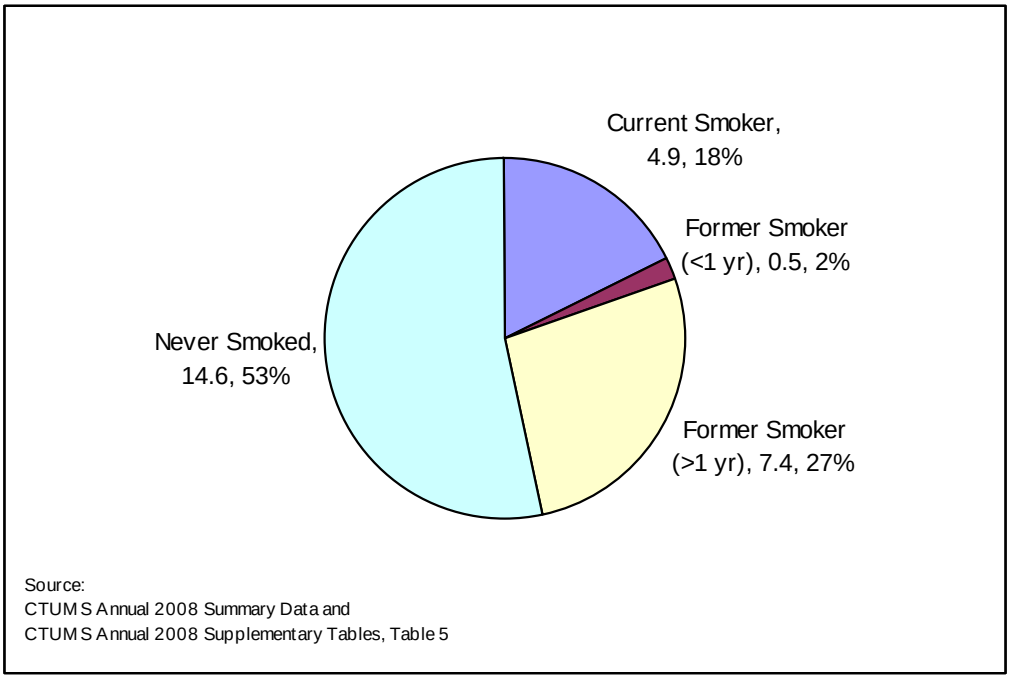
Source: Canadian Tobacco Use Monitoring Survey, 2008, Supplemental Table 1, http://www.hc-sc.gc.ca/hc-ps/tobac-tabac/research-recherche/stat/_ctums-esutc_2008/ann-table1-eng.php, as viewed October 2, 2009 (site last updated August 13, 2009).
Note:
1. Number of current smokers calculated from data presented in the source document.

CTUMS also provides data on the number of individuals who do not smoke (see Exhibit 6-2). As of 2008, 28.7 percent of the population aged 15 and above (7.9 million individuals) were former smokers, and 53.4 percent (14.6 million individuals) had never smoked. Of the former smokers, 94 percent had quit for a year or more, and 6 percent had quit for less than one year.[42]

In sum, in 2008, the Canadian population aged 15 and higher included 27.4 million individuals. Of this total, 14.6 million individuals had never smoked, 4.9 million were current smokers, and 7.9 million were former smokers. Appendix A provides data on smoking rates by province.

[42] CTUMS Table 5, http://www.hc-sc.gc.ca/hl-vs/tobac-tabac/research-recherche/stat/_ctums-esutc_2008/ann-table5-eng.php, as viewed October 2, 2009 (site last updated August 13, 2009).

EXHIBIT 6-2. SMOKING STATUS, ALL AGES, BOTH SEXES, IN MILLIONS, 2008

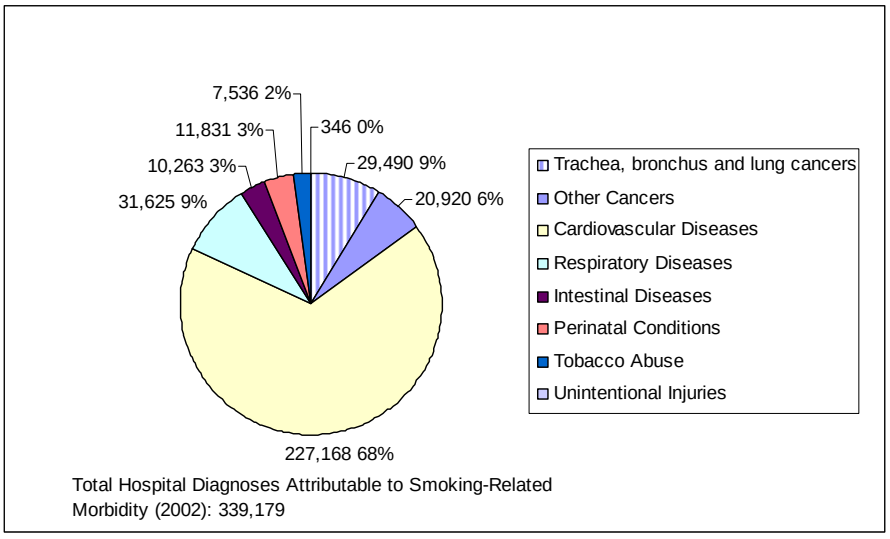


MORBIDITY EFFECTS OF TOBACCO USE

Tobacco use is associated with a range of health effects, including various cancers and cardiovascular and respiratory conditions. *The Costs of Substance Abuse in Canada 2002*, a report prepared under the auspices of the Canadian Centre on Substance Abuse, explores these effects (Rehm et al. 2006). This report, which is the most recent and complete analysis of the health effects of tobacco use, uses an attributable-fraction approach to estimate the number of associated cases of illness. For example, if tobacco use were the only cause of a health condition, the attributable fraction would be 100 percent. The attributable fraction represents the proportion of all cases of a condition in the population that would not have occurred if the effects of tobacco use were absent.

Exhibit 6-3 shows the number and percentage of hospital diagnoses attributable to tobacco-related morbidity in Canada for 2002; Appendix B provides a table that lists the conditions and summarizes the estimated number of hospital diagnoses for individual provinces. As indicated by the figure, tobacco use has been associated with a wide range of conditions, the most prevalent of which is cardiovascular disease, with over 200,000 diagnoses in 2002. Many of these conditions are relatively severe; the list includes illnesses such as lung cancer that can significantly affect quality of life and often result in reduced life expectancy. Rehm et al. (2006) report that the hospital stays related to these diagnoses totalled 2.2 million days, representing slightly over 10 percent of all days spent in Canadian acute care hospitals in 2002.

EXHIBIT 6-3. HOSPITAL DIAGNOSES ATTRIBUTABLE TO SMOKING BY CONDITION, 2002

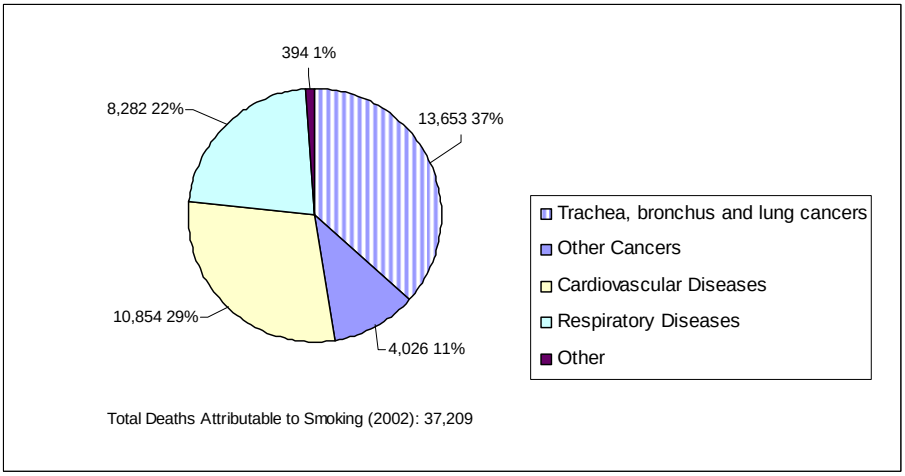


Source: Rehm et al., 2006. Note that totals may not sum due to rounding in source document.

MORTALITY EFFECTS OF SMOKING

Many of the conditions discussed above are likely to reduce life expectancy, resulting in premature death. Rehm et al. (2006) use attributable fractions to assess the effects of smoking on mortality rates. Exhibit 6-4 summarizes their national findings; Appendix C provides more detailed information at the provincial level.

EXHIBIT 6-4. NUMBER OF DEATHS ATTRIBUTABLE TO SMOKING BY CONDITION, 2002

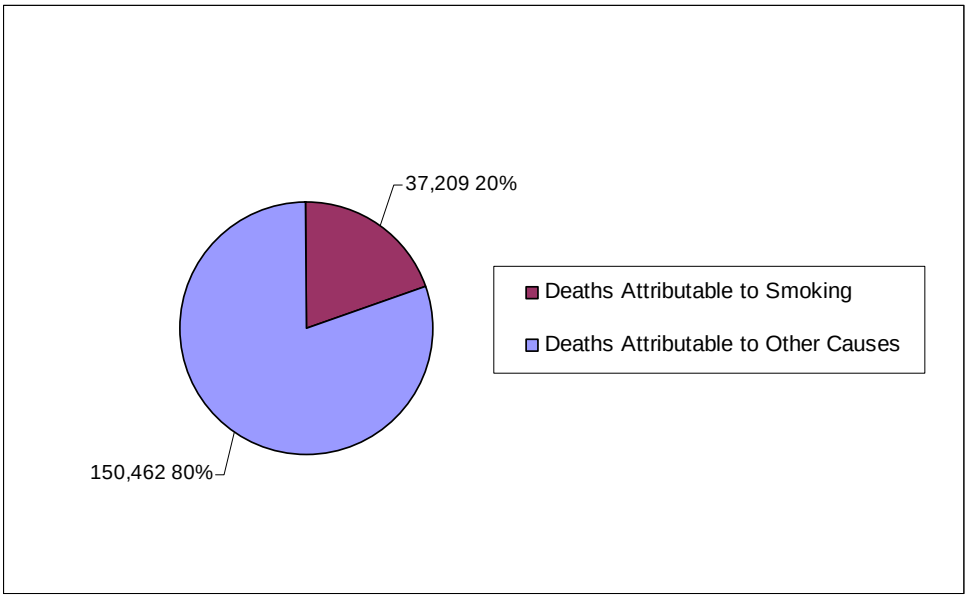


Source: Rehm et al., 2006. Note that totals may not sum due to rounding in source document.

As Exhibit 6-4 indicates, tobacco-related deaths are attributable largely to cancers, cardiovascular diseases, and respiratory conditions. The individual conditions resulting in the largest numbers of deaths include lung and related cancers (13,653 deaths), chronic obstructive pulmonary disease (7,533 deaths), and ischemic heart disease (5,922 deaths). In total, more men than women are affected, with 64 percent of the 37,209 deaths occurring among men and the remaining 36 percent among women. In general, these deaths tend to occur among older individuals; however, the study estimates 92 infant deaths, the result of sudden infant death syndrome or low birth weight/premature birth.

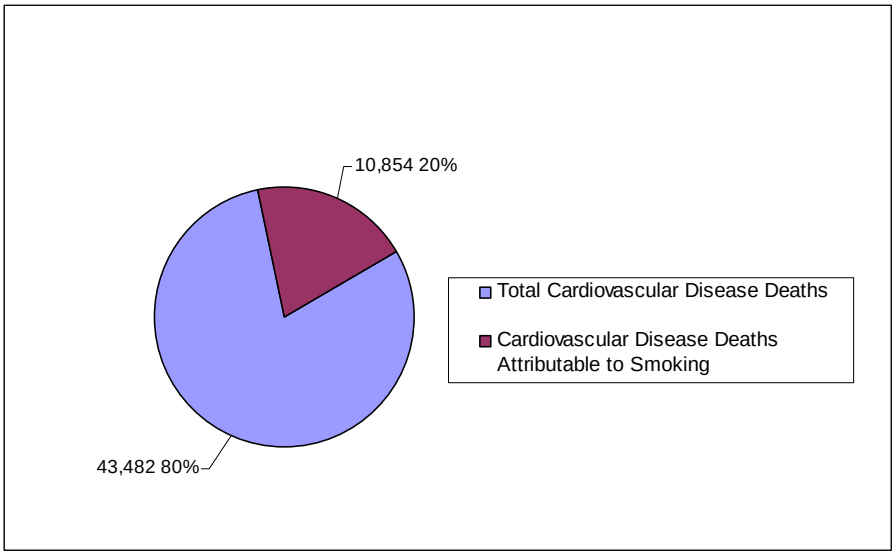
Exhibits 6-5, 6-6, and 6-7 show the total number of deaths attributable to tobacco use, as well as those attributable to other causes. Rehm et al. estimate that tobacco-related deaths accounted for approximately 20 percent of all Canadian deaths in 2002. For some conditions, they found that tobacco use was responsible for a sizable fraction of overall mortality. Specifically, they found that tobacco use accounted for 20 percent of deaths from cardiovascular disease and 31 percent of deaths from cancer (24 percent from lung cancer and 7 percent from other cancers). Furthermore, 91 percent of all lung cancer deaths are attributable to smoking.

EXHIBIT 6-5. TOTAL NUMBER OF DEATHS ATTRIBUTABLE TO SMOKING, 2002



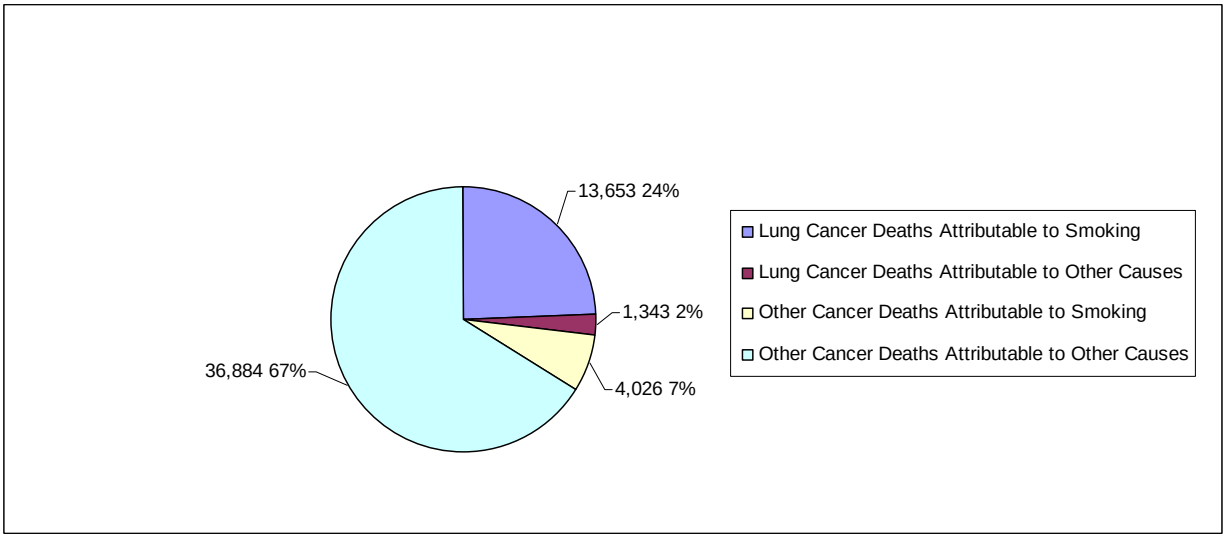
Source: Rehm et al., 2006. Note that totals may not sum due to rounding in source document.

EXHIBIT 6-6. NUMBER OF CARDIOVASCULAR DISEASE DEATHS ATTRIBUTABLE TO SMOKING, 2002



Source: Rehm et al., 2006. Note that totals may not sum due to rounding in source document.

EXHIBIT 6-7. NUMBER OF CANCER DEATHS ATTRIBUTABLE TO SMOKING, 2002



Source: Rehm et al., 2006. Note that totals may not sum due to rounding in source document.

IMPACT OF PROPOSED CHANGES IN LABELLING REQUIREMENTS ON TOBACCO USE

Developing an estimate of the potential impact of the new regulations on tobacco use presents a number of analytic challenges. Most notably, rigorous empirical estimates of the effect of warning labels on tobacco demand, either in Canada or elsewhere, have yet to be developed. In addition, much of the research on the efficacy of tobacco warning labels focuses on the impact of entirely new labelling programs, rather than the effect of enhancing or expanding an established program. These limitations suggest considerable uncertainty in estimating the effect of Health Canada's new requirements.

In light of the uncertainty noted above, we have developed a conservative estimate of the benefits of Health Canada's new labelling requirements, relying both on studies of how consumers process warning information and on observed trends in the way Canadian smokers pay attention to and think about the current warning labels. Appendix D provides a detailed review of the literature that provides the foundation for this approach, which rests on the following rationale:

- Studies have shown that the degree to which smokers react to and process the information provided in tobacco warning labels is significantly associated with behaviours related to smoking cessation.
- The effectiveness of product warning labels, both in communicating information on the adverse health effects attributable to tobacco use and in influencing cessation behaviour (increased desire to quit, quit attempts, and reduced consumption), tends to decrease over time as consumers become desensitized to the warnings and pay less attention to them. This effect, called "wear-out," has been observed among Canadian tobacco users.
- Design features addressed by the proposed changes to Health Canada's labelling requirements have been shown to mitigate the wear-out effect and can otherwise be expected to restore or increase the degree to which smokers react to and process the information provided in warning labels.
- If the proposed changes to the labelling requirements increase the extent to which smokers pay attention to and process the information provided by warning labels, then, relative to the status quo, the number of smokers who attempt to quit and succeed in stopping smoking is likely to increase.

The remainder of this section elaborates on this rationale, leading to an estimate of the impact of the new labelling requirements on tobacco use.[43] Our estimate of impacts is expressed as the number of tobacco users who would quit using tobacco each year as a result of the new requirements. As detailed below, this estimate is incremental to reductions in tobacco use that can be anticipated absent a change in labelling requirements.

[43] Much of the literature on the efficacy of tobacco warning labels focuses solely on cigarettes. The analysis assumes that the impacts of labelling requirements on cigarette use are representative of the impacts on consumption of other tobacco products.

THE WEAR-OUT EFFECT

Many studies have shown that the efficacy of advertising and health communications diminishes over time as the target audience becomes attuned to messages and pays less attention to them.[44] In a study on the effectiveness of highway safety messages in Australia, Fry (1996) discusses three stages in the response to an advertisement:

1. The advertisement generates an increasing response as the audience absorbs its message.
2. The response to the advertisement peaks.
3. The response declines as the audience becomes overexposed to the advertisement.[45]

The decline in effectiveness in the third stage is referred to as the "wear-out" effect, which can apply both to single messages and to advertising campaigns. There is evidence to suggest that this "wear-out" effect is occurring with the tobacco warning labels currently in use in Canada. As smokers pay less attention to the labels, the labels have less impact on influencing cessation behaviour. Drawing from a multiyear survey conducted by Environics Research Group, Exhibits 6-8 and 6-9 show how the percentage of both adult and youth smokers who report looking at or reading health warning messages on cigarette packages less than once a week has increased since the introduction of modified warning labels in 2001, while the percentage of smokers who report looking at or reading health warning messages at least once a day has decreased.

The Environics survey also tracked how often smokers noticed the cigarette pack insert or the information on chemicals and toxic substances, but no noticeable trend was found. Across all interview waves, fewer than 6 percent of adult smokers reported looking at or reading the insert or the toxic substances information once a day or more, while approximately 85 percent of smokers reported noticing either item less than once a week.[46]

As smokers pay less attention to the health warning messages on cigarettes, the effectiveness of the messages is likely to decrease. Data from the Environics survey of adult smokers suggest that labels may have become less effective in informing smokers about the adverse health effects of tobacco use and influencing behaviours related to smoking cessation. As Exhibit 6-10 shows, the percentage of adult smokers responding that the warning labels were "very effective" at increasing their desire to quit, getting

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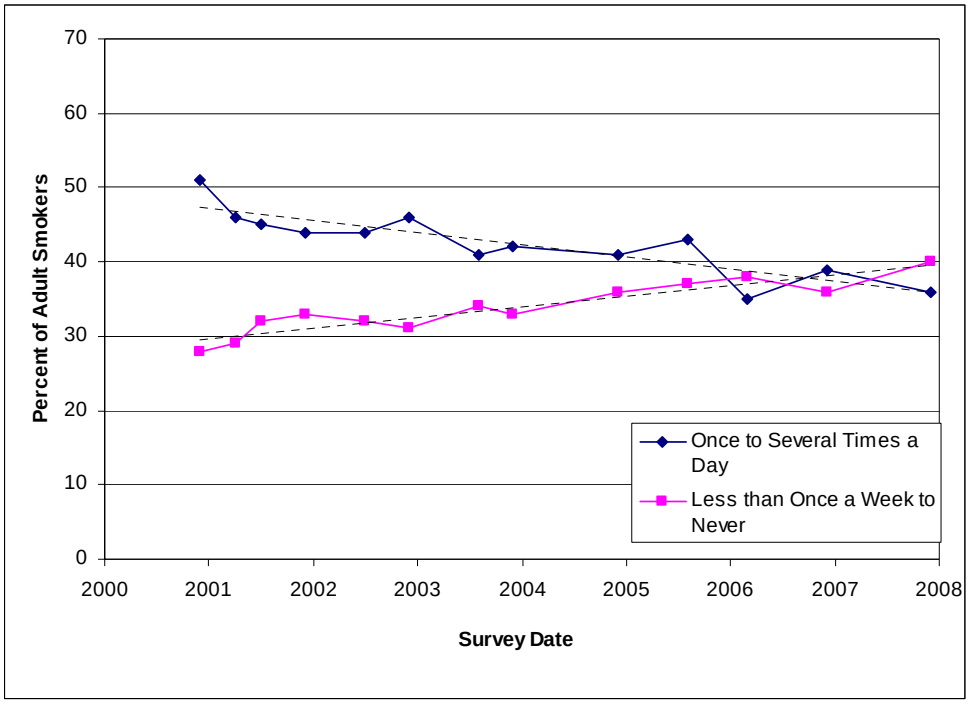
[44] Henderson, B. "Wear out: An empirical investigation of advertising wear-in and wear-out." *Journal of Advertising Research*. 2000; 6:95-100. Also: Borstein, R.F. "Exposure and effect: Overview and meta-analysis of research. *Psychological Bulletin*. 1989; 106:265-289. Both are cited in: Hammond, David. *Tobacco Labeling and Packaging: A Review of the Evidence*. University of Waterloo. 2007.

[45] Fry, T.R.L., Advertising wearout in the Transport Accident Commission Road Safety campaigns. *Accid. Anal. and Prev.*, Vol. 28, No. 1, pp.123-129, 1996.

[46] The changes in the labelling requirements that Health Canada plans to introduce are intended, in part, to address this shortcoming. The proposed new health information messages and toxic emissions statements have added features that are designed to attract and maintain the attention of users, including the use of more effective messages and the introduction of images/graphics.

them to attempt to quit, or getting them to smoke less has followed the three-stage pattern described above. The reported effectiveness of warning labels increased following their introduction in 2001, peaked during the three-year period between 2002 and 2004, and then subsided, declining or levelling off in the following four years.[47]

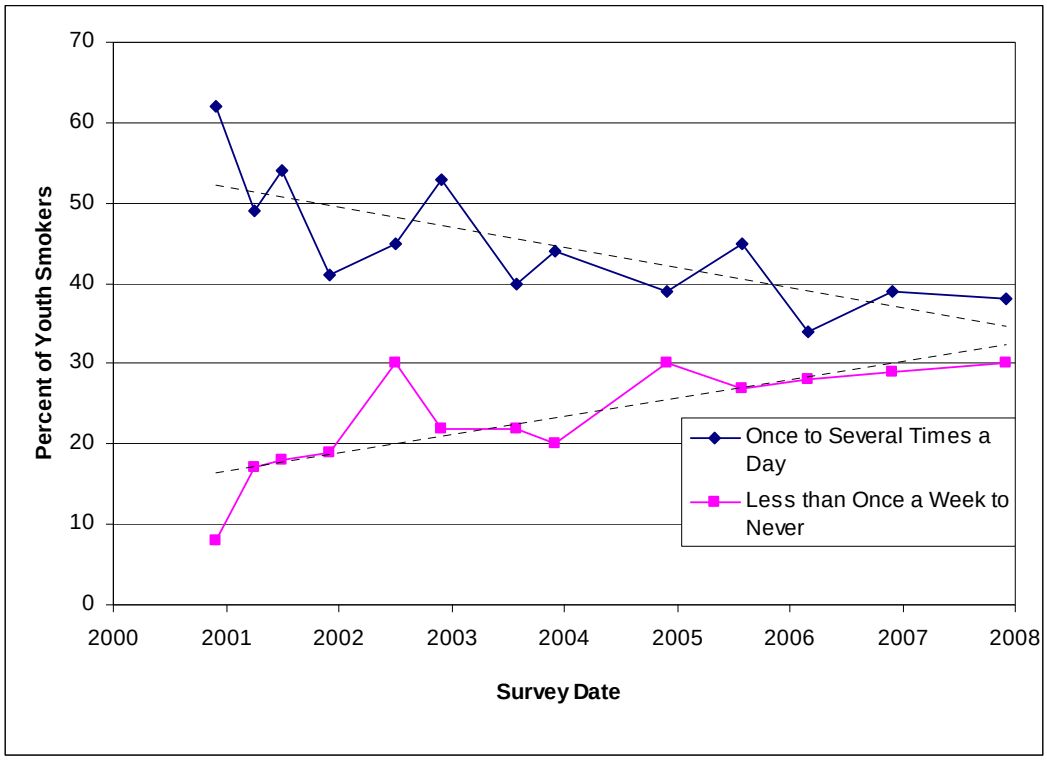
EXHIBIT 6-8. FREQUENCY WITH WHICH ADULT SMOKERS LOOK AT OR READ HEALTH WARNING MESSAGES ON CIGARETTE PACKAGES IN CANADA (N = 1000)



Source: Environics Research Group. The Health Effects of Tobacco and Health Warning Messages on Cigarette Packages—Survey of Adults and Adult Smokers: Wave 13 Surveys. Report prepared for Health Canada. 2008.

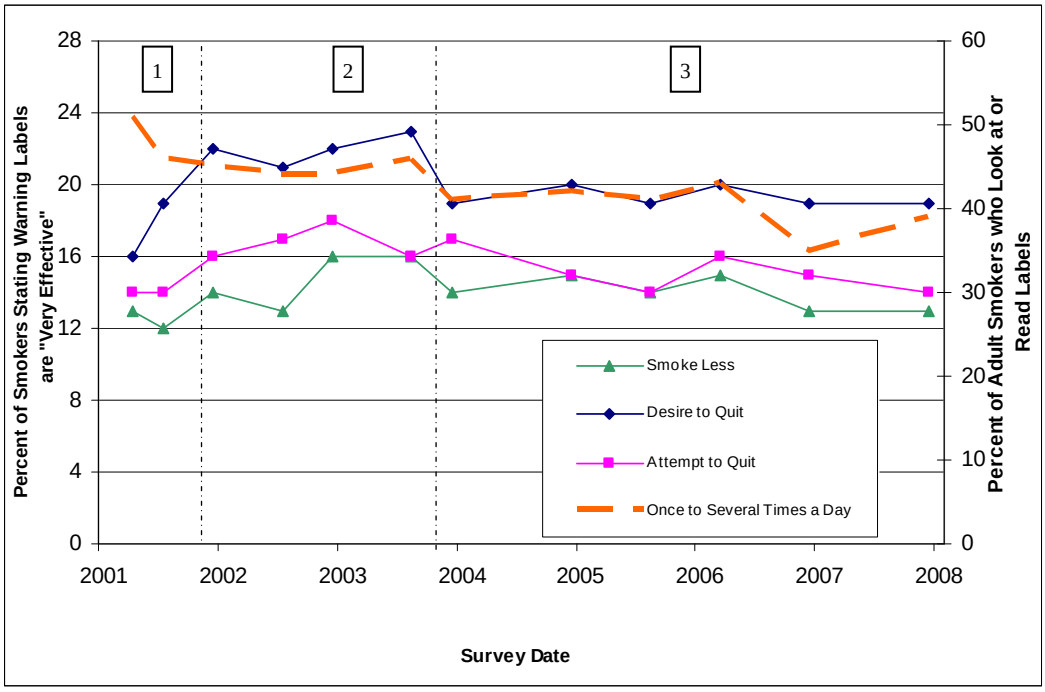
[47] Also of note, Health Canada accompanied the introduction of the new labels in 2001 with an intensive media campaign, which helped to increase awareness of the labels during the first few years after their introduction.

EXHIBIT 6-9. FREQUENCY WITH WHICH YOUTH SMOKERS LOOK AT OR READ HEALTH WARNING MESSAGES (N = 89)



Source: Environics Research Group. The Health Effects of Tobacco and Health Warning Messages on Cigarette Packages—Survey of Youth and Youth Smokers: Wave 13 Surveys. Report prepared for Health Canada. 2008.

EXHIBIT 6-10. EFFECTIVENESS OF HEALTH WARNING MESSAGES IN PROMOTING CESSATION-RELATED BEHAVIOUR AMONG ADULT SMOKERS (N = 1000)



Source: Environics Research Group. The Health Effects of Tobacco and Health Warning Messages on Cigarette Packages—Survey of Adults and Adult Smokers: Wave 13 Surveys. Report prepared for Health Canada. 2008.

Exhibit 6-10 also presents the percent of adult smokers who look at or read health warning messages once a day or more (initially shown in Exhibit 6-8) in order to show how the trend in attention paid to the labels roughly matches the trends in the reported effectiveness of the labels. Because the survey does not control for other factors that may have influenced smokers' attitudes towards smoking during the time period examined, it does not provide a precise estimate of the degree to which health warnings have become less effective at influencing cessation behaviours. Nevertheless, the results of the Environics surveys suggest that the effectiveness of tobacco warning labels in promoting cessation-related behaviours has fallen from the level achieved between two and four years after the introduction of new health warning messages. It is reasonable to assume that this difference is due to the "wear-out" effect and a lack of change in the messages featured on tobacco packages since 2000.

IMPACT OF PROPOSED CHANGES ON WARNING LABEL EFFECTIVENESS

The proposed changes to the tobacco labelling requirements are designed to continue to inform Canadians about the adverse health effects of tobacco consumption and restore or increase the effectiveness of labelling as a means of encouraging tobacco users to quit, as well as to discourage youth from initiating tobacco use. To this end, a major objective of many of the proposed changes is to eliminate or mitigate the wear-out effect. As noted in

Chapter 2, the proposed changes to the tobacco labelling requirements for cigarettes include the following features:

- ***Increased Size*** - Health warnings will be required to cover 75 percent of the prescribed display area, up from 50 percent.
- ***Design Changes with Images and Colour*** - Health warnings, health information messages, and emissions statements will feature new designs with coloured images, text, graphics, and/or backgrounds. Previously, only health warnings included images and colours.
- ***Rotation*** - Labels will feature a rotation of 32 health warnings, 16 health information messages, and 4 emissions statements. Previously, no rotation was used.
- ***Cessation Information*** – The information to be provided with each product will include a national tobacco cessation assistance telephone number and the internet address for a cessation assistance website.

A review of the literature has found studies indicating that each of the features listed above enhances labelling effectiveness.

- ***Increased Size*** - A study of tobacco labelling in the European Union found that smokers were more likely to pay attention to and reflect on bigger, more prominent health messages.[48] Other studies on Canadian labels have shown that smokers are more likely to recall larger warnings and have been found to equate the size of the warning with the magnitude of the risk.[49]
- ***Design Changes with Images and Colour*** - A study of warning labels in the U.S. and Canada found that packages that included both messages and visual images had the greatest negative effect (i.e., "fear appeal") on smokers.[50] Studies show that depth of cognitive or emotional response to labels is a predictor of behavioural compliance. In addition, a study of difficulties faced by less literate smokers in understanding tobacco warning labels found that such smokers are more likely to pay attention to images than to text.[51]
- ***Rotation*** - The World Health Organization's Guidelines for Implementing Article 11 of the WHO Framework Convention on Tobacco Control note that the impact of health warnings and messages tends to decrease over time as they

[48] Devlin, E., S. Anderson, G. Hastings, and L. Macfadyen. Targeting smokers via tobacco product labeling: opportunities and challenges for Pan European health promotion. *Health Promot Int*. 2005 Mar; 20(1):41-9. Epub 2005 Jan 28.

[49] Environics Research Group. The Health Effects of Tobacco and Health Warning Messages on Cigarette Packages—Survey of Adults and Adult Smokers: Wave 9 Surveys. Report prepared for Health Canada. 2005. Also: Environics Research Group Ltd. Reactions to cigarette packaging formats. Prepared for the Canadian Cancer Society, Focus Canada 1999-1 March 1999. Cited in Hammond, David. *Tobacco labeling and packaging: A review of the evidence.* University of Waterloo. 2007.

[50] Kees, J., S. Burton, J.C. Andrews, and J. Kozup. 2006. "Tests of graphic visuals and cigarette package warning combinations: implications for the framework convention on tobacco control." *Journal of Public Policy and Marketing* 25:212-223.

[51] Createc + Market Studies. Effectiveness of Health Warning Messages on Cigarette Packages in Informing Less-Literate Smokers: Final Report. Report prepared for Communication Canada. 2003.

are repeated.[52] A study of the impacts of Canadian warning labels in 2003 found that the relatively high number of different warnings likely contributed to the lack of wear-out found at that time.[53] WHO's guidelines note that changes in health warnings and messages are associated with increased effectiveness, and recommend frequent rotation of health warnings and messages in order to maintain saliency and enhance impact.[54]

- ***Cessation Information*** - Research in Europe, Australia, and Brazil has examined changes in the number of calls to national telephone "quitlines" after quitline contact information was included on warning labels.[55] All have shown that use of the quitlines increased following the introduction of the new warning labels. A study of the Australian Quitline found that the cessation assistance telephone service experienced a doubling of calls immediately after the Quitline number was included on warning labels.[56]

IMPACT OF PROPOSED CHANGES IN LABELLING REQUIREMENTS ON TOBACCO USE

Due to the difficulty of estimating the direct impact of labels on decreased tobacco use, many studies have examined the intermediary stages from exposure to labels to changes in smoking behaviour, i.e., measuring how consumers react to different aspects of warning labels' content or format and analyzing the correlations between consumers' reactions to the labels and their progress towards behavioural change. These studies rely on theoretical frameworks about how people receive and process information, how they make judgments based on the information, and how they change behaviour in accordance with that information. Numerous frameworks have been proposed, but most suggest that the most effective route to human behaviour change lies in frequent exposure to noticeable messages that encourage people to consider and form judgments about the information presented. Exhibit 6-11 provides a graphic illustration of one such model (for a more complete discussion of this conceptual model, see Appendix D).

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[52] Guidelines for Implementation of Article 11 of the WHO Framework Convention on Tobacco Control (Packaging and Labelling of Tobacco Products). http://www.who.int/fctc/guidelines/article_11.pdf As viewed October 2, 2009.

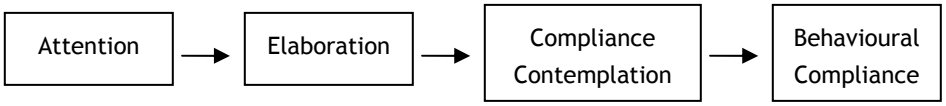
[53] Hammond, D., G.T. Fong, P.W. McDonald, R. Cameron, and K.S. Brown. "Impact of the graphic Canadian warning labels on adult smoking behavior." *Tobacco Control* 2003; 12:391-395.

[54] Guidelines for Implementation of Article 11 of the WHO Framework Convention on Tobacco Control (Packaging and Labelling of Tobacco Products). http://www.who.int/fctc/guidelines/article_11.pdf As viewed October 2, 2009.

[55] Willemsen, M.C., R.M. Van der Meer, and S. Bot. "Description, Effectiveness, and Client Satisfaction of 9 European Quitlines: Results of the European Smoking Cessation Helplines Evaluation Project (ESCHER)." Produced by STIVORO For the European Consortium of Quitlines. 2008. Also: Hammond, David. Tobacco Labeling and Packaging: A Review of the Evidence. University of Waterloo. 2007.

[56] Miller, C.L., D.J. Hill, P.G. Quester, and J.E. Hiller. Impact on the Australian Quitline of new graphic cigarette pack warnings including the Quitline number. *Tobacco Control*. 2009 Feb 11.

EXHIBIT 6-11. CONCEPTUAL MODEL OF THE ESSENTIAL STAGES OF CONSUMER INFORMATION PROCESSING



Source: Hassan, Louise M., Edward Shiu, James F. Thrasher, Geoffrey T. Fong, and Gerard Hastings. "Exploring the effectiveness of cigarette warning labels: findings from the United States and United Kingdom arms of the International Tobacco Control (ITC) Four Country Survey." *International Journal of Nonprofit and Voluntary Sector Marketing* 2008; 13:263-274.

Employing models similar to the one depicted above, several studies have measured the degree to which smokers pay attention to, reflect on, and form judgments about tobacco warning labels, and have estimated the impact that these measures have on intentions to quit and attempts to quit. Exhibit 6-12 presents several of these estimates, in the form of odds ratios (i.e., the odds that a smoker who pays attention to and reflects or elaborates upon a warning label will either think about quitting or attempt to quit, relative to the odds of a smoker who does not). Although the studies presented differ both in how they measure the ways smokers process warning labels and with respect to the cessation outcomes they examine, they all indicate that smokers who pay attention to and elaborate upon warning labels are significantly more likely to want to quit and attempt to quit than smokers who do not. For example, the most recent study, by Borland et al. (2009), used data from the International Tobacco Control survey of smokers in Canada, the U.K., the U.S., and Australia to estimate the impact of warning labels on attempts to quit. The authors created an index of "cognitive reactions" based on the extent to which warning labels made the respondent think about health risks, think about quitting, and feel more likely to quit. Employing a model that controls for pre-existing intentions to quit (Model B), the authors found that people with higher cognitive reactions were between 14 and 28 percent more likely to make a quit attempt than people with lower cognitive reactions. As explained in greater detail below, the analysis employs these odds ratios, in combination with an estimate of the degree to which the new labelling requirements will heighten cognitive processing and compliance contemplation (i.e., interest in quitting) among smokers, to estimate the potential impact of the proposed regulations on the number of smokers who are likely to attempt to quit over the next ten years.

EXHIBIT 6-12. ESTIMATES OF THE IMPACT OF SMOKERS' REACTIONS TO CANADIAN WARNING LABELS ON QUIT INTENTIONS AND QUIT ATTEMPTS

STUDY	MEASURE	ODDS RATIOS[1]	
		QUIT INTENTIONS	QUIT ATTEMPTS
Hammond et al. 2003	Depth of Cognitive Processing[2]	1.11	1.07[3]
Hammond et al. 2004	Emotional Reactions[4]	1.82	1.37[3]
Borland et al. 2009, Model A[5]	Cognitive Reactions[6]	not estimated	1.44-1.57
Borland et al. 2009, Model B[5]	Cognitive Reactions[6]	not estimated	1.14-1.28

Notes:
1. All odds ratios are significant at the 5 percent level.
2. Hammond et al. (2003) created an index of depth of processing from nine questions, including the extent to which smokers had attended to the warnings or reflected and elaborated on the warnings.
3. Hammond et al. (2003 & 2004) measure "cessation behaviour," defined as including quitting, attempts to quit, and reduced smoking.
4. Hammond et al. (2004) created an index of negative emotional reaction to the warning labels from questions about the extent to which smokers had felt fear or disgust as a result of the labels.
5. Borland et al. used data from the International Tobacco Control survey of smokers in Canada, the U.K., the U.S., and Australia. They link reactions to health warnings in one wave of surveys to impacts on cessation activity in the following wave. In Model A, the predictive impact of cognitive responses on cessation behaviour was estimated, controlling for demographic factors and cigarette consumption. In Model B, the authors also controlled for smokers' prior intentions to quit.
6. Borland et al. created an index of cognitive reactions based on questions that asked about the extent to which warnings made respondents think about health risks, made them more likely to quit smoking, and motivated them to think about quitting in the last 6 months.

Sources:
Hammond, D., et al. "Impact of the graphic Canadian warning labels on adult smoking behavior." *Tobacco Control* 2003; 12:391-395.
Hammond, D., et al. Graphic Canadian cigarette warning labels and adverse outcomes: evidence from Canadian smokers. *Am J Public Health*. 2004 Aug; 94(8):1442-5.
Borland, Ron, et al. How reactions to cigarette packet health warnings influence quitting: findings from the ITC Four-Country survey. *Addiction*. 104(4):669-675, April 2009.

IMPACT OF THE PAN-CANADIAN TOLL-FREE CESSATION HELPLINE AND WEBSITE

In addition to increasing awareness of the adverse health effects of tobacco use and potentially mitigating the wear-out effect, Health Canada's proposed regulations are expected to enhance smokers' attempts to quit by providing information on the pan-Canadian toll-free quitline telephone service (for additional information on this service, see Chapter 5). All ten provinces and the Northwest Territories currently operate toll-free smoking cessation service numbers; the national quitline service would seamlessly direct calls to the appropriate provincial or territorial service. Studies of tobacco warning labels in the Netherlands and the U.K. have shown that providing information about national quitlines in text-based warning labels can dramatically increase the number of calls made

to the quitline.[57] Another study by Miller et al. (2009) looked at graphic cigarette warning labels in Australia that included information about the national quitline.[58] That study found that the number of calls received rose by 100 percent in the year immediately after the new labels were introduced, then declined to a level 40 percent above the baseline in the following year.

In total, the provincial and territorial services currently receive approximately 80,000 calls per year.[59] Health Canada expects an increase in call volume of between 25 and 200 percent following the introduction of the national cessation assistance phone number.[60] For purposes of this analysis, we assume a call volume increase of 40 percent, consistent with the Australian experience and within Health Canada's projected range. If we assume that Canadian provincial quitlines currently serve 80,000 smokers annually (i.e., that each call represents a different individual), a 40 percent increase in call volume would result in an annual increase of 32,000 in the number of callers using quitline services.[61]

QUANTITATIVE ESTIMATE OF THE IMPACT OF PROPOSED CHANGES ON QUITTING

In order to assess the potential impact of the proposed changes in labelling requirements on tobacco use, the analysis employs a four-step approach:

1. ***Quantify the incremental impact of the proposed labelling design changes on compliance contemplation*** – The analysis quantifies the impact of reversing the wear-out effect by focusing on the "compliance contemplation" stage of consumer information processing, as measured by the percentage of adults who report that the labels are very effective in increasing their desire to quit. Using the Environics survey data presented in Exhibit 6-10, we first calculate the difference between the mean value for peak effectiveness in Stage 2 (22.0 percent) and the mean value for post-peak effectiveness in Stage 3 (19.3 percent). These data indicate that if Health Canada's new labelling requirements reverse the decline in effectiveness seen since 2004, the share of smokers who find the labels very effective in increasing their desire to quit will

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[57] Willemsen, M.C., C. Simons, and G. Zeeman. "Impact of the New EU Health Warnings on the Dutch Quit Line." *Tobacco Control* 2002;11:381-382. Also: Department of Health (UK), "Consultation on the Introduction of Picture Warnings on Tobacco Packs." London: The Crown (UK), 2006. Cited in Miller, C.L., D.J. Hill, P.G. Quester, and J.E. Hiller. Impact on the Australian Quitline of new graphic cigarette pack warnings including the Quitline number. *Tobacco Control*. 2009 Feb 11.

[58] Miller, C.L., D.J. Hill, P.G. Quester, and J.E. Hiller. Impact on the Australian Quitline of new graphic cigarette pack warnings including the Quitline number. *Tobacco Control*. 2009 Feb 11.

[59] Personal communication with Louise Bertrand, Controlled Substances and Tobacco Directorate, Health Canada.

[60] Personal communication with Louise Bertrand, Controlled Substances and Tobacco Directorate, Health Canada.

[61] All else equal, the assumption that each call represents a different individual may lead us to overstate the potential increase in the number of individuals served. This consideration is counterbalanced, however, by the possibility that the increase in call volume could be significantly greater than 40 percent. In addition, the assumption is consistent with an analysis presented in Willemsen, M.C., R.M. Van der Meer, and S. Bot. "Description, Effectiveness, and Client Satisfaction of 9 European Quitlines: Results of the European Smoking Cessation Helplines Evaluation Project (ESCHER)." Produced by STIVORO For the European Consortium of Quitlines. 2008. The Willemsen et al. report calculates point prevalence quit rates for quitlines by dividing the number of quitters by the number of calls.

increase by 2.7 percent. Within the framework of our conceptual model, this corresponds to a 2.7 percent increase in the number of smokers who engage in compliance contemplation.

2. ***Quantify the impact of increased compliance contemplation on quit attempts*** – We use the range of estimates from Borland et al., presented in Exhibit 6-12, to connect the estimated increase in compliance contemplation to an increase in the number of smokers each year who attempt to quit. Multiplying the 2.7 percent increase in compliance contemplation by the range of 14-28 percent provided by Borland et al. (Model B), we estimate that an additional 0.37 to 0.75 percent of smokers will attempt to quit each year as a result of the proposed changes to the warning labels.

3. ***Estimate the impact of increased quit attempts on quit success*** – Data from the 2008 CTUMS survey indicate that approximately 17 percent of smokers who made at least one attempt to quit smoking in the previous year identified themselves as former smokers, a point prevalence measure of quit success.[62] Measures of continuous abstinence, which only count smokers who have completely ceased smoking over a set period of time (usually one year), are more conservative than point prevalence measures. A review of quitlines in nine European countries that measured quit success using both point prevalence and continuous abstinence found that continuous abstinence success rates were about 51.8 percent as high as point prevalence success rates.[63] Using this ratio, we adjust the CTUMS quit success rate to 8.8 percent. We therefore calculate that the estimated 0.37-0.75 percent increase in the number of smokers each year who attempt to quit would result in an increase of 0.03-0.07 percent in the number of smokers who successfully quit each year as a result of the proposed regulations. Given a current baseline of 4.88 million smokers in Canada, this would equate to between 1,600 and 3,200 additional quitters per year.[64]

4. ***Quantify the additional, incremental impact of the pan-Canadian toll-free quitline service and website on quit success*** – As noted above, the inclusion of a pan-Canadian toll-free telephone number and web address on the new warning labels will link smokers to cessation services. We estimate that this step could result in an annual increase of 32,000 in the number of Canadian smokers using a cessation assistance service to aid their attempts to quit. The review of European quitlines found that between 9.4 percent and 16.0 percent of callers were successful in quitting, as measured by continuous abstinence of

[62] Quit success rate data were provided by Suzanna Keller, Epidemiologist at the Controlled Substances and Tobacco Directorate, Health Canada. A quit attempt is defined as a period of at least 24 hours of abstention from smoking. Information about the percentage of former smokers who relapse after an initial quit success is not available in CTUMS.

[63] Willemsen, M.C., R.M. Van der Meer, and S. Bot. "Description, Effectiveness, and Client Satisfaction of 9 European Quitlines: Results of the European Smoking Cessation Helplines Evaluation Project (ESCHER)." Produced by STIVORO For the European Consortium of Quitlines. 2008.

[64] The number of current smokers is taken from the 2008 CTUMS survey, available online at http://www.hc-sc.gc.ca/hc-ps/tobac-tabac/research-recherche/stat/ctums-esutc_2008_graph-eng.php.

12 months. These quit rates are between 0.6 percent and 7.2 percent higher than the estimated 8.8 percent success rate for Canadian smokers, most of whom do not currently use a cessation assistance service. Accordingly, we estimate that an annual increase of 32,000 in the number of smokers using a cessation assistance service would result in an increase of between 200 and 2,300 in the number of individuals who successfully quit smoking each year.[65]

Using the above process, we estimate that the proposal to renew the tobacco products labelling regulations would increase the number of individuals who successfully quit smoking by 1,800 to 5,500 per year, assuming a baseline of 4.88 million smokers.[66] Exhibit 6-13 summarizes the derivation of this estimate, which represents a relatively modest incremental impact on the number of Canadians who currently smoke: a reduction of 0.04-0.11 percent.

EXHIBIT 6-13. SUMMARY OF IMPACT ESTIMATION PROCESS

MEASURE	VALUE	SOURCE
Increase in the number of smokers who engage in compliance contemplation due to the proposed changes to tobacco warning labels (*CC*)	2.7 percent	Environics, 2008
Increased likelihood that smokers who engage in compliance contemplation will make a quit attempt (*QA*)	14 – 28 percent	Borland et al., 2009
Success rate of Canadian smokers who attempt to quit at least once within the past year – point prevalence measure (*QSPP*)	17 percent	CTUMS, 2008
Factor used to adjust from point prevalence quit success rate to continuous abstinence (12 months) quit success rate (**PPCA**)	51.8 percent	Willemsen et al., 2008
Success rate of Canadian smokers who quit and remain abstinent for at least 12 months – continuous abstinence measure (*QSCA = QSPP * PPCA*)	8.8 percent	Derived from above
Percent of smokers who successfully quit for 12 months or longer as a result of increased compliance contemplation (*PERQ = CC*QA*QSCA*)	0.03 – 0.07 percent	Derived from above
Total Smokers in Canada (*TS*)	4,880,000	CTUMS, 2008
Number of smokers who successfully quit each year as a result of increased compliance contemplation (*CCQ = PERQ*TS*)	1,600 – 3,200	Derived from above
Number of additional smokers per year using the national cessation assistance quitline and website (*UCAQ*)	32,000	Miller et al., 2009
Success rate of smokers who use the national cessation assistance quitline and website (*QSCAQ*)	9.4 - 16 percent	Willemsen et al., 2008
Increase in the number of smokers who successfully quit each year as a result of using the national cessation assistance quitline and website (*NCAQ = UCAQ * (QSCAQ – QSCA)*)	200 - 2,300	Derived from above
Number of smokers who successfully quit each year as a result of the proposed regulations (*TOTQ = CCQ + NCAQ*)	1,800 – 5,500	Derived from above

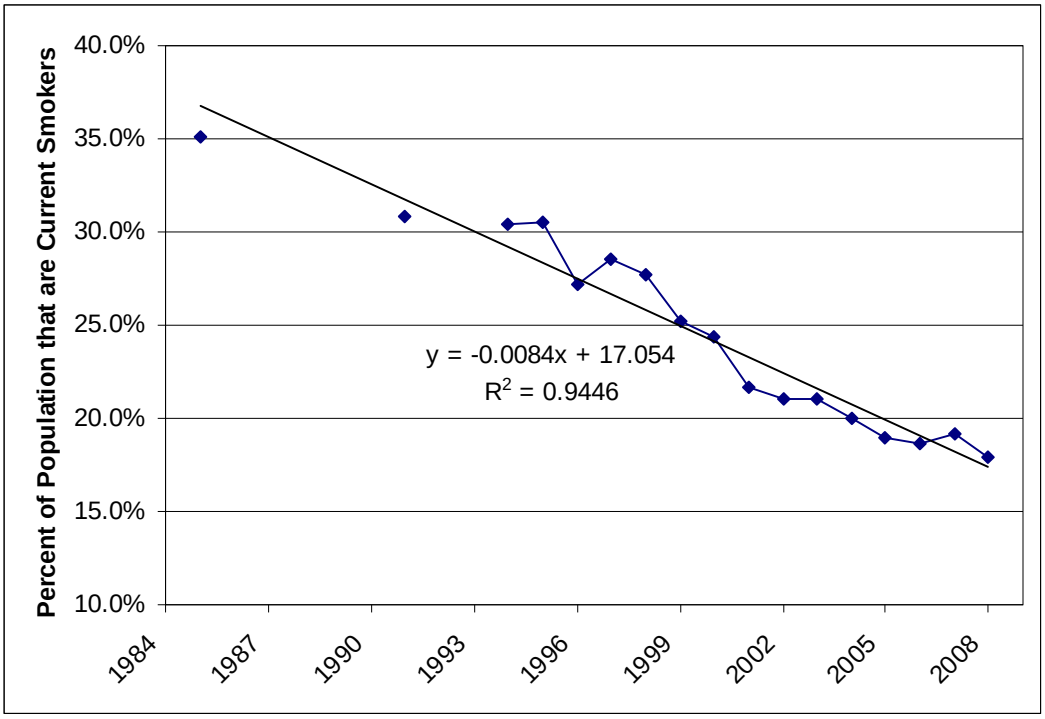
[65] This relatively wide range reflects the variation in quit success reported in Willemsen et al.'s review of European quitlines. Given the number of national services evaluated (nine), likely differences in the nature and quality of the services provided, and national differences in tobacco use and regulation, the degree of variation in quit success is not unexpected.

[66] As a frame of reference, CTUMS' 2008 survey estimates that approximately 470,000 Canadians identified themselves as former smokers who quit within the past year.

ADJUSTMENT FOR CHANGES IN SMOKING PREVALENCE

The impact estimate discussed above is based in part on the prevalence of smoking among Canadians in 2008. As Exhibit 6-14 shows, however, smoking prevalence in Canada has declined fairly steadily in recent years, from above 35 percent in 1985 to below 20 percent in 2008. Assuming smoking prevalence continues to decline in this fashion – at least in the short term – it is reasonable to assume that the incremental impact of the proposed regulations would be diminished.[67]

EXHIBIT 6-14. ESTIMATED SMOKING PREVALENCE IN CANADA, AGE 15 AND OVER



In order to account for the potential impact of the decline in smoking prevalence on the benefits of Health Canada's regulatory proposal, the analysis uses the trend line estimated above to project smoking prevalence from 2010 through 2019. It then employs these figures and the calculations outlined above to estimate the annual impact of the new regulations on the number of smokers who successfully quit each year. Exhibit 6-15 presents the results. As the exhibit indicates, the estimated impact of the new regulations on successful quit attempts declines each year, from a first-year impact that ranges from 1,720 to 5,240 to a tenth-year impact that ranges from 960 to 2,920. Over the full ten-year period, the analysis suggests that an additional 13,380 to 40,740 smokers will successfully quit as a result of the new labelling requirements.

[67] The linear trend line estimated in Exhibit 6-14 suggests that smoking prevalence will approach zero in 2030. This is an oversimplification; given the many determinants of smoking prevalence and the recent slowing of the decline in prevalence rates, it is unlikely that historic trends will continue without intervention.

EXHIBIT 6-15. ESTIMATED IMPACT OF THE NEW REGULATIONS ON SUCCESSFUL QUIT ATTEMPTS

YEAR	ESTIMATE OF TOTAL SMOKERS IN CANADA	INCREMENTAL INCREASE IN SUCCESSFUL QUIT ATTEMPTS
1	4,640,000	1,720 – 5,240
2	4,410,000	1,630 – 4,980
3	4,180,000	1,550 – 4,720
4	3,950,000	1,460 – 4,460
5	3,720,000	1,380 – 4,200
6	3,490,000	1,300 – 3,940
7	3,260,000	1,210 – 3,690
8	3,030,000	1,130 – 3,430
9	2,800,000	1,040 – 3,170
10	2,570,000	960-2,910
Total		13,380 – 40,740

BENEFITS OF REDUCED TOBACCO-RELATED MORTALITY

METHODOLOGY

The greatest benefit of the proposed regulations is likely to derive from reductions in the risk of premature mortality due to smoking. To estimate these benefits, the analysis builds on work conducted for Health Canada by Robinson (2008), which estimated the value of preventing someone aged 24 from starting to smoke.[68] The development of this value draws on "life tables" from Sloan et al. (2004) for both typical smokers (taking into account the likelihood of quitting over time) and for "non-smoking smokers" (i.e., similar individuals who do not smoke)[69] The life tables specify survival rates for each group on an annual basis, from ages 24 to 100, and are stratified by gender. As explained below, comparing the survival rates (or conversely, the mortality risks) for these two groups provides a basis for estimating the benefit of preventing a 24-year old from becoming a smoker; the analysis of the benefits of the new tobacco labelling requirements employs a similar approach to estimate the benefit of quitting smoking at various ages.

To value the reductions in mortality risks associated with quitting smoking, the analysis employs an estimate of the value of a statistical life (VSL). The VSL is an aggregated estimate of the value of small annual mortality risk changes in a population and is based on estimates of individual willingness-to-pay (WTP) to reduce one's own mortality risk by a small amount; these WTP estimates are derived primarily from wage-risk studies of workers across jobs of varying risk levels. The VSL represents the value of one

[68] Robinson, L.A. *Health Effects of Tobacco Use*, prepared for Health Canada, September 2008.

[69] Sloan, F.A., J. Ostermann, G. Picone, C. Conover, and D.H. Taylor, Jr. 2004. *The Price of Smoking*. Cambridge, MA: MIT Press.

"statistical life," not the value of saving a particular individual's life.[70] The analysis incorporates a central VSL estimate of $6.5 million (2007 dollars), as recommended by Chestnut and DeCivita (2008).[71] It also examines the sensitivity of the results to plausible changes in this value.

The analysis of mortality benefits begins by calculating the value of preventing a 24-year old from starting to smoke. Specifically:

- The analysis compares the survival rates for typical smokers to the survival rates for "non-smoking smokers," i.e., similar individuals who do not smoke. For each group, it converts the survival rates given in Sloan et al.'s life tables to estimates of annual death rates, calculating the probability of death for each year from age 24 to 100.[72] These probabilities are calculated separately for men and for women.
- In the second step, the mortality risk in each year is multiplied by the VSL to obtain the annual value of the risk of mortality at that age. Thus, if the chance of dying in a particular year is 1.0 percent (given survival to that year), the probability of death in that year is valued at $65,000 (0.01 * $6.5 million).
- Third, these annual values are discounted to a present value (at age 24) using the Treasury Board's recommended rate of 8 percent. These present values are calculated separately for males and females, and weighted by the percentage of the Canadian population of each gender that was age 24 in 2007.[73]
- Finally, the present value of the mortality risks for a non-smoking smoker are compared to the value for a typical smoker, to determine the value of avoiding the risk of dying at an earlier age as a result of smoking.

The steps above estimate the value of the reduced mortality risk for an averted smoker (i.e., an individual 24 years old or younger who chooses not to smoke). The benefits of the new labelling requirements, however, are likely to derive in large part from prompting

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[70] Although VSL values address private costs, incomplete understanding of the long term consequences of smoking and the difficulties of quitting mean that individuals who smoke may not correctly internalize the costs of their own behaviours. These values may overstate individual WTP for mortality risk reductions for those smokers who understand the risks but choose to smoke regardless, and may more accurately reflect the WTP of those who do not comprehend these risks. Because most regulations rely on individuals' decisions to voluntarily avoid smoking (i.e., do not ban smoking completely), it is likely that the individuals affected will be those who would not otherwise fully understand the risks, who are vulnerable to physiological or social factors than encourage smoking, or for whom the net benefits of smoking do not exceed the costs once regulatory barriers are implemented.

[71] Chestnut, L.G., and P. DeCivita. 2008. *Economic Valuation of Mortality Risk Reduction: Review and Recommendations for Policy Analysis*. Government of Canada Policy Research Initiative Working Paper Series 037. September. In comparison, the Treasury Board recommends a value of $6.37 million (2006 dollars), to be updated for inflation.

[72] Note that the calculation of annual mortality risks assumes, in each case, that an individual has survived through the prior year. To illustrate, consider an example in which a life table begins at age 24 with a value of 100,000, shows a value of 80,000 at age 25, and a value of 60,000 at age 26. The probability of mortality between the ages of 24 and 25 would be 0.2 ({100,000-80,000}/100,000). The probability of mortality between the ages of 25 and 26 would be 0.25 ({80,000-60,000}/80,000).

[73] According to data provided by Statistics Canada, 51 percent of the population aged 20-24 was female; the remaining 49 percent was male (http://www40.statcan.ca/l01/cst01/demo10a.htm, as viewed January 27, 2008, last updated November 29, 2007).

current smokers to quit. For those who quit at age 24 or below, the benefits are likely to be similar to those associated with averting smoking, since studies to date have yet to demonstrate that smokers who quit before age 24 experience a loss in life expectancy.[74] Conversely, those who quit at a later age will reduce their risk of a premature death, but on average are likely to die sooner than they would have if they had never smoked.

To measure the mortality benefits of smoking cessation later in life, the analysis develops life tables for typical smokers at age 35, 45, 55, and 65 and for former smokers who quit at these ages. The life tables for typical smokers are based on the survival probabilities presented for this group in Sloan et al. (2004); those for former smokers are based on the same values, but adjusted to take into account the mortality rates estimated in a 2002 paper by Taylor et al., which analysed changes in life expectancy for former smokers in the U.S., based on age and duration of smoking cessation.[75] The analysis compares the life tables for successful quitters to those for typical smokers to assess the change in mortality risks, and follows the valuation approach described above to estimate the present value of smoking cessation at different ages. Using CTUMS 2008 data on the distribution of quitters by age group, the analysis then generates a weighted-average present value of the averted mortality risks for an individual who successfully quits smoking. Multiplying this value by the number of tobacco users expected to quit as a result of the proposed regulations yields the total estimated benefit of reduced tobacco-related mortality due to the changes. Additional details on this approach may be found in Appendix E.

RESULTS

Using the methodology described above, we estimate that the reduction in the risk of premature mortality gained by the average former smoker has a present value – when quitting is achieved – of approximately $413,000. Exhibit 6-16 applies this value to the estimated impact of the regulations on smoking cessation (see Exhibit 6-15) to calculate the mortality benefits of the proposed regulations. As the exhibit shows, the annual benefits decline over the 10-year period analysed, from a high of $0.7 billion to $2.2 billion in the year immediately following implementation of the regulations to a low of from $0.4 billion to $1.2 billion at the end of the period. At an annual discount rate of 8 percent, the present value of this anticipated stream of benefits ranges from $3.8 billion to $11.7 billion.

[74] Sloan, F.A., J. Ostermann, G. Picone, C. Conover, and D.H. Taylor, Jr. 2004. *The Price of Smoking*. Cambridge, MA: MIT Press.

[75] Taylor, D.H. Jr., V. Hasselblad, S.J. Henley, M.J. Thun and F.A. Sloan. "Benefits of smoking cessation for longevity." *American Journal of Public Health*, 92(9):1389. 2002.

EXHIBIT 6-16. BENEFITS OF REDUCED TOBACCO-RELATED MORTALITY (8 PERCENT ANNUAL DISCOUNT RATE)

YEAR	INCREASE IN SUCCESSFUL QUIT ATTEMPTS	MORTALITY BENEFITS (MILLION 2007$)
1	1,720 – 5,240	$710 - $2,160
2	1,630 – 4,980	$680 - $2,060
3	1,550 – 4,720	$640 - $1,950
4	1,460 – 4,460	$600 - $1,840
5	1,380 – 4,200	$570 - $1,740
6	1,300 – 3,940	$530 - $1,630
7	1,210 – 3,690	$500 - $1,520
8	1,130 – 3,430	$460 - $1,420
9	1,040 – 3,170	$430 - $1,310
10	960 – 2,910	$390 - $1,200
Present Value (8 Percent Discount Rate)		$3,850 - $11,740

BENEFITS OF REDUCED TOBACCO-RELATED MORBIDITY

METHODOLOGY

An additional benefit of the proposed regulations is the likely reduction in illnesses attributable to smoking. Ideally, the analysis would forecast the anticipated change in the number of such illnesses over time, and value the reduction in the incidence of each illness based on an estimate of willingness to pay to avoid it. The number of illnesses attributable to smoking, however, is large, and primary research on willingness to pay to avoid this wide range of illnesses is lacking. In the absence of such research, this analysis relies on a cost-of-illness approach to characterise the benefits of reduced tobacco-related morbidity. Cost-of-illness studies do not measure willingness to pay; rather, they estimate the financial burden of an illness based on the actual direct (e.g., medical expenses such as hospital visits and medication) and indirect (e.g., lost wages) costs incurred by affected individuals. For a number of reasons, including failure to capture willingness to pay to avoid pain and suffering, cost-of-illness studies are generally assumed to understate the benefits of health improvements. Thus, this analysis is likely to provide a conservative (i.e., low) estimate of the benefits of reduced tobacco-related morbidity.

To obtain cost-of-illness values, including averted direct medical expenditures and indirect productivity costs, we rely on *The Costs of Substance Abuse in Canada 2002*.[76] As previously noted, this study uses attributable fractions to estimate the number of cases of illnesses associated with tobacco use. For each condition, Rehm et al. then derive data

[76] Rehm, J., D. Baliunas, S. Brochu, B. Fischer, W. Gnam, J. Patra, S. Popova, A. Sarnocinska-Hart, and B. Taylor. 2006. *The Costs of Substance Abuse in Canada 2002.* Prepared for the Canadian Centre on Substance Abuse in collaboration with E. Adlaf, M. Recel, E. Single, and the Members of the Steering Committee.

on typical expenditures per case from sources maintained by the Canadian Institute for Health Information. Direct health care expenditures are divided among four cost categories: acute care hospitalization, ambulatory care (physician fees), family physician visits, and prescription drugs. In addition to estimating direct medical expenditures associated with tobacco-related morbidities, Rehm et al. also estimate the short-term disability costs of such illnesses, i.e., the forgone wages from lost productivity due to bed days and reduced activity.[77] The analysis employs these values to estimate the costs of smoking-related illnesses.[78]

The Costs of Substance Abuse in Canada 2002 estimates costs based on the prevalence of tobacco-related illnesses in a specific year, 2002, rather than on the incidence of smoking. Accordingly, the study does not provide estimates of the annual or lifetime morbidity-related costs faced by a single smoker. For purposes of this analysis, we derive a rough estimate of per-smoker costs. Recognizing that tobacco-related illnesses generally take several years to manifest themselves, we develop this estimate by dividing Rehm et al.'s cost estimates for 2002 by the number of smokers in 1991.[79] Using smoking prevalence data from the 1991 General Social Survey and population data from the Canadian Census, we estimate that there were about 6.56 million smokers above the age of 15 in 1991.[80] Exhibit 6-17 presents the resulting estimate of morbidity costs per smoker: an average of $751 per year.

We employ our estimate of average annual morbidity costs per smoker to estimate the present value of reduced morbidity costs for a typical former smoker. Using CTUMS data on the distribution of successful quitters in 2008, we estimate that the average age of individuals who quit smoking is 40. We then derive survival probabilities for each age between 40 and 100 using the life tables for smokers who quit at age 45. We multiply these survival probabilities by the average annual cost of tobacco-related morbidity per smoker ($751); this calculation yields the expected value of avoided morbidity costs at each year of life from age 40 to 100. Finally, we estimate the present value of this stream of avoided costs, assuming an annual discount rate of 8 percent.

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[77] The study also estimates the costs of long-term disability, but in a manner that is inconsistent with its estimates of direct medical expenditures and short-term disability costs. For purposes of this analysis, we do not consider the indirect costs of tobacco use due to long-term disability. As a result, our estimate of the benefits of avoided tobacco-related morbidity is likely biased downward.

[78] Rehm et al. also estimate other costs attributable to smoking, such as the cost of prevention and research programs or the damage to property caused by smoking-related fires. These and other costs unrelated to morbidity are excluded from our analysis.

[79] We use 1991 data because smoking prevalence data are not available for 1992 or 1993. Because there were more Canadian smokers in 1991 than in 2002, dividing total costs by the number of smokers in 1991 yields a lower estimate of the average annual cost of illness per smoker. All else equal, the use of a lower estimate of the costs of illness per smoker will yield a lower estimate of the costs averted by successfully encouraging smokers to quit, and thus a lower estimate of the benefits of the proposed regulations.

[80] Smoking prevalence data from the General Social Survey are presented in Gilmore, Jason. "Report on Smoking in Canada 1985 to 2001." Statistics Canada Research Paper. 2002. Census data are available at http://www40.statcan.gc.ca/l01/cst01/educ40a-eng.htm. Accessed August 5, 2009.

EXHIBIT 6-17. DIRECT AND INDIRECT COSTS OF SMOKING-RELATED MORBIDITY (2002)

COST CATEGORY	COST	
	TOTAL COST IN 2002 (MILLIONS OF 2007 DOLLARS)	AVERAGE ANNUAL COST PER SMOKER (2007 DOLLARS)
Direct Health Care Costs		
Acute Care Hospitalization	$2,840	$434
Ambulatory Care (Physician Fees)	$159	$24.2
Family Physician Visits	$342	$52.1
Prescription Drugs	$1,520	$231
Subtotal, Direct Costs	*$4,860*	*$741*
Indirect Costs (Productivity Losses)		
Short-Term Disability – Bed Days	$27.2	$4
Short-Term Disability – Reduced Activity	$40.4	$6
Subtotal, Indirect Costs	*$67.6*	*$10*
Total, Direct and Indirect Costs	**$4,930**	**$751**

RESULTS

Using the methodology described above, we estimate that the morbidity benefits realised by the average former smoker have a present value – at the time he or she quits smoking – of $8,533. Exhibit 6-18 applies this value to the estimated impact of the regulations on smoking cessation (see Exhibit 6-15) to calculate the morbidity benefits of the proposed regulations. As the exhibit shows, annual benefits decline over the 10-year period analysed, from a high of $15 million to $45 million in the year immediately following implementation of the regulations to a low of from $8 million to $25 million at the end of the period. At an annual discount rate of 8 percent, the present value of this anticipated stream of benefits ranges from $80 million to $240 million.

Because the morbidity benefits estimated above reflect the value of reducing the incidence of smoking-related illness, they cannot be compared directly to the prevalence values given in Rehm et al. As context, however, it is possible to compare our estimate of morbidity benefits for a single year to the values provided by Rehm et al. For example, we estimate that the regulations will lead to an additional 1,720 to 5,240 successful quit attempts in the year they first take effect. At an average cost per smoker of $751 per year (see above), this suggests a one-year reduction in morbidity costs ranging from $1.3 million to $3.9 million. This would represent a reduction of from 0.03 percent to 0.08 percent in Rehm et al.'s estimate of the annual costs of illness attributable to smoking: $4.9 billion (see above).

EXHIBIT 6-18. BENEFITS OF REDUCED TOBACCO-RELATED MORBIDITY (8 PERCENT ANNUAL DISCOUNT RATE)

YEAR	INCREASE IN SUCCESSFUL QUIT ATTEMPTS	MORBIDITY BENEFITS (MILLION 2007$)
1	1,720 - 5,240	$15 - $45
2	1,630 - 4,980	$14 - $43
3	1,550 - 4,720	$13 - $41
4	1,460 - 4,460	$13 - $38
5	1,380 - 4,200	$12 - $36
6	1,300 - 3,940	$11 - $34
7	1,210 - 3,690	$10 - $32
8	1,130 - 3,430	$10 - $29
9	1,040 - 3,170	$9 - $27
10	960 - 2,910	$8 - $25
Present Value (8 Percent Discount Rate)		$80 - $240

SUMMARY AND DISCUSSION

TOTAL BENEFITS

Exhibit 6-19 summarizes the estimated benefits of the proposed regulations over the ten-year period analysed. As the exhibit shows, annual benefits range from a high of $0.7 billion to $2.2 billion in the year immediately following implementation of the regulations to a low of from $0.4 billion to $1.2 billion at the end of the period. In each year, reductions in mortality risks account for approximately 98 percent of the total benefits, while reductions in tobacco-related morbidity account for approximately 2 percent. At an annual discount rate of 8 percent, the present value of this anticipated stream of benefits ranges from $3.9 billion to $12.0 billion.

It is important to note that the benefits estimates presented in Exhibit 6-19 depend upon a number of key assumptions. In particular, both the annual benefits estimates and the present value of these estimates depends upon the use of an 8 percent annual discount rate. In addition, the mortality benefits depend upon the assumed value of a statistical life: $6.5 million. To test the sensitivity of the analysis to these assumptions, Appendix F provides alternative results based on an annual discount rate of 3 percent. In addition, the appendix illustrates the sensitivity of the results to the use of two alternative VSL estimates: $3.5 million and $9.5 million.

EXHIBIT 6-19. ESTIMATED BENEFITS OF THE PROPOSED REGULATIONS

YEAR	INCREASE IN SUCCESSFUL QUIT ATTEMPTS	BENEFITS (MILLION 2007$, 8 PERCENT DISCOUNT RATE)		
		MORTALITY	MORBIDITY	TOTAL
1	1,720 - 5,240	$710 - $2,160	$15 - $45	$730 - $2,210
2	1,630 - 4,980	$680 - $2,060	$14 - $43	$690 - $2,100
3	1,550 - 4,720	$640 - $1,950	$13 - $41	$650 - $1,990
4	1,460 - 4,460	$600 - $1,840	$13 - $38	$620 - $1,880
5	1,380 - 4,200	$570 - $1,740	$12 - $36	$580 - $1,770
6	1,300 - 3,940	$530 - $1,630	$11 - $34	$550 - $1,660
7	1,210 - 3,690	$500 - $1,520	$10 - $32	$510 - $1,550
8	1,130 - 3,430	$460 - $1,420	$10 - $29	$470 - $1,440
9	1,040 - 3,170	$430 - $1,310	$9 - $27	$440 - $1,340
10	960 - 2,910	$390 - $1,200	$8 - $25	$400 - $1,230
Present Value (8 Percent Discount Rate)		$3,850 - $11,740	$80 - $240	$3,930 - $11,980

DISCUSSION

This analysis is based on a number of simplifying assumptions. For the most part, these assumptions have led us to generate conservative estimates of the benefits of the proposed changes. Below we briefly discuss how our approach has dealt with key uncertainties, as well as our expectation of the impact of these uncertainties on our estimate of total benefits.

- ***We assume that smokers who successfully quit remain abstinent.*** We have attempted to take into account the likelihood of relapse by basing the benefits analysis on an estimate of the impact of the regulations in increasing "successful" quit attempts, as defined by continuous abstinence for a period of at least 12 months, rather than quit attempts per se. The calculation of both morbidity and mortality benefits assumes that those who successfully quit remain abstinent. To the extent that they do not, the analysis may overstate the benefits of the new requirements.
- ***We do not rely on studies that directly estimate the impact of warning labels on tobacco use.*** To date, studies that attempt to directly estimate the impact of labels on tobacco use have focused on requirements that are already in effect in Canada, rather than on the changes currently proposed. Estimates from studies that examine the introduction of warning labels or the use of colour photographs in health warning messages would likely lead to overestimating the impact of the proposed changes on tobacco use.

- ***We assume that the proposed changes will restore the effectiveness of warning labels – as measured by their impact on a smoker's desire to quit (i.e., to contemplate compliance behaviour) – to levels that the current labels once achieved***. As data from the Environics survey show, a greater percentage of Canadian smokers paid attention to tobacco warning labels and claimed that the labels were effective in encouraging them to smoke less or quit in 2003 than in late 2007. Our proposed approach assumes a return to levels of effectiveness that have historically been achieved and does not require projections of behavioural changes that have no precedent. If the new labels prove more effective than the old labels at increasing the number of smokers with a strong desire to quit, then our analysis may underestimate total benefits.
- ***We do not estimate the impact of the warning labels in preventing uptake of smoking***. Because we have relied on studies that link cognitive processing of warning labels with attempts to quit smoking, we have focused on how the labels will increase the number of smokers who quit, rather than the number of people who never begin to smoke or the number of former smokers who successfully remain abstinent. Accordingly, it is likely that the proposed changes will have benefits beyond those estimated.
- ***We assume that the recent decline in smoking prevalence will continue***. When adjusting our estimate of annual benefits to account for future declines in smoking prevalence, we assume that recent declines in prevalence will continue. To the extent that this trend could level off as it becomes harder to encourage the remaining smokers to quit, our estimates may understate the benefits of the proposed amendments.
- ***We base our estimates of reduced premature mortality on the health impacts of cigarette smoking***. Although the estimate of the costs of tobacco-related morbidity by Rehm et al. (2006) includes the effects of cigarette smoking and other forms of tobacco use, the research on which we base our estimates of mortality benefits does not. Accordingly, the mortality benefits attributable to reductions in tobacco use could exceed our estimate.

APPENDIX A

DISTRIBUTION OF CURRENT SMOKERS BY AGE GROUP AND PROVINCE

DISTRIBUTION OF CURRENT SMOKERS BY AGE GROUP AND PROVINCE (2006)[1]											
Age Group	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL	Total
15-19											
Population Estimate	284,000	242,000	76,000	86,000	868,000	493,000	48,000	61,000	10,000	32,000	2,201,000
Percent Current Smokers	15.2%	16.0%	20.0%	17.0%	12.7%	16.6%	14.1%	14.4%	13.7%	14.7%	14.8%
Number of Current Smokers [2]	43,168	38,720	15,200	14,620	110,236	81,838	6,768	8,784	1,370	4,704	325,748
20-24											
Population Estimate	311,000	274,000	76,000	85,000	882,000	479,000	49,000	62,000	10,000	31,000	2,259,000
Percent Current Smokers	21.0%	29.2%	27.0%	24.5%	27.2%	30.7%	29.0%	26.3%	30.8%	28.2%	27.3%
Number of Current Smokers [2]	65,310	80,008	20,520	20,825	239,904	147,053	14,210	16,306	3,080	8,742	616,707
25-44											
Population Estimate	1,248,000	1,085,000	256,000	320,000	3,731,000	2,147,000	202,000	246,000	36,000	137,000	9,407,000
Percent Current Smokers	14.7%	21.5%	23.1%	24.7%	18.3%	22.9%	22.6%	23.8%	21.4%	25.1%	19.9%
Number of Current Smokers [2]	183,456	233,275	59,136	79,040	682,773	491,663	45,652	58,548	7,704	34,387	1,871,993
45 and above											
Population Estimate	1,872,000	1,241,000	399,000	464,000	5,106,000	3,303,000	329,000	413,000	60,000	228,000	13,415,000
Percent Current Smokers	13.6%	18.4%	17.4%	18.2%	14.5%	15.4%	17.8%	17.1%	16.9%	17.0%	15.4%
Number of Current Smokers [2]	254,592	228,344	69,426	84,448	740,370	508,662	58,562	70,623	10,140	38,760	2,065,910
Total, 15 and above											
Population Estimate	3,715,000	2,842,000	807,000	956,000	10,586,000	6,422,000	628,000	783,000	115,000	428,000	27,282,000
Percent Current Smokers	14.7%	20.4%	20.3%	20.8%	16.8%	19.1%	19.9%	19.7%	19.2%	20.2%	17.9%
Number of Current Smokers [2]	546,105	579,768	163,821	198,848	1,778,448	1,226,602	124,972	154,251	22,080	86,456	4,883,478

Source: Canadian Tobacco Use Monitoring Survey, 2008, Supplemental Table 2, http://www.hc-sc.gc.ca/hc-ps/tobac-tabac/research-recherche/stat/_ctums-esutc_2008/ann-table2-eng.php, as viewed October 7, 2009 (site last updated August 13, 2008).

Notes:
1. Entries may not sum to totals reported due to rounding in source materials.
2. Number of current smokers calculated from data presented in the source materials.

APPENDIX B

HOSPITAL DIAGNOSES ATTRIBUTABLE TO SMOKING-RELATED MORBIDITY

NUMBER OF HOSPITAL DIAGNOSES ATTRIBUTABLE TO SMOKING-RELATED MORBIDITY BY PROVINCE, 2002[1]														
	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL	YT	NT	NU	Total
ACTIVE SMOKERS														
Malignant neoplasms (cancers)														
Oropharyngeal cancer	322	278	105	151	1,115	977	98	111	10	66	3	4	4	3,244
Oesophageal cancer	233	117	69	68	644	437	44	66	9	34	2	1	2	1,725
Stomach cancer	86	63	31	30	300	196	20	26	2	22	2	1	1	780
Pancreatic cancer	139	109	42	43	404	276	28	35	6	19	0	0	1	1,101
Laryngeal cancer	99	103	38	47	462	307	31	61	8	27	2	0	1	1,187
Trachea, bronchus and lung cancers	3,326	2,423	1,227	1,112	10,946	7,187	724	1,202	150	559	28	17	27	28,929
Cervical cancer	185	170	52	53	437	341	34	64	3	36	4	2	1	1,381
Urinary tract cancer	1,126	869	451	409	4,285	2,645	267	402	47	207	4	5	10	10,728
Renal cell carcinoma	129	107	49	45	438	288	29	52	5	24	1	2	1	1,169
Bladder cancer	931	703	382	348	3,788	2,249	227	303	41	186	2	2	8	9,169
Acute myeloid leukemia	80	80	17	29	321	190	19	22	2	12	0	1	1	775
Subtotal, malignant neoplasms[2]	*5,596*	*4,212*	*2,033*	*1,942*	*18,914*	*12,557*	*1,266*	*1,989*	*236*	*982*	*45*	*31*	*46*	*49,849*
Cardiovascular diseases														
Ischaemic heart disease	9,643	11,365	4,008	3,928	39,741	25,393	2,560	3,724	387	1,784	42	35	95	102,704
Pulmonary circulatory disease	1,883	2,911	732	767	7,243	4,955	499	554	51	219	2	15	18	19,852
Cardiac arrhythmias	3,105	3,483	1,230	1,127	11,138	7,290	734	924	106	428	18	11	27	29,624
Heart failure	2,358	2,837	1,109	930	9,276	6,010	606	732	110	422	14	14	21	24,434
Cerebrovascular diseases	2,144	1,853	746	654	7,117	4,223	425	539	101	286	13	13	15	18,129
Atherosclerosis	2,523	3,030	907	920	8,518	5,948	600	846	111	490	15	3	22	23,933
Subtotal, cardiovascular diseases	*21,656*	*25,479*	*8,731*	*8,325*	*83,033*	*53,818*	*5,425*	*7,319*	*866*	*3,632*	*103*	*90*	*199*	*218,675*
Respiratory diseases														
Pneumonia and influenza	2,404	2,196	1,073	826	8,221	5,338	538	737	131	339	20	52	20	21,894
Chronic obstructive pulmonary disease	856	1,335	600	374	3,329	2,416	244	334	84	143	4	4	9	9,731
Subtotal, respiratory diseases	*3,260*	*3,532*	*1,673*	*1,200*	*11,550*	*7,754*	*782*	*1,071*	*215*	*482*	*24*	*56*	*29*	*31,625*
Intestinal diseases														
Ulcers	1,112	1,465	542	401	3,403	2,591	261	256	33	158	13	17	10	10,263
Subtotal, intestinal diseases	*1,112*	*1,465*	*542*	*401*	*3,403*	*2,591*	*261*	*256*	*33*	*158*	*13*	*17*	*10*	*10,263*
Perinatal conditions														

NUMBER OF HOSPITAL DIAGNOSES ATTRIBUTABLE TO SMOKING-RELATED MORBIDITY BY PROVINCE, 2002[1]														
	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL	YT	NT	NU	Total
Sudden infant death syndrome	1	0	0	11	1	72	7	1	0	0	0	0	0	3
Subtotal, perinatal conditions [3]	*1,397*	*1,747*	*315*	*42,209*	*4,495*	*2,800*	*282*	*263*	*21*	*137*	*7*	*14*	*10*	*11,831*
Unintentional injuries														
Fire-related injuries	43	45	18	14	105	93	9	7	3	6	1	1	0	346
Subtotal, unintentional injuries	*43*	*45*	*18*	*14*	*105*	*93*	*9*	*7*	*3*	*6*	*1*	*1*	*0*	*346*
Tobacco abuse														
Tobacco abuse	573	2,046	127	572	2	3,695	372	86	25	2	5	2	14	7,522
Toxic effect of tobacco and nicotine	2	2	0	1	0	7	1	2	0	0	0	0	0	14
Subtotal, tobacco abuse	*575*	*2,047*	*127*	*573*	*2*	*3,702*	*373*	*88*	*25*	*2*	*5*	*2*	*14*	*7,536*
TOTAL HOSPITAL DIAGNOSES, ACTIVE SMOKERS	*33,639*	*38,527*	*13,439*	*54,664*	*121,502*	*83,315*	*8,398*	*10,993*	*1,399*	*5,399*	*198*	*211*	*308*	*330,125*
PASSIVE SMOKERS														
Lung cancer	65	47	24	22	212	139	14	23	3	11	1	0	1	561
Ischaemic heart disease	797	940	331	325	3,286	2,100	212	308	32	148	4	3	8	8,493
TOTAL HOSPITAL DIAGNOSES, PASSIVE SMOKERS	*862*	*987*	*355*	*346*	*3,499*	*2,239*	*226*	*331*	*35*	*158*	*4*	*3*	*8*	*9,054*
TOTAL HOSPITAL DIAGNOSES, ACTIVE AND PASSIVE SMOKERS	*34,501*	*39,514*	*13,793*	*55,010*	*125,001*	*85,554*	*8,623*	*11,324*	*1,434*	*5,558*	*203*	*214*	*316*	*339,179*

Source: Rehm, J., et al. 2006. *The Costs of Substance Abuse in Canada 2002.* Tables D-HC-S-1 through D-HC-S-14.

Notes:

1. Detail may not add to total due to rounding in source document.
2. Subtotals as reported in source document; detail reported in "Total" column sums to 60,188 cancer diagnoses. The reason for the discrepancy is unclear.
3. Subtotals as reported in source document; detail sums to 53,697 diagnoses for perinatal conditions. The reason for the discrepancy is likely an error of two orders of magnitude in the Manitoba figures, as well as similar errors in SIDS values for Quebec and New Brunswick. This error affects subsequent totals reported for these provinces, but not the nation.

APPENDIX C

DEATHS ATTRIBUTABLE TO SMOKING BY PROVINCE

NUMBER OF DEATHS ATTRIBUTABLE TO SMOKING BY PROVINCE, 2002[1]														
	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL	YT	NT	NU	TOTAL
ACTIVE SMOKERS														
Malignant neoplasms (cancers)														
Oropharyngeal cancer	78	54	18	21	222	146	15	18	3	10	1	1	0	586
Oesophageal cancer	90	61	21	24	254	168	17	21	3	12	1	1	0	672
Stomach cancer	37	24	9	10	104	68	7	8	1	5	0	0	0	273
Pancreatic cancer	63	42	15	17	180	119	12	15	2	8	0	0	0	475
Laryngeal cancer	44	29	10	12	122	81	8	10	1	6	0	0	0	323
Trachea, bronchus and lung cancers	1,534	944	430	456	4,579	4,259	367	489	76	233	12	8	15	13,401
Cervical cancer	16	12	4	5	48	31	3	4	1	2	0	0	0	126
Urinary tract cancer	196	128	47	53	550	362	36	45	7	25	1	1	1	1,452
Renal cell carcinoma	34	23	8	9	97	64	6	8	1	4	0	0	0	256
Bladder cancer	131	82	32	36	366	240	24	30	4	17	1	1	0	964
Acute myeloid leukemia	16	11	4	4	45	29	3	4	1	2	0	0	0	118
Subtotal, malignant neoplasms [2]	*2,073*	*1,305*	*559*	*602*	*6,103*	*5,265*	*467*	*614*	*94*	*303*	*15*	*12*	*17*	*17,427*
Cardiovascular diseases														
Ischaemic heart disease	608	506	187	220	2,083	1,245	139	182	32	132	0	5	0	5,343
Pulmonary circulatory disease	100	65	25	28	286	188	19	23	3	13	4	0	0	751
Cardiac arrhythmias	31	22	7	8	92	60	6	7	0	4	0	0	0	242
Heart failure	67	43	18	18	191	125	12	16	1	9	0	0	0	499
Cerebrovascular diseases	284	181	71	79	807	529	52	66	9	36	2	2	0	2,116
Atherosclerosis	178	111	44	49	504	334	33	41	6	22	1	1	0	1,325
Subtotal, cardiovascular diseases	*1,269*	*928*	*352*	*403*	*3,961*	*2,479*	*261*	*335*	*55*	*215*	*7*	*8*	*3*	*10,275*
Respiratory diseases														
Pneumonia and influenza	102	61	26	29	287	187	19	23	3	12	0	0	0	750
Chronic obstructive pulmonary disease	1,016	620	276	287	2,409	2,172	255	310	42	129	3	10	5	7,533
Subtotal, respiratory diseases	*1,118*	*682*	*302*	*315*	*2,695*	*2,359*	*274*	*333*	*46*	*141*	*4*	*10*	*5*	*8,282*
Intestinal diseases														
Ulcers	26	16	6	7	72	48	5	6	1	3	0	0	0	190
Subtotal, intestinal diseases	*26*	*16*	*6*	*7*	*72*	*48*	*5*	*6*	*1*	*3*	*0*	*0*	*0*	*190*
Perinatal conditions														
Low birth weight and short gestation	7	6	2	2	23	13	1	2	0	1	0	0	0	59
Sudden infant death syndrome	4	4	1	1	13	7	1	1	0	1	0	0	0	33
Subtotal, perinatal conditions	*11*	*10*	*3*	*4*	*36*	*21*	*2*	*3*	*0*	*1*	*0*	*0*	*0*	*92*
Unintentional injuries														
Fire-related injuries	0	6	2	2	21	21	1	2	0	1	0	0	0	55
Subtotal, unintentional injuries	*0*	*6*	*2*	*2*	*21*	*21*	*1*	*2*	*0*	*1*	*0*	*0*	*0*	*55*

NUMBER OF DEATHS ATTRIBUTABLE TO SMOKING BY PROVINCE, 2002[1]														
	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL	YT	NT	NU	TOTAL
Tobacco abuse														
Tobacco abuse	8	5	2	2	22	14	1	2	0	1	0	0	0	57
Subtotal, tobacco abuse	*8*	*5*	*2*	*2*	*22*	*14*	*1*	*2*	*0*	*1*	*0*	*0*	*0*	*57*
TOTAL DEATHS, ACTIVE SMOKERS	*4,504*	*2,951*	*1,226*	*1,335*	*12,909*	*10,205*	*1,011*	*1,294*	*196*	*665*	*26*	*30*	*25*	*36,378*
PASSIVE SMOKERS														
Lung cancer	34	23	8	9	95	63	6	8	1	4	0	0	0	252
Ischaemic heart disease	78	50	19	21	220	145	14	18	3	10	0	0	0	579
TOTAL DEATHS, PASSIVE SMOKERS	*111*	*72*	*27*	*30*	*315*	*209*	*21*	*26*	*4*	*14*	*1*	*1*	*0*	*831*
TOTAL DEATHS, ACTIVE AND PASSIVE SMOKERS	*4,616*	*3,023*	*1,253*	*1,366*	*13,224*	*10,414*	*1,032*	*1,320*	*200*	*680*	*26*	*31*	*25*	*37,209*

Source: Rehm, J., et al. 2006. *The Costs of Substance Abuse in Canada 2002.* Tables I-S-1 through I-S-14.

Notes:

1. Detail may not add to total due to rounding in source document.
2. Subtotals as reported in source document; detail sums to 18,646 deaths from cancers. The reason for the discrepancy is unclear.

APPENDIX D

LITERATURE REVIEW

INTRODUCTION

Research across a variety of disciplines, including cognitive psychology, social psychology, communication, judgment and decision-making, and marketing has explored a number of factors surrounding the effectiveness of consumer product warning labels, including the effectiveness of tobacco warning labels. In a meta-analysis of the effectiveness of warning labels on various products, Argo and Main (2004) found that warnings do in fact increase safe behaviours, despite varying rates of behavioural compliance. This appendix further explores that literature, providing a foundation for estimating the benefits of the proposed changes to Canada's tobacco warning labels.

CONSUMER RESPONSES TO TOBACCO WARNING LABEL DESIGN

There is a large body of research that focuses on the different design possibilities for tobacco warning labels and how consumers respond to such differences. As Canada is a world leader in the use of large, graphic health warning messages, many studies focus on consumers' responses to a change from smaller, text-only warnings to Canadian-style warnings. In accordance with the World Health Organization's Framework Convention on Tobacco Control, many countries are moving to adopt warning labels similar to Canada's. This will likely spur additional research on the effectiveness of such labels.

THE FRAMEWORK CONVENTION ON TOBACCO CONTROL

The WHO Framework Convention on Tobacco Control (FCTC) is the first global health treaty negotiated under the auspices of the World Health Organization. To date, more than 160 countries have ratified the FCTC. Article 11 of the FCTC covers three main areas: 1) government-mandated health warnings; 2) labelling of tobacco constituents and emissions; and 3) the removal of misleading information from the package. Article 11 sets standards in each of these three areas that countries are required to adopt, as well as recommendations that countries "should" adopt to enhance the effectiveness of labelling policies. These standards state that warning labels on tobacco packages:

- Shall be rotating,
- Shall be large, clear, visible and legible,
- Should be 50 percent or more of the principal display areas but shall be no less than 30 percent of the principal display areas,
- May be in the form of or include pictures or pictograms (WHO 2008).

HEALTH WARNING MESSAGES

The health warning messages that currently appear on Canadian cigarette packages cover 50 percent of the front of the package, and include a set of 16 graphic images and associated text that are distributed evenly among each brand's products. In a study

conducted to support development of the current regime of Canadian health warning messages, Liefeld (1999) used conjoint analysis to estimate the relative importance of the size, content, and pictures. The study found that the message content has the highest impact on respondent perceptions of what would encourage them not to smoke (51 percent), followed by the presence of a picture (29 percent), size (12 percent), and the absence of the brand trademark (8 percent).

Use of Pictures in the Health Warning Message

The photographic depictions of the health consequences of smoking are perhaps the most salient feature of the current Canadian health warning messages. When adolescents from Greece were asked to compare existing EU text-only messages to graphic messages, non-smokers rated the suggested graphics as more effective in preventing them from smoking; 84 percent said that they believed the graphic labels would be much more effective in preventing them from initiating smoking (Vardavas 2009).

Authors such as Levie and Lentz (1982), Sherman et al. (1985), Wogalter et al. (1987), and Brown et al. (1995) have written on the value of imagery in warning messages. These studies underscore the importance of using pictures in tobacco health warnings. Focus group testing and market research commissioned by government health agencies consistently demonstrate that health warnings with pictures are rated by smokers and non-smokers as more effective and associated with greater impact and memory for health risks than text-only warnings (Hammond 2007). The pictorial warnings are most notable for the strong emotional reactions that they arouse in tobacco consumers. This appears to be the case in Canada: Hammond et al. (2004) found that 44 percent of smokers surveyed reported experiencing some fear and 58 percent reported feeling disgust in response to the graphic Canadian cigarette warning labels.

These findings are supported by Kees et al.'s study (2006) of reactions to different combinations of warning statements used on packages in the U.S. and visual images of lung cancer used on packages in Canada. To measure the negative effect (or "fear-appeal") associated with the packages, study authors used five seven-point bipolar adjective scales (e.g. "fearful/not fearful at all") and asked respondents to indicate how information on the package made them "feel." The study found that the packages with both the message and the visual had the greatest negative effect.

While pictorial warnings that contain graphic images of health effects have been criticized on the grounds that threatening information may cause defensive reactions among smokers (such as avoiding looking at the health warning or covering it up), Hammond (2007) found that there is no evidence that graphic warning labels decrease the effectiveness of the warnings in terms of intentions to quit, thinking about health risks, or engaging in cessation behaviour. Instead, Hammond (2007) concludes that strong emotional reactions are associated with increases in each of these measures of effectiveness, with smokers who reported greater fear twice as likely to indicate that the labels had reduced the amount they smoke (OR=2.02) and significantly more likely to indicate that the labels increased their likelihood of quitting (OR=1.82). Liefeld (1999) also found that messages with strong emotional appeal were more effective at discouraging smoking than messages of a factual or unemotional nature.

Hammond et al. (2004) also conducted a logistic regression to determine whether negative emotional reactions to the warnings at baseline predicted cessation behaviour at follow-up. This analysis concluded that smokers who reported greater fear and disgust were significantly more likely to have quit, made an attempt to quit, or reduced their smoking at the three month follow-up (OR=1.37). In a direct response to Hammond's views on fear appeals, Ruiter and Kok (2006) assert that scare tactics are not necessarily a productive way to encourage smokers to quit, and may create defensive behaviours. They also note the importance of presenting positive messages in addition to strong warnings to give smokers the confidence they need for cessation, as observed in a previous study by Witte and Allen (2000). They recommend that interventions be experimentally pilot-tested before implementation (Ruiter and Kok 2006). Strahan et al. (2002) find that fear appeals are more likely to be effective if they are combined with gain-framed messages (emphasizing that quitting is possible and beneficial) and advise the reader how to quit or where to get help. The Canadian warning labels introduced in 2000 are consistent with these recommendations.

Message Size and Location

As found by the Liefeld (1999) study, the size of the health warning is also very important. Hammond's (2007) review of the evidence found that smokers are more likely to recall larger warnings and have been found to equate the size of the warning with the magnitude of the risk. Riordan (2009) found that in the United States smaller warning labels are associated with smokers underestimating the dangers of cigarettes. Devlin et al.'s (2005) study of the new warning labels introduced in the European Union found that the bigger, more prominent format facilitated the processing of the health messages and made it more difficult for smokers who want to "screen out" or avoid them. New Zealand consulting firm BRC (2004) found that a large picture and text display (50 percent as opposed to 30 percent of the front of the pack) were overwhelmingly preferred in discussion groups held with current smokers. When presented with several different formats, 76 percent of participants ranked the warning with the largest picture as the most effective.

The location of the health warning also plays a role in the salience and recall of the message. In an article for The Campaign for Tobacco-Free Kids, Riordan (2009) notes that smokers report greater recall for warnings that appear on the front, as compared to the side of packages. Environics (2008) found that 22 percent of Canadian smokers reported they looked at or read the health warning messages on the front of the pack several times a day, compared with only 1 percent who said they looked at or read the information about toxic substances (found on the side of the package) several times a day. Only 9 percent of smokers were even aware that there was a message on the back of the slide. Elliott and Shanahan's (2008) study of the introduction of graphic health warnings in Australia found that 91 percent of smokers reported being aware of the health messages on the front of the pack, whereas 73 percent reported being aware of the health messages on the back and only 46 percent reported being aware of the health messages on the side. Similarly, 80 percent of smokers claimed to have read the information on the front of the pack, but only 66 and 41 percent of smokers read the information on the back and side.

"Wearout" and the Importance of Message Variety and Rotation

"Wearout" is a somewhat fluid concept in research on advertising and product warning labels. Corkindale and Newall (1978) define wearout as "That level of advertising which corresponds to the point at which an individual, or group of individuals, fails to respond to the advertising stimulus. Beyond this point, the likelihood that the individual or group of individuals will fail to respond increases despite continued repetition of the stimulus." Other definitions of wearout look for "a diminution in or negative effect in response to additional exposures to the message" (Pechmann and Stewart 1988). Perhaps the most widely used definition of wearout simply looks for the absence of further incremental effects of an advertisement. This definition assumes that once a communication has been processed by all consumers, it reaches a point at which it cannot produce higher awareness or recall. This also means that once an advertisement has produced a strong change in attitude or behaviour, it is unlikely to result in further change.

Hammond's (2007) review of the current evidence on the effectiveness of tobacco warning labels states that it is widely accepted that the salience of advertising and health communications is typically greatest upon initial exposure. The frequency with which smokers read and attend to warnings has been shown to lessen over time as smokers become desensitized to the warnings. Fong's (2001) review of social psychological research supports this finding, suggesting that when people are exposed to a persuasive message, its effectiveness diminishes over time. Hassan et al. (2008) found that in the United States (where warning labels have been left unchanged over a long period), consumer awareness, depth of processing, and elaboration of the message contents generally decreased over time.

Hammond et al. (2003) found very little erosion or wear out in the salience of the Canadian warning labels between their introduction and follow-up with smokers nine to twelve months later. Although talking about the warnings and reading the outside messages decreased after the introduction of the enhanced warning labels, in many cases processing of the warnings remained the same and the salience of the messages on the inside of packages actually increased from baseline to follow-up. At follow-up, more smokers reported reading the messages on the inside of cigarette packages (44.4 to 51.5 percent) and thinking about what the messages on the inside of the packages have to say (23.3 to 34 percent).

Recent surveys, however, suggest that nine years after the introduction of the enhanced warning labels, Canadian smokers may be experiencing wearout. Beginning in 2000, Health Canada commissioned Environics Research Group Limited to conduct surveys of Canadian adult smokers and non-smokers in order to provide information on the impact of tobacco health warning messages on public knowledge and behaviour. Since the baseline survey, Environics has conducted thirteen additional waves of the survey, with the most recent occurring in November and December of 2007. Wave 13 shows some evidence that the current Canadian warning labels are losing their effectiveness. While awareness of the existence of the health warnings remains nearly universal among adult smokers, the survey found that smokers are looking at or reading the health warning messages less frequently (see Exhibit 1). Of particular note is the decrease in the percentage of adults who say they look at the health warnings several times a day (36

percent at Wave 1 to 22 percent at Wave 13) and the increase in the percentage of adults who say they never look at or read the health warnings (14 percent at Wave 1 to 22 percent at Wave 13). In addition, the effectiveness of the warning messages in encouraging behaviours related to smoking cessation appears to have diminished from the period immediately following the labels' introduction (see Exhibit 2). These findings are consistent with the three-stage response to warning messages described by Fry (1995): an initial response, followed by a peak in behaviour change or results, then a levelling off as the campaign begins to show signs of wearout.

Marketing experts have developed strategies to counter the effects of wearout and increase the effectiveness of advertisements. Weitz and Wensley (2006) state that using "new messages that contain additional information may provide a means for obtaining incremental effects in attitude, intention, and purchase behaviour." Similarly, Bass et al. (2007) model the effects of wearout using mathematical formulas to study the advertising-sales relationship. Their results support the theory set forth by Weitz and Wensley (2006). They found that "changing the execution of the message appears to refresh the message and mitigates wearout."

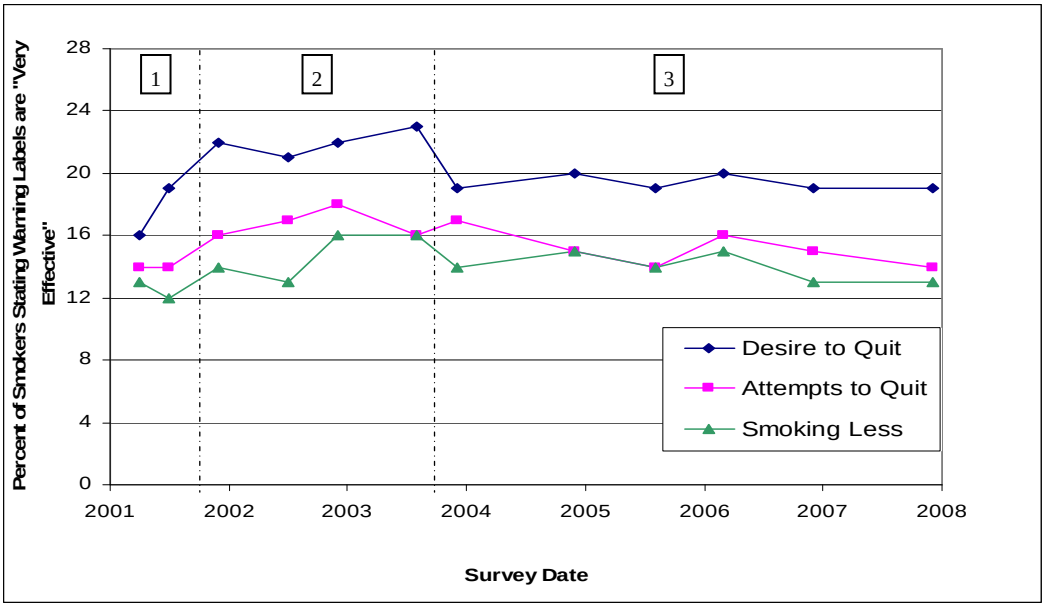
Consistent with the findings cited above, Hammond (2007) concludes that tobacco health warnings must be regularly updated to maintain their maximum impact over time. In addition to creating new labels, other strategies include the rotation of warning labels, a recommendation that is included in article 11 of the FCTC standards (WHO 2008). Rotating the warnings is also expected to maintain the labels' impact. Fong (2001) cites a study that utilized eye-tracking equipment to measure participants' point of gaze, fixation, and other visual scanning variables. The study concluded that new warnings lead to greater salience, readership, and quicker attention. Therefore, any strategy that reduces or eliminates wearout should lead to greater salience for a longer period of time, which leads to a greater likelihood of informing and educating the public.

The Canadian tobacco warning labels and information messages incorporate many elements designed to delay wearout, including the use of colour, images, and a variety of messages. After almost a decade, however, the initial results have begun to diminish. Given the evidence of eventual wearout in the effectiveness of advertising and public service campaigns, it seems reasonable to conclude that the warning labels on tobacco products may be experiencing the effects of wearout as well. As suggested by Bass et al. (2007) and Weitz and Wensley (2006), refreshed labels should mitigate these effects.

EXHIBIT 1. PERCENTAGE OF ADULT SMOKERS THAT LOOK AT OR READ HEALTH WARNING MESSAGES ON CIGARETTE PACKAGES (ENVIRONICS 2008)

FREQUENCY	NOV-DEC 2000	MAR-APR 2001	JUL 2001	NOV-DEC 2001	JUL 2002	NOV-DEC 2002	JUL-AUG 2003	DEC 2003	NOV-DEC 2004	JUL-AUG 2005	FEB-MAR 2006	NOV-DEC 2006	NOV-DEC 2007
Several times a day	36(%)	29	27	29	28	29	25	26	25	28	18	24	22
About once a day	15	17	18	15	16	17	16	16	16	15	17	15	14
Once every two or three days	9	10	8	9	9	9	8	8	8	8	10	10	10
About once a week	12	13	14	13	14	14	16	16	14	12	15	14	13
Less than once a week	14	13	14	16	13	16	17	15	17	17	19	17	18
Never	14	16	18	17	19	15	17	18	19	20	19	19	22
Note: May not sum to 100 percent due to "don't know" answers													

EXHIBIT 2. EFFECTIVENESS OF HEALTH WARNING MESSAGES IN PROMOTING CESSATION-RELATED BEHAVIOUR AMONG ADULT SMOKERS (N = 1000)



Source: Environics Research Group. The Health Effects of Tobacco and Health Warning Messages on Cigarette Packages—Survey of Adults and Adult Smokers: Wave 13 Surveys. Report prepared for Health Canada. 2008.

In general, Canadians remain aware of the health warning messages carried on cigarette packages: Hammond et al. (2006) found that 84.3 percent of Canadian respondents cited

cigarette packages as a source of information on the dangers of smoking, second only to television. Environics (2008) arrived at a similar finding, as 74 percent of adult smokers surveyed said that the health warning messages have been effective in informing them about the health effects of smoking. However, the Environics survey also provides evidence that the utility of the health information messages may be diminishing. When asked where they have recently seen or heard information that talks about the health effects of smoking cigarettes, 43 percent of adult smokers surveyed mention cigarette packages as a source of information about the health effects of smoking cigarettes. This figure has decreased 14 percent from Wave 2 (the first wave following the introduction of the enhanced warnings), when 57 percent of adult smokers mentioned cigarette packages as a source of information about the health effects of smoking (see Exhibit 3).

EXHIBIT 3. PERCENTAGE OF ADULT SMOKERS WHO MENTIONED CIGARETTE PACKAGES AS A SOURCE OF INFORMATION ABOUT THE HEALTH EFFECTS OF SMOKING (ENVIRONICS 2008)

NOV-DEC 2000	MAR-APR 2001	JUL 2001	NOV-DEC 2001	JUL 2002	NOV-DEC 2002	JUL-AUG 2003	DEC 2003	NOV-DEC 2004	JUL-AUG 2005	FEB-MAR 2006	NOV-DEC 2006	NOV-DEC 2007
33%	57%	57%	60%	58%	48%	51%	43%	47%	52%	43%	37%	43%

QUITLINE INFORMATION

The introduction of a national quitline and its advertisement on Canadian packages via health warning labels could significantly increase their utility. BRC's (2004) study of the New Zealand's health warning labels found that 81 percent of current smokers surveyed agreed that having quitline information printed on cigarette packs was likely to encourage smokers to call the quitline. After inclusion of a quitline on tobacco warning labels in the Netherlands, the number of calls received increased steadily, reaching a peak of over a 1000 in the 24th week after implementation before declining to an average of around 700 callers a week. The latter figure represents an increase of 3.5 times the number of calls received before the quitline number was added to cigarette packages (Willemsen 2002). Another study by Miller et al. (2009) looked at graphic cigarette warning labels in Australia that included information about the national quitline. That study found that the number of calls received rose by 100 percent in the year immediately after the new labels were introduced, then declined to a level 40 percent above the baseline in the following year.

TOXIC EMISSION STATEMENTS

In addition to the warning label design standards, FCTC Article 11 states that each tobacco package shall contain information on relevant constituents and emissions of tobacco products, as defined by national authorities (WHO 2008). The Canadian labels currently present ranges of toxic emissions per unit for six different chemicals. Hammond (2007) states that the disclosure of constituents and emissions on tobacco packaging presents a unique challenge for regulators. Cigarette smoke contains approximately 4,000 chemicals, including over 60 carcinogens and toxins; while there is general agreement that cigarette packages should include some information on these chemicals, regulators continue to struggle with how best to communicate this information to consumers. A further difficulty is that emission numbers, which are determined by a machine that "smokes" cigarettes, can be misleading to consumers because they cannot predict the actual amount of smoke inhaled by human smokers. O'Connor et al. (2006) examined whether smokers in four different countries (Canada, the United States, Australia, and the United Kingdom) could recall the tar yield of their brand of cigarettes, using data from the third wave of the International Tobacco Control Four Country Survey (ITC-4). Of current smokers across all countries, 33.6 percent gave a numeric response when asked to report the tar yield of their brand, whereas 66.4 percent responded "I don't know." Across the four countries, the ability of smokers to self-report their tar yields was largely a function of the labelling policy of their home country. U.S. packs typically feature no tar or nicotine information, and consequently, very few American smokers (8.9 percent) could give a

THE INTERNATIONAL TOBACCO CONTROL PROJECT

The ITC Project is the first-ever international cohort study of smoking, with an emphasis on national-level tobacco control policy evaluation. Launched in 2002 in Canada, the United States, the United Kingdom and Australia (the ITC Four Country Survey or ITC-4), the ITC Project now consists of cohort surveys of representative samples of adult smokers in 19 countries. One broad objective of the ITC Project is to create an international evaluation system to measure the impact of the FCTC, as well as other tobacco control initiatives implemented in ITC countries.

The ITC Project conducts annual national-level surveys to collect information to evaluate FCTC policies and other tobacco control activities. The longitudinal cohort design of the ITC Project, in which individuals are measured on the same key outcome variables over time, allows stronger conclusions to be drawn about whether graphic warnings increase the attention that smokers pay to the warnings, whether this is associated with increases in perception of the health risks, and whether this leads to quit attempts and successful quitting. Smokers (and non-smokers in some countries) are asked more than 200 questions to measure smoking and quitting behaviour, health knowledge, psychosocial mediators, and awareness of and support for various tobacco policies. Using a strong common conceptual approach with multiple survey measures, the ITC Project can test how policies change or fail to change behaviour and identify areas where improvement in policy impact might be achieved

response. Australian packs at the time of the survey provided both numerical and some descriptive information about emissions, and Australians were most likely to provide a response (68.2 percent). In contrast, only 36.5 percent of U.K. smokers (where numbers alone appear on packs) and 29.0 percent of Canadians (where ranges and information on emissions of additional constituents are featured) were able to respond. Among Canadian respondents, 6.4 percent reported a range of tar yields, consistent with how they are displayed on Canadian packages, as opposed to a single number. The authors found, however, that simply providing more numbers (as in Canada) does not improve knowledge of emissions levels.

Hammond et al. (2006) also used the results of the ITC Four Country Survey; however, the authors arrived at a different conclusion than O'Connor (2006). Hammond et al. found that Canadian smokers were more knowledgeable about tobacco emissions than their counterparts in other countries: 90.7 percent of Canadians agreed that smoke contains carbon monoxide (Australia: 82.6 percent, U.S.: 85.1 percent, U.K.: 64.6 percent), 57.7 percent of Canadians agreed that smoke contains arsenic (Australia: 41.1 percent, U.S.: 42.1 percent, U.K.: 16.9 percent), and 71.7 percent of Canadians agreed that smoke contains cyanide (Australia: 44.4 percent, U.S.: 51.6 percent, U.K.: 25.1 percent). Canadians also reported greater numbers of constituents in smoke (51.1 percent of Canadians reported the greatest number (3), compared to 29.2 percent of Australians, 34.6 percent of Americans, and 11.3 percent of the British).

These studies provide mixed results concerning Canadian smokers' knowledge of the toxic emissions from tobacco products. O'Connor et al. (2006) concluded that while pack labelling may be a useful means of conveying information about cigarettes to smokers, there is an urgent need to develop more effective ways to communicate information on toxic emissions. Given that the tar yields from existing smoking regimes are unrelated to individual exposure, it is unclear how these numbers should be used by consumers. Perhaps not surprisingly, there are calls to remove these numbers from packages and to replace the misleading quantitative values with more descriptive information on toxic smoke emissions and their effects. Countries such as Brazil and Australia have already taken this step.

HEALTH INFORMATION MESSAGES

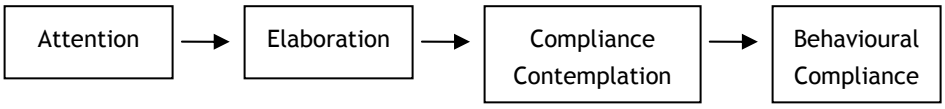
The current Canadian cigarette packages contain informational inserts that provide smokers with messages and tips intended to help them quit. Evidence on the effectiveness of such inserts, however, is mixed. In a study of the health information messages included on cigarette packages in New Zealand, BRC (2004) found that 34 percent of smokers and recent quitters agreed with the statement that the inserts would be an effective way of encouraging smokers to quit or reduce the amount they smoke, 33 percent disagreed with the statement, and 14 percent neither agreed nor disagreed. While some respondents were positive about the informative and educational tone of the text in the inserts, respondents largely felt that the inserts would inevitably receive little attention and be thrown away.

THEORETICAL FRAMEWORKS RELEVANT TO ESTIMATING THE IMPACT OF TOBACCO WARNING LABELS ON CONSUMBER BEHAVIOUR

The fact that people are limited in their capacity to attend to information has guided research and theories about how people receive information, how they process it, how they make judgments, and how they behave in accordance with that information (or at times behave at odds with that information) (Fong 2001). This insight provides the basis for three major theoretical frameworks relevant to the analysis of the effectiveness of warning labels.

- **Heuristic-systematic model –** People employ two modes of processing information: the systematic processing mode (purposeful/analytical) and the heuristic processing mode (simpler decision rules) (Fong 2001).
- **Elaboration-likelihood model –** People are sometimes persuaded as a result of thinking very carefully about the content of a message through a process called elaboration, while on other occasions they are persuaded by factors that have little to do with the content of a message (Strahan et al. 2002).
- **Transtheoretical model of change –** The transtheoretical model of change contends that the frequency with which people have thoughts about a behaviour affects that behaviour at least partly independent of the strength of their associated beliefs. According to this model, anything that leads to an increase in the frequency of relevant thoughts (and/or behaviours) should be associated with increases in appropriate behaviour change (Borland 1997).

These frameworks could be presented separately as above with more thorough descriptions, or combined into one point. While they differ in emphases, all three suggest that the route to human behaviour change lies in frequent exposure to noticeable messages that encourage people to consider and form judgments about the information presented. A study by Hassan et al. (2007) provides a conceptual model of the essential stages of consumer information processing:



Given the lack of research on the direct causal relationship between tobacco warning labels and behaviour change, many of the studies reviewed examine the intermediary stages from exposure to compliance by 1) measuring how consumers react to different aspects of warning labels' content and format, and 2) analyzing the correlations between consumers' reactions to the labels and their experience of these stages. While this approach may not produce direct estimates of the number of smokers who successfully quit as a result of the warning labels, it can indicate probabilistic relationships between

consumers' reactions to the warning labels and the likelihood that they will attempt to quit.[1]

MEASURES OF WARNING LABEL EFFECTIVENESS

In accordance with the conceptual model of consumer information processing drawn from the theoretical frameworks, most analyses of warning label effectiveness employ measures that are intended to gauge the extent to which tobacco consumers notice, think about, and change their behaviour to comply with the warnings. Although the specific measures vary among published studies, the following list provides a representative set:

- **Attention –** The amount of cognitive effort and/or capacity that a person directs to a particular stimulus.
- **Reading and comprehension –** A function of the characteristics of the message, an opportunity to process the message, and characteristics of the message receiver (motivation and ability).
- **Recall –** People must recall the potential risks conveyed in the warning and retrieve that information when necessary.
- **Judgments –** Estimations of the probability that an outcome will happen and decisions regarding its favorability.
- **Behavioural compliance –** Whether the consumer is prevented from engaging in unsafe behaviours (Argo and Main 2004).

COGNITIVE PROCESSING

Cognitive processing is essentially the sum of the above effectiveness measures leading up to behavioural compliance. Evidence from the literature fully supports the premise that cognitive processing is improved by the previously mentioned design elements endorsed by the FCTC and incorporated into Canada's current tobacco labels. Argo and Main (2004) conducted a series of meta-analyses to demonstrate the impact of warning labels (on a variety of products, not just tobacco packaging) across the five dimensions of effectiveness: attention, reading and comprehension, recall, judgments, and behavioural compliance. The authors found that the presence of vividness-enhancing characteristics (color, pictures, font size, etc.) in warnings is more likely to attract consumers' attention (presence: avg. r = .38, absence: avg. r = .20).[2] Consumers are also more likely to read and comprehend warnings when vividness-enhancing characteristics are present.

A variety of studies attempt to measure Canadian smokers' cognitive processing as related to the design of health warnings. For example, Environics (2008) found that consumer awareness of the Canadian health warnings is high. Most adult smokers notice

[1] An alternative approach employed by Tansel in "Cigarette Demand, Health Scares and Education in Turkey" (1993) was to estimate a demand function for cigarettes in Turkey for the years 1960 to 1988. The demand function expresses the quantity of cigarettes consumed as a function of the real price of cigarettes and real disposable income, and includes a vector of dummy variables to proxy the effects of health warnings and education on cigarette consumption (Tansel 2003). While this approach arrived at an estimate of the percentage reduction in cigarette demand due to the health warnings in Turkey and has been cited in subsequent studies (see Hara 2000), to the best of our knowledge it has not been replicated.

[2] Avg. r refers to the average correlation found in the meta-analysis.

and read the health warnings, as 22 percent say they look at or read health warning messages several times a day, 14 percent do so once a day, 10 percent do so every two or three days, and 13 percent do so about once a week (18 percent say they do this less than once a week, and 22 percent say they never look at or read the health warnings). Canadian adult smokers express virtually unanimous (99 percent) recall of seeing health warning messages on cigarette packages, and 93 percent report that they have seen the health warning messages on their main brand of cigarettes. Consumer judgments of the labels also appear to be in line with regulators' intent: 86 percent of adult smokers agree that the health warning messages are accurate, 84 percent agree that they provide important information about health effects, and 65 percent agree that they make smoking seem less attractive.

Evidence that the Canadian health warnings have produced relatively high levels of cognitive processing in tobacco consumers is supported by Hammond et al.'s (2007) analysis of the International Tobacco Control Four Country Survey. The study found that at Wave 1 (October to December 2002), 60 percent of Canadian smokers reported noticing the labels, 32 percent reported reading them, and 85 percent reported noticing cessation information on packs. This level of cognitive processing led to some preliminary behavioural compliance: 15 percent of Canadian smokers reported forgoing a cigarette as a result of the warnings, and 45 percent reported that the warnings had led them to think about quitting. This trend continued at Wave 2 of the study (June to August 2003), when 78 percent of Canadian smokers reported noticing anti-smoking and smoking cessation information on cigarette packages often or very often, 47 percent reported that the warnings made them think about the health risks in the past month, and 39 percent reported that the warnings led them to think about quitting in the past month. The survey found that the processing of information on health risks held relatively steady at two subsequent points, as 50 percent of Canadian smokers reported that the warnings had made them think about the health risks of smoking at Wave 3 (June to September 2004) and 48 percent reported the same at Wave 4 (October to January 2005. The number of respondents who reported that the warnings had led them to think about quitting, however, remained comparable to that reported at Wave 2, approximately six points lower than in Wave 1.

Hammond et al. (2003) studied smoking status, knowledge of the health warnings, and depth of cognitive processing through interviews of 616 Canadian smokers in 2001 (approximately 9 months after the introduction of the new Canadian graphic warnings) and in a three month follow-up. Cognitive processing was assessed by asking questions about the extent to which smokers attended to the warnings, reflected or elaborated on the warnings, and talked or thought about the labels when they were out of sight. Hammond et al. (2003) summed these measures to create an index of depth of processing. At baseline, 93.1 percent of participants had read the messages on the outside of cigarette packages, 44.4 percent had read the messages on the inside of cigarette packages, and 81.1 percent had talked about the new warning labels with other smokers or non-smokers. Curiously, the study found that overall cognitive processing of the warnings decreased slightly from baseline to follow-up. However, smokers were more likely to read and think about the messages on the inside of packages at follow-up. This may suggest that the initial "shock value" of the graphic health warning may diminish, but the health

information retains its salience for those smokers who are encouraged to think about quitting.

The FCTC's claim that its recommended design elements increase cognitive processing is supported by comparisons of Canadian consumers' reactions to health warning labels with the reactions of other countries' consumers to their respective countries' warnings. Hammond et al. (2007) found that at Wave 1 of the longitudinal FCTC survey (October to December 2002), at which time Canada was the only country studied that had warning labels meeting FCTC recommendations, 60 percent of Canadian smokers noticed their country's health warnings "often" or "very often." This can be compared with 52 percent of Australians, 44 percent of U.K. smokers, and 30 percent of U.S. smokers who responded the same.

BEHAVIOURAL COMPLIANCE: INTENTIONS TO QUIT AND QUIT ATTEMPTS

Many of the studies reviewed examine the effectiveness of warning labels by asking consumers whether the labels have an effect on their personal intention to quit or have caused them to exhibit behaviours likely to precede quit attempts, such as foregoing cigarettes or stubbing out cigarettes prematurely. In addition, a few studies employ a longitudinal method in which they followed up with consumers to see if they had quit or attempted to quit after being exposed to warning labels. While none of these studies directly estimate causal relationships between consumer exposure to warning labels and quit success, some do conduct logistic regression analyses to relate measures of cognitive processing to predictions of quitting, quit attempts, and reductions in smoking.

Effect of Warning Labels on Quit Intentions

Several studies have attempted to relate warning label design and consumers' intentions to quit smoking. Kees et al. (2006) present the results of three studies (one focused on young adult smokers, one focused on U.S. adult smokers, and one focused on Canadian adult smokers) of reactions to different combinations of warning statements used on packages in the U.S. and the visual images of lung cancer used on packages in Canada. The study found that the packages with both the message and the visual had the greatest effect on respondents' perceived effectiveness of the packages to encourage other current smokers to quit and to prevent non-smokers from starting, as well as their own personal intentions to quit smoking. Hammond et al. (2004) and Elliot and Shanahan (2008) also support the effectiveness of the graphic health warnings in stimulating consumers' cognitive processing and quit intentions. Hammond et al. found that 24.8 percent of smokers surveyed reported that the graphic warnings on Canadian cigarette packages increased their confidence in their ability to quit, and 33 percent reported that the warnings increased the likelihood they would quit smoking. Elliott and Shanahan (2008) found that the Australian graphic cigarette warnings made 57 percent of smokers think about quitting.

Additional studies have focused on the relationship between cognitive processing and smokers' intentions to quit. Hassan et al. (2008) used structural equation modeling to compare the impact of different types of warning labels in the United Kingdom and the United States on tobacco consumers' information processing and intention to quit, using longitudinal data from the ITC Four Country Survey. Study results for both countries fully supported the hypotheses that smokers who notice and attend to warning labels

more will elaborate more on the content of the warning label messages, and smokers who elaborate more on the warning label messages will contemplate quitting smoking more frequently. This finding is supported by Hammond et al. (2003), who used a logistic regression relating cognitive processing to quit intentions to find that smokers who read, thought about, and discussed the warning labels in greater depth at baseline were more likely to intend to quit in the next six months (OR 1.11).

The role of tobacco labels in informing consumers about the health-related effects of smoking appears to influence quit intentions as well: Hammond et al. (2006) found that planning to quit smoking was positively associated with judgments of the health warnings' accuracy and consumers' health knowledge. When asked about their views on five diseases, respondents' odds of planning to quit were greater among smokers who endorsed each of the diseases as being smoking-related. When asked their opinion on the number of health effects related to smoking, respondents' odds of planning to quit increased in a linear fashion with the total number of health effects reported. Environics' (2008) assessment of Canada's tobacco labels found that 52 percent of adult smokers said that the health warning messages have been somewhat (33 percent) or very (19 percent) effective in increasing their desire to quit smoking.

The impact of tobacco labels on quit intentions also appears to depend somewhat upon the strength of smokers' desire to quit before being exposed to the health warnings. Fathelrahman et al. (2009) surveyed over 2,000 adult smokers in Malaysia to examine whether different responses among smokers toward cigarette pack warning labels (prior to the introduction of visual warnings) could predict quit intentions and self-efficacy in quitting. Fifty-eight percent of smokers surveyed reported that the warning labels made them more likely to quit. Those who reported that the warning labels made them more likely to quit were more likely to be further along in the stages of change (any interest in quitting OR=1.76, contemplating quitting OR=1.72, preparing to quit OR=1.78) and were more than twice as likely to have high self-efficacy in quitting successfully (OR=2.36). These findings are supported by Willemsen (2005), who studied the self-reported effect of health warnings introduced in the Netherlands on the attractiveness of cigarettes, smokers' motivation to quit, and on smoking behaviour. Overall, only 18 percent of smokers surveyed reported that the warnings made them more motivated to quit. However, a strong relationship was observed between quit intention and the impact of the warnings, as over a third of smokers intending to quit within six months said that the warnings made them more motivated to quit (see Exhibit 4).

Estimates of the numbers of current Canadian smokers who intend to quit are somewhat conflicting, but generally encouraging. Hammond et al. (2003) found that 41 percent of study participants intended to quit smoking within the next six months. Environics (2008) found that 60 percent of adult smokers are now seriously thinking of quitting smoking. Of those, 40 percent reported that they will try to quit within the next month, and 48 percent say they will try to quit within the next six months.

EXHIBIT 4. SELF-REPORTED CHANGE IN MOTIVATION TO QUIT BY QUIT INTENTION (WILLEMSON 2005)

QUIT INTENTION	SELF-REPORTED IMPACT OF HEALTH WARNINGS ON MOTIVATION TO QUIT		
	HIGHER	NEUTRAL	LOWER
Never	6.0%	78.8%	15.2%
Don't Know	12.5%	81.8%	5.7%
> 1 Year	18.8%	77.4%	3.8%
> 6 Months	28.6%	69.1%	2.3%
> 1 Month	36.6%	59.8%	3.7%
< 1 Month	34.4%	63.2%	2.4%

Effect of Warning Labels on Quit Behaviours and Attempts

Hammond (2007) states that the extent to which health warnings lead to changes in smoking behaviour is difficult to ascertain within the context of population-based data. However, measurement difficulties do not mean that health warnings do not affect quitting: significant proportions of adult and youth smokers report that large comprehensive warnings have reduced their consumption levels, increased their likelihood of quitting, increased their motivation to quit, and increased the likelihood of remaining abstinent following a quit attempt. The literature reviewed contains studies that attempt to link health warnings to quit behaviours through a variety of methods.

Several studies measured the effect of the warning labels on intermediary quit behaviours such as forgoing a cigarette, extinguishing cigarettes before finishing them, or smoking less. One of the earlier studies that linked warnings to such quit behaviours was conducted by Borland and Hill (1997), who studied the introduction of larger, more prominent health warnings in black and white on Australian cigarette packages in 1995. They found that 13.5 percent of smokers reported that they smoked less because of the warnings, and 18 percent of smokers who had tried to quit recently reported that the warnings contributed to their decision to quit. Another study of the same warnings by Borland (1997) found that the percentage of smokers who said that they had been influenced to forgo a cigarette by the warning labels increased from 7 percent at baseline to 14 percent after the implementation of the enhanced (but still black and white) warnings. Forgoing cigarettes was strongly associated with attempting to quit, as 10 percent of quit attempters had forgone a cigarette compared with 3 percent of those who had not tried to quit. Similarly, 34 percent of quit attempters had stubbed out a cigarette compared to 14 percent of those who did not try to quit.

Environics (2008) asked similar questions of adult Canadian smokers, and found that 40 percent of respondents reported that the health warnings have been effective or very effective in getting them to smoke less, while 43 percent reported that the messages have

been effective or very effective in getting them to try to quit smoking. In addition, 57 percent of adult smokers say that Canada's health information messages have been effective or very effective in getting them to smoke less around others than they used to. The greater percentages reported by the Environics survey may be a testament to the increased effectiveness of the design of the Canadian health warnings as compared to black and white text warnings. This is supported by Hammond et al. (2004), who found that 19 percent of smokers surveyed reported that the graphic warnings on Canadian cigarette packages made them reduce their smoking. Australia has since enhanced its warning labels to meet FCTC standards, and a more recent study conducted by Elliott and Shanahan (2008) found that 36 percent of Australian smokers reported that the warning labels helped them smoke less. In addition, 62 percent of recent quitters reported that the labels helped them give up smoking and 55 percent of recent quitters reported that the labels have helped them stay abstinent.

Research conducted in Europe, Australia, and Brazil has examined changes in the number of calls placed to national telephone "quitlines" after quitline contact information was included in package health warnings. Each of these studies reports significant increases in call volumes. For example, Miller et al. (2009) found that the Australian Quitline experienced a doubling of calls upon introduction of graphic cigarette packet warnings that included a prominent Quitline number. The Australian Quitline received 81,490 calls in 2004 and 84,442 calls in 2005. In 2006, the first year after the warnings were introduced, the number of calls jumped to 164,850. In 2007 the number of calls decreased somewhat (117,544), but remained higher than the call volume prior to the introduction of the labels. Previous research demonstrated that at 12 months, around 30 percent of callers to the Australian Quitline have succeeded in quitting smoking. Additionally, a review of quitlines in nine European countries found that between 9.4 and 16.0 percent of quitline callers had continuously abstained from smoking for 12 months after calling (Willemson et al., 2008). This research suggests that the inclusion of a quitline number on tobacco product packaging can be an important source of consumer information and an effective cessation intervention.

Quit behaviours have also been linked to cognitive processing and the strength of smokers' intentions to quit. Hassan et al.'s (2008) study of smokers in the United States and United Kingdom found full support for their hypotheses that smokers who elaborate more on the warning label messages and smokers who contemplate quitting smoking more frequently will be more likely to adopt quit behaviours. Fathelrahman et al.'s (2009) study of adult smokers in Malaysia found that those who forwent cigarettes were more likely to be further along in the stages of change towards quitting (any interest in quitting OR=1.99, contemplating quitting OR=2.12, preparing to quit OR=3.24) and were almost twice as likely to have high self-efficacy in quitting successfully (OR=2.18). Overall, 39.6 percent of smokers surveyed reported forgoing a cigarette in the past month because of the labels. Willemsen (2005), who examined the self-reported effects of health warnings introduced in the Netherlands on smoking behaviour, found that 28 percent of smokers intending to quit within one month reported smoking less because of the new warnings, whereas just five percent of smokers who never intend to quit responded the same. Smokers intending to quit within the month were almost eight times more likely to

report smoking less because of the new warnings (OR=7.89). Overall, 10 percent of respondents said they smoked less because of the new warnings (see Exhibit 5).

EXHIBIT 5. SELF-REPORTED CHANGE IN SMOKING BEHAVIOUR BY QUIT INTENTION (WILLEMSON 2005)

QUIT INTENTION	SELF-REPORTED CHANGE IN SMOKING BEHAVIOUR DUE TO HEALTH WARNINGS		
	SMOKE LESS	NEUTRAL	SMOKE MORE
Never	5.1%	94.2%	0.7%
Don't Know	7.7%	91.7%	0.6%
> 1 Year	7.6%	91.2%	1.2%
> 6 Months	12.5%	87.2%	0.4%
> 1 Month	18.0%	81.4%	0.6%
< 1 Month	28.2%	71.4%	0.4%

Some longitudinal studies have linked cognitive processing of health warnings to subsequent cessation behaviour more explicitly with baseline and follow-up surveys of the same group of smokers. Hammond et al. (2003) created an index to measure smokers' depth of cognitive processing, then conducted logistic regression analyses to predict quitting, quit attempts, and reductions in smoking in a three month follow-up. The analysis adjusted for smoking status at baseline (including intention to quit, daily consumption, years smoking, and prior quit attempts), sex, and educational status. At the follow-up, 23 percent of study participants had made an attempt to quit, 11 percent of study participants remained abstinent, and 24 percent had reduced their cigarette consumption. The study results show that smokers who read, discussed, and thought about the warnings at baseline were more likely to have quit, made a quit attempt, or have reduced their smoking at three month follow-up than smokers who did not engage in cognitive processing. Specifically, smokers in the top quartile of the depth of processing index were 2.68 times more likely to have reduced their smoking, 1.37 times more likely to have made a quit attempt, and 1.77 times more likely to have quit at the follow-up.[3] Combining the various quit-related behaviours, smokers in the top quartile of the depth of processing index were 2.5 times more likely to have quit, attempted to quit, or reduced their smoking at follow-up. Hammond et al. concluded that cognitive processing of the labels does in fact predict future cessation behaviour, making the graphic warnings an effective cessation intervention.

Borland et al. (2009) used five waves (2002 to 2006) of ITC survey data to link reactions to health warnings at one wave to impacts on cessation activity at the next wave. The authors used logistic regression analyses to predict making quit attempts between waves.

[3] Curiously, smokers in the third quartile of the depth of processing index were 2.03 times more likely to have quit smoking.

The predictors studied are warning salience, cognitive reactions to the warnings, forgoing cigarettes, and warning avoidance. The authors found that measures of cognitive responses and, in particular, forgoing cigarettes are useful predictors of future quit attempts and therefore can indicate the effectiveness of health warnings. Exhibits 6 and 7 present the study's results in greater detail.

EXHIBIT 6. PERCENTAGES MAKING QUIT ATTEMPTS BETWEEN WAVES AND, OF THOSE, THE PERCENTAGE THAT QUIT FOR AT LEAST ONE MONTH (BORLAND ET AL. 2009)

PERIOD	INTERSURVEY INTERVAL (DAYS)	OUTCOME	CANADA
Waves 1-2	203	Quit attempt	43.9%
		Minimum one month	45.2%
Waves 2-3	388	Quit attempt	43.4%
		Minimum one month	55.2%
Waves 3-4	458	Quit attempt	39.8%
		Minimum one month	57.3%
Waves 4-5	361	Quit attempt	37.5%
		Minimum one month	56.9%

Borland et al. (2009) found that while the effects of the predictors on quit attempts are mediated partly through intentions to quit (as evidenced by the differences between Models A and B in Exhibit 7), Model B shows clear evidence that some of the effect is independent of intentions. Replicating the associations several times is a major strength of this kind of longitudinal study. The authors conclude that the data provide the strongest evidence to date that health warnings stimulate consumer reactions that are predictable antecedents of quit attempts. The authors further state that the stronger the warnings, the greater the reactions, and thus the greater the quitting activity they evoke.

EXHIBIT 7. PREDICTORS OF HAVING REPORTED QUIT ATTEMPTS AT SURVEYS IN WAVES 2 TO 5 (BORLAND ET AL. 2009)

PREDICTOR	WAVE 2 OR	WAVE 3 OR	WAVE 4 OR	WAVE 5 OR
Model A (controlled for demographic factors and cigarette consumption)				
Salience	1.07**	0.94*	0.96	0.96
Cognitive reactions	N/A	1.57***	1.44***	1.46***
Forgoing	1.69***	1.30**	1.43***	1.40**
Avoidance	1.32***	1.15	1.04	1.04
Model B (additionally adjusted for quit intention)				
Salience	1.02	0.96	0.97	0.97
Cognitive reactions	N/A	1.28***	1.14*	1.16**
Forgoing	1.38***	1.23*	1.42**	1.30*
Avoidance	1.17*	1.09	1.03	1.03

OR: Odds ratio. *P < 0.05, **P < 0.01, ***P < 0.001
N/A: relevant questions not asked in wave 1 survey

A retrospective study conducted by Hammond et al. (2004) also supports the influence of health warnings on smokers who have quit. The survey of 191 Canadian former smokers, conducted in 2001, asked participants who had quit smoking in the past three years to rate the factors that influenced their decision to quit and helped them to stay abstinent. Thirty-one percent of respondents cited the warning labels as having at least some influence over their decision to quit. In addition, participants who quit after the new warning labels were more likely to list the warnings as a motivation to quit than former smokers who quit in 1999 and 2000, prior to the graphic warnings (44 percent compared to 23 percent). In addition, 26.5 percent of former smokers indicated that the warning labels had helped them to remain abstinent.

A final study worth mentioning, conducted by Thrasher et al. (2007), used an auction method to evaluate the potential impact of graphic warning labels among adult Mexican smokers, by determining whether adult smokers perceived a cigarette pack with a graphic warning label to be less valuable than a cigarette pack that contained the text-only warning that is currently in force in Mexico. The pack with a graphic image had a mean attributed value $3.21 pesos lower than the normal pack with the text warning, representing a 17 percent reduction in perceived value. This lower value is theoretically equivalent to the reduced demand associated with introducing this graphic warning label, which would translate into a fairly profound reduction in tobacco consumption. However, extrapolation from this study to a broad-scale population impact may not be merited, particularly since smokers appear to habituate to warning labels, even though the habituation effect appears to take longer for graphic warnings.

TARGET AUDIENCE

Youth and less literate smokers are two important groups within the smoking population. Many studies have looked at the effects of current warning labels on these two specific audiences, analyzing their effectiveness and postulating how labels might be changed to better reach smokers that fall into these categories.

Youth Smokers

The vast majority of Canadian youth (aged 14-17) have seen and read the current warnings on cigarette packages whether or not they currently smoke. Studies indicate that the warning labels have affected youth smoking habits, increased their knowledge of smoking related illness, and encouraged them to change their smoking habits. The studies also indicate that larger warning labels would enhance these effects.

The Canadian Tobacco Use Monitoring Survey (CTUMS) records data on the use of tobacco in Canada by age group, gender, and province. CTUMS has collected data twice annually since 1999, publishing a wave one, wave two, and annual report. These surveys provide comprehensive data on smoking trends. An early CTUMS report (CTUMS 1999) found a high correlation between attempts to quit and age, with those 15-19 years old making more attempts than older smokers. The report noted, however, that the "high level of smoking at age 20-22 … suggests that the will to quit is not often translated into successful action." Despite the difficulties, CTUMS data reveal increasing youth attempts to quit and greater numbers of youth ex-smokers. For the 23.3 percent of youth smokers that had quit by 2007, 31.8 percent made four or more attempts. The CTUMS data also indicate that quit rates rise with age: 15-24 year olds in 2007 had a 23.3 percent quit rate, compared to 63 percent for those over 25.

The Environics (2008) wave 13 study of youth and the effects of tobacco warning labels in December 2007 looked at various effects of labels on youth knowledge. According to the survey, 77 percent of smoking youth believe that smoking is a major problem in Canada compared with 87 percent of non-smoking youth. Most teens are aware of the connection between cigarettes and diseases like lung cancer, heart disease, and other cancers. Those that have seen, heard, or read the health warning labels are more likely to strongly agree about the relationship between smoking and emphysema, and asthma; those that have actually seen the labels themselves are more likely to strongly agree that cigarettes cause premature death, impotence, mouth cancer, and gum disease. The current warning labels have increased and enforced knowledge about the dangers of cigarettes among youth smokers and non-smokers.

The survey on youth conducted by Environics (2008) observed that the current labels have been widely viewed and accepted as a credible source of information among both smoking and non-smoking youth. Ninety percent of Canadian youth have seen the health warning messages on cigarette packages, and 100 percent of youth who smoke have seen the warning labels. Ninety-two percent of youth believe that the warning labels on cigarettes provide them with important health information, and 19 percent of youth mention cigarette packages as a recent source of information on the health effects of tobacco (third, behind schools and television). Ninety percent of youth surveyed believed the information to be credible.

The Environics (2008) study of youth also found that warning labels on cigarette packaging have been effective in changing the behaviour of many youth smokers. Forty-nine percent said the warnings led them to attempt to quit, 51 percent said the warnings increased their desire to quit, 45 percent cited the messages as effective in getting them to smoke less, and 81 percent believe that the messages have been effective overall at informing them about the health risks of smoking. The warning labels have also had an effect on youth awareness of second-hand smoke; 44 percent stated the labels motivated them to smoke less around others (these numbers reflect those who responded either "very effective" or "somewhat effective" to the survey questions).

The data on the impact of the current warning labels on youth also support the idea of wear-out. The share of youth smokers who found health warning labels to be very effective at providing information on the health effects of smoking fell from 51 percent in late 2001 to 42 percent in late 2007. Other survey data categories, such as the effectiveness of warning labels at getting youth to try to quit smoking, follow a similar pattern (see Exhibit 7). This coincides with a reduction in the frequency with which youth smokers look at warning labels (see Exhibit 8).

EXHIBIT 8. IMPACT OF WARNING LABELS ON YOUTH SMOKERS (ENVIRONICS 2008)

WARNING LABELS WERE CONSIDERED VERY EFFECTIVE AT:	MAR-APR 2001	JUL 2001	NOV-DEC 2001	JUL 2002	DEC 2002	JUL-AUG 2003	DEC 2003	NOV-DEC 2004	JUL-AUG 2005	FEB-MAR 2006	DEC 2006	DEC 2007
Informing you about the health effects of cigarette smoking	39	45	51	48	49	47	50	48	49	42	46	42
Increasing your desire to quit smoking	27	21	24	19	33	25	20	19	25	28	24	25
Getting you to smoke less around others than you used to	17	22	21	15	27	19	21	23	36	27	28	19
Getting you to try to quit smoking	17	16	28	18	29	22	19	17	18	14	27	15
Getting you to smoke less	19	17	20	17	24	19	11	23	18	16	23	15
Note: Slightly different question wording in Dec. 2002												

EXHIBIT 9. PERCENTAGE OF YOUTH SMOKERS THAT LOOK AT OR READ HEALTH WARNING MESSAGES ON CIGARETTE PACKAGES (ENVIRONICS 2008)

FREQUENCY	NOV-DEC 2000	MAR-APR 2001	JUL 2001	NOV-DEC 2001	JUL 2002	NOV-DEC 2002	JUL-AUG 2003	DEC 2003	NOV-DEC 2004	JUL-AUG 2005	FEB-MAR 2006	NOV-DEC 2006	NOV-DEC 2007
Several times a day	40	26	34	23	29	35	24	21	21	24	18	26	23
About once a day	22	23	20	18	16	18	16	23	18	21	16	13	15
Once every two or three days	14	17	13	19	9	8	22	11	16	11	14	17	13
About once a week	15	17	15	21	16	18	15	25	16	18	22	16	18
Less than once a week	5	11	9	11	18	12	15	13	17	19	11	13	20
Never	3	6	9	8	12	10	7	7	13	8	17	16	10
Note: May not sum to 100 percent due to "don't know" answers													

A study by Les Etudes de marche Createc + (2008) tested the potential impacts of larger warning labels on teen smokers and potential smokers ("vulnerable non-smokers"). It found that the majority, more than 60 percent, underestimated the current amount of cigarette packaging that is devoted to a warning label (only 8 percent over-estimated). The majority of teens sampled also believed that current packages give more importance to the brand than the warning; this was especially true of the vulnerable non-smokers. The survey looked at a change in size from 50 percent of the package to 75, 90, and 100 percent of the package, and found that all three of the larger sizes would increase the effectiveness of the current labels. Study participants felt that warnings increased to 75 percent of the package were more effective at personally convincing respondents to stay away from smoking. The survey also found that these larger warnings were seen as more effective at communicating with the public about the risks of smoking. Only warnings on 100 percent of the package were effective in affecting the attributes associated with smoking and product/brand images.

Strahan et al. (2002) suggest that warning labels that emphasize social norms might be particularly effective with adolescents. Adolescents are less likely than adults to value their health; therefore, a narrow focus on the health risks associated with smoking may not be optimally effective with younger audiences. Furthermore, research has highlighted the role that social factors play in adolescent smoking. Therefore, warnings that focus on the negative social consequences of smoking may be more effective among adolescents than those that focus on negative health consequences.

Less-literate Smokers

Hammond 2007's review of the literature found that the message content of text-based warnings must target an appropriate literacy level. The current U.S. warnings, for example, require a college reading level and may be inappropriate for youth and Americans with poor reading abilities. This is particularly important considering that, in most countries, smokers report lower levels of education than the general public. Graphic

warnings may be particularly important in communicating health information to populations with lower literacy rates. Preliminary evidence suggests that countries with pictorial warnings demonstrate fewer disparities in health knowledge across educational levels.

ABC Canada, a private literacy foundation, reports on the demographics of the less literate population. Between 22 and 50 percent of adults with low levels of literacy live in low income households, and Canadians classified as the least healthy have the lowest literacy skills. Lower literacy levels are reportedly higher among First Nations populations: 17 percent of Aboriginal peoples age 15 to 49 have either no formal schooling or no schooling beyond eighth grade, compared to 6 percent for the population overall (ABC Canada, undated).[4] Dugdale and Clark (2008) of the National Literacy Trust, a British organization, found that less literate populations are about 10 percent more likely to smoke.

In a study on education level and smoking in Canada, Millar (1996) employed data from 1977 to 1994 to establish that people with less education are more likely to smoke. Those in the lowest educational attainment groups (elementary school or less, and some/completed high school) saw the smallest decline in smoking rates between 1977 and 1994. Smokers who had not had any education beyond high school were less likely to quit. There are important gender differences, however. While men with elementary education or less were the least likely to try to quit (33 percent) and had the highest smoking rate, women in this group were the most likely to have tried to quit (53 percent) despite also having the highest smoking rate. Although smokers were universally aware of the health warnings on cigarette packages, the recall of specific messages was lower on the whole for those with lower education levels.

A 2003 Createc study looked at the comprehension difficulties that less literate smokers face with current warning labels (Createc 2003). "Less literate" is considered a literacy level of two or lower.[5] Forty-eight percent of Canadians fall into this category, with 22 percent at Level 1 and 26 percent at Level 2. The survey found that less literate smokers are likely to scan a warning label and see the image but ignore the text. If they do not readily understand the full meaning of the image, they may assign their own superficial meaning. For example, upon seeing a picture of lungs, rather than look for context within the text, they will assign a simple meaning like "cigarettes are bad for your lungs." Once this meaning is assigned, they make no further attempts to understand the warning. Less literate smokers often never read the various messages or comprehend the gravity of the warnings.

The Createc study (2003) also provided examples of ways to improve the effectiveness of warning messages for the less-literate population, including improvements in the following dimensions:

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[4] ABC Canada cites the *Aboriginal Peoples Survey*, published by Statistics Canada in 1991, as the source of this statement.

[5] **Level 1** is generally described as being able to locate pieces of information in short texts, understand short texts on familiar topics, and obtain information from common signs and symbols. **Level 2** is described as the ability to make simple inferences, understand straightforward text, perform operations using easily located numbers, and obtain information from familiar sources.

- **Relevance** – the use of a more personal tone in order to limit any tendency to exclude oneself from the warning.
- **Accessibility** – the use of simpler words and images to enhance comprehension of the message.
- **Understanding** – the use of images that convey the meaning of the warning clearly and credibly.

The use of effective images is critical in enhancing the comprehension of less literate smokers. These images aid both understanding of the text as well as recall of the message.

QUIT ATTEMPTS AND PROBABILITY OF SUCCESS

Many studies have attempted to estimate the relationship between quit attempts and the probability of success. By looking at the correlation between attempts at cessation and successful quitting, it may be possible to determine how new warning labels will affect the behaviour of current smokers. A difficulty in this area of analysis is the definition of "success." Stages of change, age, method of cessation, and the length of time that determines quitting all play a role in evaluating the probability of successfully quitting a tobacco habit.

Trends

The Canadian Tobacco Use Monitoring Surveys (CTUMS 1999, 2003, 2005, 2007) data show a consistent decline in the percentage of Canadians who smoke, while the percentage of the population that considers themselves *former* smokers has increased from 25 percent in 1999 to 28 percent in 2007.[6] The rate of quitting (maintaining cessation for at least six months) has been steadily growing. The quit rate rose steadily between 1999 and 2005, but has levelled since.[7] The percentage of smokers attempting to quit has also increased; 13 percent of smokers in 1999 made four or more attempts, compared with 18 percent in 2003.[8]

Environics (2008) found that 82 percent of adult smokers report having tried to quit smoking (see Exhibit 9). Fifty-eight percent reported having stopped smoking for at least 24 hours one or more times in the past year (19 percent tried once, 17 percent tried twice, 8 percent tried three times, and 14 percent tried more than three times).

[6] **Former smoker**: was not smoking at the time of the interview, however, answered "YES" to the question "Have you smoked at least 100 cigarettes in your life?"

[7] **Quit rate:** the ratio of the number of former smokers in a specified group divided by the number of ever-smokers in that group.

[8] **Quit attempt**: not smoking for at least 24 hours in an effort to quit.

EXHIBIT 10. RELATIONSHIP BETWEEN HEALTH MESSAGES ON CIGARETTES AND QUIT ATTEMPTS (ENVIRONICS 2008A)

ENVIRONICS (2008A) SURVEY OF ADULT SMOKERS	NOV-DEC 2000	MAR-APR 2001	JUL 2001	NOV-DEC 2001	JUL 2002	NOV-DEC 2002	JUL-AUG 2003	DEC 2003	NOV-DEC 2004	JUL-AUG 2005	FEB-MAR 2006	NOV-DEC 2006	NOV-DEC 2007
Quit Attempts (ever)	77	79	78	77	79	78	80	80	80	82	81	81	82
Quit Attempts in the Past Year (Stopped smoking for 24 hours at least once)	60	59	56	62	67	66	67	68	65	61	63	61	58
Health messages inform you about the health effects of cigarette smoking (very or somewhat effective)	-	54	64	69	68	74	73	73	73	69	71	73	74
Health messages increase your desire to quit smoking (very or somewhat effective)	-	42	45	49	50	53	53	50	51	48	50	49	52
Health messages have gotten you to try to quit smoking (very or somewhat effective)	-	36	38	43	45	47	47	46	46	41	43	45	43
Health messages have gotten you to smoke less (very or somewhat effective)	-	34	36	37	38	43	43	39	42	39	41	39	40

Stages of Change

Fathelrahman et al. (2009) cite previous studies' findings that smokers' interest in quitting and their self-efficacy for doing so mediate and predict behaviour change and the maintenance of change. Interest in quitting (or intention to quit) has been conceptualized both as a continuous variable and as a series of stages. The latter has been popularized by the transtheoretical model of Prochaska and DiClemente, which postulates three stages of change before quitting: precontemplation (no interest in quitting in the next six months), contemplation (in between), and preparation (planning to quit in the next 30 days). Others have suggested dividing the precontemplation stage between those not planning to quit at all and those with no plans in the next six months. Of the Malaysian smokers surveyed in the Fathelrahman study, 55.5 percent were planning to quit smoking, 11.5 percent were at least at the contemplation stage of change, and 5.4 percent were in the preparation stage of change.

CTUMS (1999, 2003, and 2007) also records information related to the "stages of change" categories. The difference between desire to quit and actual attempts to quit can be seen in the large discrepancy between the "Preparation" and "Action" stages of

change.[9] A report compiled by CTUMS on quitting (2003a) notes that approximately 50 percent of smokers were thinking about quitting, while only about 16 percent were seriously considering quitting in the next 30 days. Those who successfully quit averaged about 3.2 attempts before stopping for good. On average three to four times more people are "seriously considering" quitting than are actually quitting at the time of the survey. This is especially true for younger adults. The 1999, 2003, and 2007 surveys all returned relatively consistent results for the percentage of smokers who were considering quitting, as well as the percentage of those that had recently quit or were in the process of quitting. In 2003, 16 percent of 20-24 year old smokers were in the preparation stage while only 3 percent of smokers had quit within the last 6 months. In 2007, 57.1 percent of Canadian ever smokers[10] were in the maintenance[11] stage. This shows a high eventual success rate, despite an approximate 5 percent "per attempt" success rate. The high percentage of former smokers listed, along with the increasing number of smokers that have made more than one attempt, indicates that quitting smoking is more likely to be achieved over time.

Success

Estimates of quit success can either use point prevalence measures or measures of continuous abstinence. Point prevalence measures are drawn from surveys that ask individuals whether they consider themselves to be former smokers at a given point in time, whereas continuous abstinence measures include only smokers who have completely refrained from smoking over a specified period (usually one year). As a measure of success, continuous abstinence measures are generally more conservative than point prevalence measures.

CTUMS (2007) provides information on success rates for tobacco users trying to quit. In 2007, CTUMS reported that 59.3 percent of survey respondents who had ever smoked had successfully quit. The survey indicates that the majority of smokers who try to quit are eventually successful; however, most ex-smokers are over 45. Younger adults are more likely to attempt to quit due to lower dependence and lighter smoking rates, but have limited success. While the majority of the smoking population in Canada eventually achieves cessation, the Lung Association (2008) notes that success can be a slow process rather than an event. The CTUMS data support this observation.

[9] **Preparation:** current smokers who were seriously considering quitting within the next 30 days and had quit smoking at least once, for at least 24 hours, during the past year. **Action:** former smokers (i.e., did not currently smoke) who had quit smoking within the past six months.

[10] **Ever-smokers:** current and former smokers combined.

[11] **Maintenance:** former smokers who, at the time of the interview, had quit smoking at least six months ago.

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APPENDIX E

ESTIMATING THE VALUE OF REDUCED MORTALITY RISKS

INTRODUCTION

To estimate the value of the reduced mortality risk resulting from smoking cessation, this analysis uses a modified version of an approach suggested by Robinson (2008) to estimate the mortality benefits of averted smoking.[1] Robinson's approach is based on life tables for typical 24-year-old smokers (taking into account the likelihood of quitting over time) and for "non-smoking smokers," i.e., similar individuals who do not smoke, presented in a Sloan et al. (2004) study.[2] These tables, along with the life tables from Sloan et al. for never smokers and for lifetime smokers, are presented for both men and women in Exhibit E-1.

Whereas Robinson's analysis estimated the mortality risk reduction of averted smoking by comparing the life table for "non-smoking smokers" to the life table for typical 24-year-old smokers, this analysis estimates the mortality risk reduction of smoking cessation by comparing the life tables for former smokers to life tables for typical smokers at each age of cessation examined. For smokers who quit at age 24, we assume that the mortality risk reduction would equal the risk reduction estimated by Robinson for an averted smoker. For the other ages examined, we have modified the Sloan et al. life tables, drawing on estimates from a Taylor et al. (2002) study on the impact of smoking cessation on life expectancy to develop new life tables for individuals who smoke until the ages of 35, 45, 55, or 65, and then quit.[3] To provide a consistent basis for determining differences in mortality risks, we also employ Sloan et al.'s estimates of expected quit rates by age and gender to develop life tables for typical 35-, 45-, 55-, and 65-year-old smokers. As with the life table for typical 24-year-old smokers, these tables project annual survival rates for smokers at each age, taking into account the likelihood of quitting over the remainder of their lives. Additional detail on this approach is provided below.

LIFE TABLES FOR FORMER SMOKERS WHO QUIT AT AGES 35, 45, 55, OR 65

In their 2002 study, Taylor et al. estimated the impacts of smoking cessation on longevity, using data collected from 1982 to 1996 for the Cancer Prevention Study II, a U.S. study with a cohort of 1.2 million adults. From these data, the authors estimated the relative mortality risks of continuing smokers and of former smokers who had quit for different lengths of time and at different ages. The relative risk estimates represent the adjusted likelihood of all-cause mortality for each type of smoker compared to the likelihood of all-cause mortality for never smokers. Exhibit E-2 presents the relative risk estimates developed by Taylor et al. for each category of smoker. To develop new life tables for former smokers who quit at the ages of 35, 45, 55, and 65, we apply the relative risk estimates presented in Exhibit E-2 to the life table for "never smokers" from Sloan et

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[1] Robinson, L. Health Effects of Tobacco Use. Review Draft. Prepared for Industrial Economics, Incorporated under Health Canada Standing Offer Number 100062415001. September 2008.

[2] Sloan, F.A., J. Ostermann, G. Picone, C. Conover, and D.H. Taylor, Jr. *The Price of Smoking*. Cambridge, MA: MIT Press. 2004.

[3] Taylor, D.H. Jr., V. Hasselblad, S.J. Henley, M.J. Thun and F.A. Sloan. "Benefits of smoking cessation for longevity." *American Journal of Public Health*, 92(9):1389. 2002.

al. For example, to estimate the mortality risk for a male 55-year-old former smoker who quit at age 45, we calculate the mortality risk of a 55-year-old never smoker from the Sloan et al. life tables (0.0132), then multiply that risk by the relative risk of a 55-year-old male smoker who had quit 10 years prior (1.86, according to Exhibit E-2). With mortality risks for each category of smoker at all ages, we were able to develop new life tables for male and female former smokers, presented in Exhibit E-3.[4] We also developed new life tables for lifetime smokers, which we employed to develop new life tables for typical 35-, 45-, 55-, and 65-year-old smokers (see below).

LIFE TABLES FOR TYPICAL 35-, 45-, 55-, AND 65-YEAR-OLD SMOKERS

As noted above, analysis of the effect of smoking cessation on mortality risks also requires the development of life tables for typical smokers at the ages of interest (i.e., 35, 45, 55, and 65). To develop these tables, we begin with Sloan et al.'s tables for typical 24-year-old male and female smokers. In developing these tables, Sloan et al. projected gender-specific quit rates between the ages of 24 and 100, based on the age- and gender-specific quit rates for smokers between the ages of 24 and 68 reported in a Health and Retirement Study conducted by the University of Michigan's Institute for Social Research. Exhibit E-4 presents a graphic representation of these projected quit rates. Using these quit rate estimates, we developed new life tables for typical 35-, 45-, 55-, and 65-year-old smokers. This process involved the following steps:

1. From the year examined onward, we applied the age- and gender-specific quit rates estimated by Sloan et al.
2. For continuing smokers, we estimated the number of deaths per year using annual mortality rates from the new life tables for lifetime smokers.[5]
3. For former smokers who had quit for three years or more, we estimated the number of deaths per year using annual mortality rates from the life tables we developed for former smokers who quit at each year examined.[6]

Employing the three steps listed above, we estimated the number of surviving continuing smokers and former smokers at each age specified for each of the smoking cessation scenarios. Adding the two groups of survivors together yielded life tables for 35-, 45-, 55-, and 65-year old smokers, taking into account the likelihood that a typical smoker would quit at some point in his or her lifetime. These new life tables are presented in Exhibit E-5.[7]

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[4] Note that in each case the life table is normalized to a population of 100,000 at the age of smoking cessation.

[5] We used the mortality rates from the new lifetime smoker life tables rather than the Sloan et al. lifetime smoker life table in order to ensure consistency with the mortality rates from the life tables for former smokers. The former smoker life tables were generated using estimates of relative risk from the Taylor et al. analysis, which differed slightly from the mortality risks estimated by Sloan et al.

[6] Smokers who had quit for fewer than three years were combined with current smokers. According to Taylor et al. (2002), smokers who had quit less than three years prior to their baseline examination had similar mortality rates to current smokers, due in part to the relatively high relapse rate among recent quitters.

[7] Note that in each case the life table is normalized to a population of 100,000 for typical smokers of the age specified.

NET PRESENT VALUE OF QUITTING AT AGES 24, 35, 45, 55, AND 65

Following Robinson's approach, we used the newly developed life tables to compare the annual death rates of former smokers to the annual death rates of typical smokers. Using a central VSL estimate of $6.5 million and a low and high VSL estimate for sensitivity analysis of $3.5 million and $9.5 million (all in 2007 dollars), we then estimated the present value of the difference in lifetime mortality risk due to smoking cessation at four different ages, using both an 8 percent and a 3 percent discount rate. The net present value of the mortality benefits of quitting at ages 24, 35, 45, 55, and 65 is presented in Exhibit E-6. As indicated by the exhibit, this approach suggests that the value of averting mortality risks by quitting ranges from about $44,800 to over $3 million per smoker, depending on the age at quitting, the VSL estimate and the discount rate used. The value of quitting increases with age, even though one would expect the individual to receive less benefit in terms of reduced mortality risks and increased life expectancy. This counter-intuitive result reflects the impact of discounting on the NPV of benefits. Smokers who quit earlier achieve greater mortality reduction overall, but much of that benefit is achieved later in life; assuming that the individual exhibits a positive rate of time preference, the individual would value those future reductions less than mortality reductions that would be achieved today or in the near future. Smokers who quit later in life achieve less risk reduction, but experience that benefit sooner and thus discount it less.

EXHIBIT E-1. SLOAN ET AL. (2004) LIFE TABLES BY GENDER AND SMOKING STATUS

AGE	MEN				WOMEN			
	LIFETIME SMOKER	TYPICAL 24-YEAR-OLD SMOKER	NON-SMOKING SMOKER	NEVER SMOKER	LIFETIME SMOKER	TYPICAL 24-YEAR-OLD SMOKER	NON-SMOKING SMOKER	NEVER SMOKER
24	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
25	99,850	99,850	99,841	99,870	99,939	99,939	99,946	99,953
26	99,702	99,701	99,685	99,743	99,876	99,876	99,889	99,905
27	99,558	99,557	99,533	99,618	99,812	99,812	99,831	99,855
28	99,417	99,415	99,385	99,497	99,746	99,746	99,771	99,805
29	99,276	99,273	99,236	99,375	99,676	99,676	99,709	99,751
30	99,131	99,126	99,083	99,250	99,603	99,604	99,642	99,694
31	98,980	98,974	98,926	99,121	99,525	99,527	99,572	99,634
32	98,824	98,815	98,761	98,986	99,443	99,445	99,498	99,571
33	98,662	98,649	98,589	98,846	99,353	99,357	99,418	99,503
34	98,491	98,474	98,408	98,698	99,259	99,264	99,333	99,430
35	98,313	98,291	98,222	98,544	99,158	99,164	99,242	99,352
36	98,127	98,099	98,025	98,383	99,047	99,056	99,143	99,267
37	97,783	97,776	97,886	98,269	98,943	98,952	99,031	99,172
38	97,422	97,440	97,739	98,148	98,831	98,840	98,911	99,068
39	97,043	97,089	97,583	98,021	98,709	98,720	98,782	98,958
40	96,641	96,720	97,419	97,886	98,579	98,591	98,645	98,840
41	96,212	96,331	97,243	97,741	98,439	98,452	98,496	98,713
42	95,765	95,922	97,072	97,601	98,297	98,310	98,331	98,572
43	95,286	95,488	96,889	97,450	98,142	98,154	98,154	98,420
44	94,775	95,028	96,692	97,289	97,976	97,987	97,964	98,257
45	94,225	94,538	96,480	97,114	97,797	97,807	97,758	98,081
46	93,638	94,017	96,252	96,926	97,604	97,614	97,536	97,890
47	93,014	93,478	95,973	96,697	97,286	97,318	97,356	97,736
48	92,344	92,902	95,671	96,448	96,942	96,999	97,160	97,567
49	91,625	92,290	95,346	96,180	96,569	96,656	96,948	97,385
50	90,858	91,642	94,997	95,892	96,163	96,284	96,716	97,187
51	90,042	90,961	94,625	95,585	95,722	95,882	96,464	96,970
52	89,179	90,237	94,261	95,285	95,250	95,457	96,173	96,720
53	88,256	89,471	93,870	94,961	94,734	94,997	95,854	96,445
54	87,269	88,657	93,449	94,613	94,173	94,498	95,506	96,146
55	86,209	87,790	92,993	94,236	93,561	93,957	95,124	95,817
56	85,067	86,863	92,499	93,826	92,895	93,373	94,709	95,460
57	83,798	85,837	91,925	93,350	92,081	92,686	94,273	95,084
58	82,422	84,732	91,295	92,827	91,187	91,938	93,792	94,669
59	80,930	83,542	90,606	92,253	90,209	91,126	93,263	94,212
60	79,317	82,263	89,854	91,627	89,145	90,249	92,684	93,712

AGE	MEN				WOMEN			
	LIFETIME SMOKER	TYPICAL 24-YEAR-OLD SMOKER	NON-SMOKING SMOKER	NEVER SMOKER	LIFETIME SMOKER	TYPICAL 24-YEAR-OLD SMOKER	NON-SMOKING SMOKER	NEVER SMOKER
61	77,583	80,896	89,034	90,943	87,991	89,305	92,053	93,166
62	75,836	79,473	88,125	90,182	86,711	88,254	91,364	92,570
63	73,964	77,953	87,135	89,353	85,324	87,124	90,612	91,917
64	71,963	76,334	86,064	88,454	83,832	85,917	89,795	91,208
65	69,837	74,618	84,908	87,480	82,239	84,637	88,917	90,445
66	67,591	72,808	83,666	86,432	80,550	83,287	87,975	89,625
67	65,202	70,842	82,278	85,257	78,742	81,847	86,966	88,745
68	62,724	68,800	80,809	84,010	76,844	80,344	85,893	87,808
69	60,144	66,671	79,248	82,679	74,838	78,764	84,747	86,804
70	57,446	64,440	77,577	81,248	72,697	77,083	83,506	85,715
71	54,618	62,090	75,779	79,704	70,398	75,286	82,154	84,527
72	51,603	59,568	73,731	77,935	68,053	73,367	80,597	83,154
73	48,498	56,949	71,556	76,047	65,567	71,336	78,922	81,673
74	45,332	54,251	69,263	74,044	62,950	69,196	77,129	80,082
75	42,133	51,493	66,862	71,933	60,213	66,954	75,218	78,379
76	38,932	48,694	64,363	69,721	57,375	64,622	73,197	76,573
77	35,878	45,935	61,423	67,097	54,661	62,108	71,004	74,604
78	32,853	43,156	58,407	64,381	51,851	59,494	68,691	72,517
79	29,868	40,357	55,309	61,564	48,939	56,771	66,245	70,299
80	26,921	37,530	52,122	58,634	45,913	53,922	63,645	67,927
81	24,019	34,671	48,833	55,576	42,768	50,935	60,875	65,384
82	21,296	31,712	45,233	52,183	39,767	47,935	57,675	62,424
83	18,629	28,733	41,543	48,652	36,674	44,813	54,310	59,285
84	16,057	25,763	37,802	45,012	33,502	41,575	50,786	55,965
85	13,631	22,854	34,067	41,312	30,270	38,232	47,107	52,464
86	11,388	20,051	30,396	37,601	27,008	34,801	43,292	48,789
87	9,768	17,614	26,176	33,224	24,066	31,647	39,114	44,708
88	8,261	15,294	22,238	29,025	21,164	28,474	34,933	40,560
89	6,879	13,112	18,615	25,043	18,344	25,321	30,808	36,394
90	5,634	11,085	15,333	21,315	15,644	22,226	26,791	32,261
91	4,528	9,229	12,409	17,874	13,105	19,230	22,938	28,211
92	3,568	7,558	9,853	14,748	10,765	16,377	19,307	24,305
93	2,753	6,083	7,669	11,964	8,658	13,711	15,956	20,606
94	2,078	4,808	5,847	9,536	6,808	11,274	12,935	17,177
95	1,534	3,731	4,365	7,465	5,228	9,093	10,272	14,062
96	1,107	2,840	3,188	5,735	3,913	7,184	7,980	11,290
97	779	2,120	2,277	4,322	2,849	5,551	6,055	8,878
98	535	1,550	1,589	3,193	2,015	4,190	4,481	6,829
99	359	1,110	1,084	2,312	1,383	3,087	3,234	5,136
100	234	778	721	1,639	921	2,219	2,274	3,773

AGE	MEN				WOMEN			
	LIFETIME SMOKER	TYPICAL 24-YEAR-OLD SMOKER	NON-SMOKING SMOKER	NEVER SMOKER	LIFETIME SMOKER	TYPICAL 24-YEAR-OLD SMOKER	NON-SMOKING SMOKER	NEVER SMOKER

Source: Sloan, F.A., J. Ostermann, G. Picone, C. Conover, and D.H. Taylor, Jr. 2004. *The Price of Smoking*. Cambridge, MA: MIT Press.
Note: This life table indicates, for a population of 100,000 24 year-old men or women, the number of individuals likely to survive to a given age, depending on smoking status.

EXHIBIT E-2. RELATIVE RISK ESTIMATES FOR CURRENT AND FORMER SMOKERS VS. NEVER SMOKERS

	AGE IN 1982				
	<50	50-59	60-69	70-79	≥80
Men					
Current Smoker, 1982	2.57[a]	3.11[a]	3.53[a]	3.12[a]	1.95[a]
Former Smoker, quit duration in 1982:					
3-5 years	1[b]	1.93	2.13	1.98	1[b]
6-10 years	1.46	1.86	2.17	2.08	1.56
11-15 years	1[b]	1.5	1.75	1.92	1.6
≥16 years	1[b]	1.13	1.23	1.32	1.19
Women					
Current Smoker, 1982	1.86[a]	2.58[a]	2.89[a]	3.14[a]	2.14[a]
Former Smoker, quit duration in 1982:					
3-5 years	1.55	1.76	2.06	1.55	1.64
6-10 years	1[b]	1.31	1.89	1.8	1.53
11-15 years	1[b]	1.23	1.59	1.7	1.47
≥16 years	1[b]	1[b]	1.11	1.2	1.21

Source: Taylor, D.H. Jr., V. Hasselblad, S.J. Henley, M.J. Thun and F.A. Sloan. 2002. "Benefits of smoking cessation for longevity." *American Journal of Public Health*, 92(9):1389.

Notes:

a. Relative risk ratios for current smokers are adjusted to reflect the possibility that some current smokers in 1982 subsequently quit.

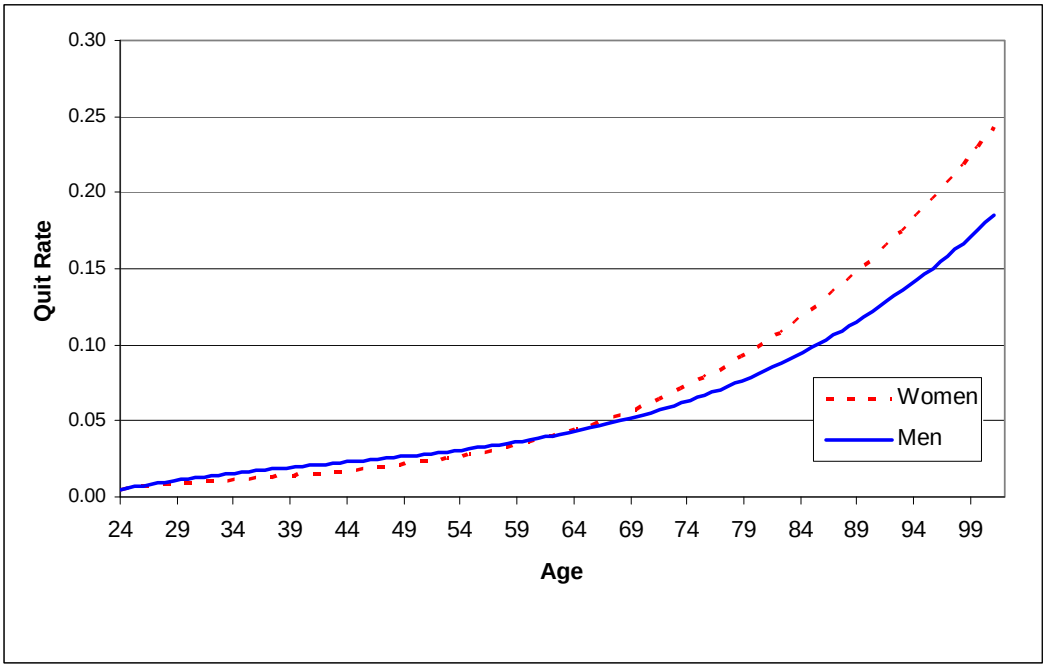
b. Estimates of these relative risk ratios are not significant at the 0.05 level.

EXHIBIT E-3. LIFE TABLES FOR FORMER SMOKERS WHO QUIT AT AGES 35, 45, 55, OR 65

AGE	MEN				WOMEN			
	FORMER SMOKER, QUIT @ 35	FORMER SMOKER, QUIT @ 45	FORMER SMOKER, QUIT @ 55	FORMER SMOKER, QUIT @ 65	FORMER SMOKER, QUIT @ 35	FORMER SMOKER, QUIT @ 45	FORMER SMOKER, QUIT @ 55	FORMER SMOKER, QUIT @ 65
35	100,000	n/a	n/a	n/a	100,000	n/a	n/a	n/a
36	99,580	n/a	n/a	n/a	99,841	n/a	n/a	n/a
37	99,284	n/a	n/a	n/a	99,663	n/a	n/a	n/a
38	98,969	n/a	n/a	n/a	99,469	n/a	n/a	n/a
39	98,841	n/a	n/a	n/a	99,298	n/a	n/a	n/a
40	98,705	n/a	n/a	n/a	99,114	n/a	n/a	n/a
41	98,559	n/a	n/a	n/a	98,917	n/a	n/a	n/a
42	98,353	n/a	n/a	n/a	98,775	n/a	n/a	n/a
43	98,131	n/a	n/a	n/a	98,623	n/a	n/a	n/a
44	97,894	n/a	n/a	n/a	98,460	n/a	n/a	n/a
45	97,637	100,000	n/a	n/a	98,283	100,000	n/a	n/a
46	97,361	99,502	n/a	n/a	98,092	99,638	n/a	n/a
47	97,131	98,898	n/a	n/a	97,938	99,346	n/a	n/a
48	96,881	98,244	n/a	n/a	97,768	99,027	n/a	n/a
49	96,612	97,971	n/a	n/a	97,586	98,740	n/a	n/a
50	96,322	97,677	n/a	n/a	97,387	98,429	n/a	n/a
51	95,860	97,074	n/a	n/a	97,120	98,042	n/a	n/a
52	95,520	96,507	n/a	n/a	96,870	97,711	n/a	n/a
53	95,153	95,897	n/a	n/a	96,594	97,347	n/a	n/a
54	94,759	95,243	n/a	n/a	96,295	96,952	n/a	n/a
55	94,332	94,537	100,000	n/a	95,965	96,517	100,000	n/a
56	93,868	93,772	98,647	n/a	95,608	96,046	99,039	n/a
57	93,330	93,059	97,090	n/a	95,231	95,581	98,032	n/a
58	92,739	92,277	95,399	n/a	94,815	95,068	96,928	n/a
59	92,091	91,421	94,260	n/a	94,358	94,503	96,105	n/a
60	91,385	90,490	93,026	n/a	93,857	93,886	95,207	n/a
61	90,546	89,308	91,547	n/a	93,250	93,017	94,064	n/a
62	89,614	88,389	89,884	n/a	92,588	92,356	92,927	n/a
63	88,601	87,389	88,091	n/a	91,863	91,633	91,688	n/a
64	87,504	86,308	86,168	n/a	91,076	90,849	90,352	n/a
65	86,319	85,139	84,109	100,000	90,231	90,005	88,923	100,000
66	85,047	83,884	81,923	95,771	89,323	89,099	87,399	97,380
67	83,625	82,482	79,974	91,175	88,349	88,128	86,035	94,617
68	82,121	80,998	77,927	86,468	87,314	87,095	84,591	91,729
69	80,520	79,420	75,766	83,550	86,205	85,990	83,053	89,569
70	78,806	77,729	73,471	80,470	85,005	84,792	81,396	87,254
71	76,829	75,779	70,790	77,442	83,591	83,382	79,478	85,380

AGE	MEN				WOMEN			
	FORMER SMOKER, QUIT @ 35	FORMER SMOKER, QUIT @ 45	FORMER SMOKER, QUIT @ 55	FORMER SMOKER, QUIT @ 65	FORMER SMOKER, QUIT @ 35	FORMER SMOKER, QUIT @ 45	FORMER SMOKER, QUIT @ 55	FORMER SMOKER, QUIT @ 65
72	74,579	73,559	68,716	73,867	81,962	81,757	77,929	82,883
73	72,194	71,207	66,519	70,145	80,210	80,010	76,263	80,226
74	69,684	68,731	64,206	66,302	78,335	78,139	74,481	77,413
75	67,061	66,144	61,790	62,370	76,336	76,145	72,580	74,450
76	64,339	63,460	59,282	58,381	74,225	74,040	70,573	71,362
77	61,143	60,307	56,337	54,162	71,935	71,755	68,396	68,243
78	57,876	57,085	53,327	49,953	69,520	69,346	66,100	64,997
79	54,533	53,788	50,247	45,756	66,969	66,801	63,673	61,618
80	51,107	50,409	47,090	41,575	64,257	64,096	61,095	58,083
81	47,935	47,280	44,168	38,106	61,346	61,193	58,328	54,887
82	44,453	43,845	40,959	35,337	57,986	57,841	55,133	51,880
83	40,873	40,315	37,661	32,492	54,458	54,322	51,778	48,723
84	37,234	36,725	34,308	29,599	50,768	50,641	48,270	45,422
85	33,592	33,133	30,952	26,704	46,925	46,807	44,616	41,984
86	30,001	29,591	27,643	23,849	42,948	42,840	40,834	38,425
87	25,845	25,492	23,814	20,546	38,601	38,504	36,701	34,536
88	21,958	21,658	20,232	17,456	34,267	34,182	32,581	30,659
89	18,373	18,122	16,929	14,606	30,009	29,933	28,532	26,849
90	15,119	14,912	13,930	12,018	25,885	25,820	24,611	23,159
91	12,214	12,047	11,254	9,710	21,953	21,898	20,873	19,641
92	9,672	9,540	8,912	7,689	18,275	18,229	17,376	16,351
93	7,499	7,397	6,910	5,962	14,910	14,873	14,176	13,340
94	5,688	5,611	5,241	4,522	11,908	11,878	11,322	10,654
95	4,218	4,161	3,887	3,353	9,295	9,272	8,837	8,316
96	3,055	3,013	2,815	2,428	7,078	7,060	6,729	6,332
97	2,159	2,130	1,990	1,716	5,248	5,235	4,990	4,695
98	1,488	1,468	1,371	1,183	3,783	3,773	3,596	3,384
99	999	986	921	795	2,648	2,641	2,518	2,369
100	653	644	602	519	1,798	1,793	1,709	1,608

EXHIBIT E-4. PREDICTED QUIT RATES BY AGE AND GENDER



Source: Sloan, F.A., J. Ostermann, G. Picone, C. Conover, and D.H. Taylor, Jr. 2004. *The Price of Smoking*. Cambridge, MA: MIT Press.

EXHIBIT E-5. LIFE TABLES FOR TYPICAL 35-, 45-, 55-, AND 65-YEAR-OLD SMOKERS

AGE	MEN				WOMEN			
	TYPICAL 35-YEAR-OLD SMOKER	TYPICAL 45-YEAR-OLD SMOKER	TYPICAL 55-YEAR-OLD SMOKER	TYPICAL 65-YEAR-OLD SMOKER	TYPICAL 35-YEAR-OLD SMOKER	TYPICAL 45-YEAR-OLD SMOKER	TYPICAL 55-YEAR-OLD SMOKER	TYPICAL 65-YEAR-OLD SMOKER
35	100,000	n/a	n/a	n/a	100,000	n/a	n/a	n/a
36	99,573	n/a	n/a	n/a	99,839	n/a	n/a	n/a
37	99,272	n/a	n/a	n/a	99,659	n/a	n/a	n/a
38	98,952	n/a	n/a	n/a	99,462	n/a	n/a	n/a
39	98,621	n/a	n/a	n/a	99,254	n/a	n/a	n/a
40	98,272	n/a	n/a	n/a	99,032	n/a	n/a	n/a
41	97,903	n/a	n/a	n/a	98,794	n/a	n/a	n/a
42	97,547	n/a	n/a	n/a	98,534	n/a	n/a	n/a
43	97,166	n/a	n/a	n/a	98,255	n/a	n/a	n/a
44	96,764	n/a	n/a	n/a	97,959	n/a	n/a	n/a
45	96,332	100,000	n/a	n/a	97,642	100,000	n/a	n/a
46	95,873	99,491	n/a	n/a	97,300	99,631	n/a	n/a
47	95,338	98,872	n/a	n/a	97,027	99,334	n/a	n/a
48	94,764	98,203	n/a	n/a	96,729	99,009	n/a	n/a
49	94,158	97,495	n/a	n/a	96,410	98,660	n/a	n/a
50	93,517	96,748	n/a	n/a	96,065	98,282	n/a	n/a
51	92,677	95,788	n/a	n/a	95,550	97,714	n/a	n/a
52	91,890	94,867	n/a	n/a	94,977	97,075	n/a	n/a
53	91,052	93,888	n/a	n/a	94,355	96,381	n/a	n/a
54	90,166	92,855	n/a	n/a	93,688	95,637	n/a	n/a
55	89,222	91,755	100,000	n/a	92,964	94,831	100,000	n/a
56	88,213	90,581	98,604	n/a	92,189	93,970	99,012	n/a
57	87,090	89,280	97,000	n/a	91,391	93,084	97,977	n/a
58	85,883	87,884	95,257	n/a	90,524	92,123	96,842	n/a
59	84,585	86,385	93,391	n/a	89,582	91,079	95,612	n/a
60	83,197	84,786	91,408	n/a	88,566	89,953	94,288	n/a
61	81,516	82,846	89,017	n/a	87,319	88,572	92,692	n/a
62	79,764	80,836	86,438	n/a	86,035	87,156	90,995	n/a
63	77,907	78,712	83,724	n/a	84,656	85,636	89,177	n/a
64	75,953	76,483	80,884	n/a	83,187	84,021	87,250	n/a
65	73,899	74,148	77,923	100,000	81,641	82,322	85,228	100,000
66	71,760	71,725	74,863	95,591	80,016	80,540	83,113	97,262
67	69,510	69,195	71,701	90,810	78,355	78,727	80,973	94,378
68	67,215	66,627	68,510	85,927	76,635	76,853	78,769	91,369
69	64,857	64,000	65,267	81,014	74,836	74,897	76,475	88,256
70	62,419	61,299	61,955	76,049	72,932	72,832	74,062	85,001

AGE	MEN				WOMEN			
	TYPICAL 35-YEAR-OLD SMOKER	TYPICAL 45-YEAR-OLD SMOKER	TYPICAL 55-YEAR-OLD SMOKER	TYPICAL 65-YEAR-OLD SMOKER	TYPICAL 35-YEAR-OLD SMOKER	TYPICAL 45-YEAR-OLD SMOKER	TYPICAL 55-YEAR-OLD SMOKER	TYPICAL 65-YEAR-OLD SMOKER
71	59,972	58,645	58,796	71,587	70,785	70,513	71,369	81,404
72	57,412	55,909	55,613	66,739	68,492	68,055	68,549	77,410
73	54,783	53,116	52,391	61,886	66,112	65,513	65,650	73,340
74	52,103	50,287	49,159	57,076	63,655	62,900	62,689	69,223
75	49,392	47,444	45,946	52,359	61,131	60,228	59,682	65,085
76	46,670	44,610	42,776	47,775	58,564	57,523	56,661	60,976
77	43,613	41,458	39,308	42,870	55,910	54,743	53,587	56,863
78	40,603	38,381	35,970	38,248	53,222	51,942	50,518	52,814
79	37,634	35,374	32,758	33,900	50,492	49,115	47,450	48,829
80	34,698	32,427	29,660	29,810	47,704	46,245	44,366	44,892
81	32,273	30,071	27,326	27,028	45,183	43,722	41,791	41,907
82	29,772	27,688	25,055	24,528	42,447	41,017	39,094	38,925
83	27,232	25,277	22,778	22,065	39,625	38,238	36,341	35,927
84	24,682	22,868	20,522	19,673	36,727	35,394	33,546	32,932
85	22,160	20,496	18,320	17,383	33,760	32,493	30,713	29,946
86	19,702	18,191	16,199	15,219	30,737	29,547	27,858	26,984
87	16,887	15,563	13,799	12,818	27,482	26,386	24,813	23,873
88	14,283	13,141	11,607	10,670	24,282	23,288	21,848	20,893
89	11,905	10,937	9,627	8,770	21,177	20,290	18,996	18,066
90	9,763	8,957	7,862	7,103	18,202	17,425	16,284	15,412
91	7,865	7,208	6,311	5,662	15,391	14,723	13,738	12,949
92	6,214	5,690	4,971	4,434	12,781	12,219	11,388	10,697
93	4,809	4,400	3,838	3,407	10,407	9,945	9,259	8,674
94	3,642	3,331	2,901	2,566	8,299	7,928	7,375	6,895
95	2,698	2,466	2,146	1,893	6,471	6,180	5,746	5,364
96	1,952	1,784	1,552	1,366	4,924	4,701	4,369	4,074
97	1,379	1,260	1,095	963	3,649	3,484	3,237	3,016
98	950	868	754	662	2,629	2,510	2,332	2,171
99	638	583	506	444	1,840	1,757	1,632	1,519
100	417	381	331	290	1,249	1,192	1,107	1,031

EXHIBIT E-6. PRESENT VALUE OF REDUCED PROBABILITY OF PREMATURE DEATH: FORMER SMOKER (BY AGE AT CESSATION) VS. TYPICAL SMOKER (2007 DOLLARS)

VSL (MILLIONS)	PRESENT VALUE BY AGE AT CESSATION									
	8 % DISCOUNT RATE					3 % DISCOUNT RATE				
	24*	35	45	55	65	24	35	45	55	65
$3.5	$43,800	$147,000	$273,000	$448,000	$642,000	$171,000	$524,000	$744,000	$968,000	$1,100,000
$6.5	$81,300	$273,000	$507,000	$832,000	$1,190,000	$317,000	$974,000	$1,380,000	$1,800,000	$2,040,000
$9.5	$119,000	$399,000	$741,000	$1,220,000	$1,740,000	$464,000	$1,420,000	$2,020,000	$2,630,000	$2,990,000

APPENDIX F

SENSITIVITY ANALYSIS

EXHIBIT F-1. ESTIMATED BENEFITS OF THE PROPOSED REGULATIONS: 8 PERCENT DISCOUNT RATE, $6.5 MILLION VSL

YEAR	INCREASE IN SUCCESSFUL QUIT ATTEMPTS	BENEFITS (MILLION 2007$)		
		MORTALITY	MORBIDITY	TOTAL
1	1,720 - 5,240	$710 - $2,160	$15 - $45	$730 - $2,210
2	1,630 - 4,980	$680 - $2,060	$14 - $43	$690 - $2,100
3	1,550 - 4,720	$640 - $1,950	$13 - $41	$650 - $1,990
4	1,460 - 4,460	$600 - $1,840	$13 - $38	$620 - $1,880
5	1,380 - 4,200	$570 - $1,740	$12 - $36	$580 - $1,770
6	1,300 - 3,940	$530 - $1,630	$11 - $34	$550 - $1,660
7	1,210 - 3,690	$500 - $1,520	$10 - $32	$510 - $1,550
8	1,130 - 3,430	$460 - $1,420	$10 - $29	$470 - $1,440
9	1,040 - 3,170	$430 - $1,310	$9 - $27	$440 - $1,340
10	960 - 2,910	$390 - $1,200	$8 - $25	$400 - $1,230
Present Value		$3,850 - $11,740	$80 - $240	$3,930 - $11,980

EXHIBIT F-2. ESTIMATED BENEFITS OF THE PROPOSED REGULATIONS: 8 PERCENT DISCOUNT RATE, $3.5 MILLION VSL

YEAR	INCREASE IN SUCCESSFUL QUIT ATTEMPTS	BENEFITS (MILLION 2007$)		
		MORTALITY	MORBIDITY	TOTAL
1	1,720 - 5,240	$380 - $1,160	$15 - $45	$400 - $1,210
2	1,630 - 4,980	$360 - $1,110	$14 - $43	$380 - $1,150
3	1,550 - 4,720	$340 - $1,050	$13 - $41	$360 - $1,090
4	1,460 - 4,460	$330 - $990	$13 - $38	$340 - $1,030
5	1,380 - 4,200	$310 - $930	$12 - $36	$320 - $970
6	1,300 - 3,940	$290 - $880	$11 - $34	$300 - $910
7	1,210 - 3,690	$270 - $820	$10 - $32	$280 - $850
8	1,130 - 3,430	$250 - $760	$10 - $29	$260 - $790
9	1,040 - 3,170	$230 - $700	$9 - $27	$240 - $730
10	960 - 2,910	$210 - $650	$8 - $25	$220 - $670
Present Value		$2,080 - $6,320	$80 - $240	$2,160 - $6,570

EXHIBIT F-3. ESTIMATED BENEFITS OF THE PROPOSED REGULATIONS: 8 PERCENT DISCOUNT RATE, $9.5 MILLION VSL

YEAR	INCREASE IN SUCCESSFUL QUIT ATTEMPTS	BENEFITS (MILLION 2007$)		
		MORTALITY	MORBIDITY	TOTAL
1	1,720 - 5,240	$1,040 - $3,160	$15 - $45	$1,050 - $3,210
2	1,630 - 4,980	$990 - $3,010	$14 - $43	$1,000 - $3,050
3	1,550 - 4,720	$940 - $2,850	$13 - $41	$950 - $2,890
4	1,460 - 4,460	$880 - $2,690	$13 - $38	$900 - $2,730
5	1,380 - 4,200	$830 - $2,540	$12 - $36	$840 - $2,570
6	1,300 - 3,940	$780 - $2,380	$11 - $34	$790 - $2,410
7	1,210 - 3,690	$730 - $2,220	$10 - $32	$740 - $2,260
8	1,130 - 3,430	$680 - $2,070	$10 - $29	$690 - $2,100
9	1,040 - 3,170	$630 - $1,910	$9 - $27	$640 - $1,940
10	960 - 2,910	$580 - $1,760	$8 - $25	$580 - $1,780
Present Value		$5,630 - $17,160	$80 - $240	$5,710 - $17,400

EXHIBIT F-4. ESTIMATED BENEFITS OF THE PROPOSED REGULATIONS: 3 PERCENT DISCOUNT RATE, $6.5 MILLION VSL

YEAR	INCREASE IN SUCCESSFUL QUIT ATTEMPTS	BENEFITS (MILLION 2007$)		
		MORTALITY	MORBIDITY	TOTAL
1	1,720 - 5,240	$1,800 - $5,490	$28 - $86	$1,830 - $5,580
2	1,630 - 4,980	$1,710 - $5,220	$27 - $82	$1,740 - $5,300
3	1,550 - 4,720	$1,620 - $4,950	$26 - $78	$1,650 - $5,030
4	1,460 - 4,460	$1,540 - $4,680	$24 - $74	$1,560 - $4,750
5	1,380 - 4,200	$1,450 - $4,400	$23 - $69	$1,470 - $4,470
6	1,300 - 3,940	$1,360 - $4,130	$21 - $65	$1,380 - $4,200
7	1,210 - 3,690	$1,270 - $3,860	$20 - $61	$1,290 - $3,920
8	1,130 - 3,430	$1,180 - $3,590	$19 - $57	$1,200 - $3,650
9	1,040 - 3,170	$1,090 - $3,320	$17 - $52	$1,110 - $3,370
10	960 - 2,910	$1,000 - $3,050	$16 - $48	$1,020 - $3,100
Present Value		$12,140 - $29,790	$190 - $470	$12,330 - $30,260

EXHIBIT F-5. ESTIMATED BENEFITS OF THE PROPOSED REGULATIONS: 3 PERCENT DISCOUNT RATE, $3.5 MILLION VSL

YEAR	INCREASE IN SUCCESSFUL QUIT ATTEMPTS	BENEFITS (MILLION 2007$)		
		MORTALITY	MORBIDITY	TOTAL
1	1,720 - 5,240	$970 - $2,960	$28 - $86	$1,000 - $3,040
2	1,630 - 4,980	$920 - $2,810	$27 - $82	$950 - $2,890
3	1,550 - 4,720	$870 - $2,660	$26 - $78	$900 - $2,740
4	1,460 - 4,460	$830 - $2,520	$24 - $74	$850 - $2,590
5	1,380 - 4,200	$780 - $2,370	$23 - $69	$800 - $2,440
6	1,300 - 3,940	$730 - $2,230	$21 - $65	$750 - $2,290
7	1,210 - 3,690	$680 - $2,080	$20 - $61	$700 - $2,140
8	1,130 - 3,430	$630 - $1,930	$19 - $57	$650 - $1,990
9	1,040 - 3,170	$590 - $1,790	$17 - $52	$600 - $1,840
10	960 - 2,910	$540 - $1,640	$16 - $48	$550 - $1,690
Present Value		$6,540 - $16,040	$190 - $470	$6,730 - $16,510

EXHIBIT F-6. ESTIMATED BENEFITS OF THE PROPOSED REGULATIONS: 3 PERCENT DISCOUNT RATE, $9.5 MILLION VSL

YEAR	INCREASE IN SUCCESSFUL QUIT ATTEMPTS	BENEFITS (MILLION 2007$)		
		MORTALITY	MORBIDITY	TOTAL
1	1,720 - 5,240	$2,630 - $8,020	$28 - $86	$2,660 - $8,110
2	1,630 - 4,980	$2,500 - $7,630	$27 - $82	$2,530 - $7,710
3	1,550 - 4,720	$2,370 - $7,230	$26 - $78	$2,400 - $7,310
4	1,460 - 4,460	$2,240 - $6,830	$24 - $74	$2,270 - $6,910
5	1,380 - 4,200	$2,110 - $6,440	$23 - $69	$2,140 - $6,510
6	1,300 - 3,940	$1,980 - $6,040	$21 - $65	$2,000 - $6,110
7	1,210 - 3,690	$1,850 - $5,640	$20 - $61	$1,870 - $5,710
8	1,130 - 3,430	$1,720 - $5,250	$19 - $57	$1,740 - $5,300
9	1,040 - 3,170	$1,590 - $4,850	$17 - $52	$1,610 - $4,900
10	960 - 2,910	$1,460 - $4,460	$16 - $48	$1,480 - $4,500
Present Value		$17,740 - $43,540	$190 - $470	$17,940 - $44,010

CHAPTER 7 | ECONOMIC IMPACTS

INTRODUCTION

The costs and benefits discussed in previous chapters constitute the direct economic impacts of the proposed changes in Health Canada's tobacco products labelling regulations. This chapter extends the economic analysis to consider the potential indirect impacts of the regulations and the distribution of costs and benefits among affected stakeholders. The chapter addresses the following issues:

- The potential impact of the regulations on industry sales, manufacturers' profits, and employment;
- The potential effect of a change in product sales on tobacco excise tax revenues;
- The potential distribution of economic impacts across various sectors of the tobacco products industry;
- The anticipated distribution of health benefits among various demographic groups; and
- The potential second-order benefits of reductions in tobacco use.

POTENTIAL IMPACT ON INDUSTRY SALES, PROFITS, AND EMPLOYMENT[99]

Analysing the impact of the renewed tobacco products labelling regulations on product sales, manufacturers' profits, and employment requires consideration of two key factors:

- **The impact of the labelling changes on the demand for tobacco products** – As noted in the benefits analysis, the change in labelling standards is expected to reduce the number of Canadians who use tobacco. All else equal, this change would be expected to lead to a reduction in tobacco product sales.
- **The effect of any change in product prices on the demand for tobacco products** – As previously discussed, tobacco products manufacturers would incur the direct costs of complying with the new requirements. Some manufacturers may choose to absorb these additional costs without increasing the prices they

[99] The discussion in this section focuses on impacts to manufacturers of tobacco products. The regulations may also have an indirect effect on others involved in the production and sale of tobacco products (e.g., growers, retailers). These impacts are discussed qualitatively later in this chapter.

charge for their products, thereby reducing their profits.[100] Alternatively, manufacturers may choose to raise prices to offset their increased costs. The degree to which individual manufacturers would raise prices is uncertain, and would depend upon competitive forces within the market for each tobacco product.

For purposes of illustration, the analysis presented below assumes that manufacturers pass on the incremental costs of complying with the new regulations to consumers in the form of price increases. It examines impacts at two points in time: one year and ten years following the introduction of the new labelling requirements. The former offers insight to the potential impacts of the regulations on a year-to-year basis; the latter characterises the cumulative effects of the regulations at the end of the ten-year period for which costs and benefits have been analysed.

FIRST-YEAR IMPACTS

Exhibit 7-1 summarises potential sales and profit impacts for the year immediately following implementation of the new labelling requirements. The analysis first estimates the downward shift in demand attributable to the introduction of the new regulations. Based on the benefits analysis presented in Chapter 6, we assume an annual reduction in demand of 0.04 to 0.11 percent for all tobacco products; this is consistent with the estimated annual impact of the regulations on the number of Canadians who smoke. To estimate the impact of the new requirements, we multiply the assumed percentage reduction in demand by the current annual sales of each tobacco product; this calculation yields the anticipated reduction in the number of units sold.[101] To calculate the associated reduction in profit, we multiply this figure by an estimate of average profit per unit sold.

[100] For instance, the analysis indicates that the proposed change in labelling requirements would raise cigarette manufacturers' costs by an average of approximately $0.05 per carton. If these costs were absorbed by cigarette manufacturers with no increase in prices, the companies' overall operating profits would be reduced by an estimated one percent (assuming an average operating profit of $4.93 per carton).

[101] The analysis implicitly assumes that research findings on the effectiveness of cigarette warning messages are equally applicable to other tobacco products. It also assumes that, on a percentage basis, the reduction in tobacco product sales would correspond to the anticipated reduction in tobacco product users.

EXHIBIT 7-1. IMPACTS ON SALES, PRICES, AND PROFITS (YEAR 1)

		IMPACT OF REVISED LABELS					IMPACT OF PRICE INCREASE						TOTAL PROFIT LOSS	
PRODUCT	SALES UNIT	REDUCTION IN UNITS SOLD		PROFIT PER UNIT SOLD	LOST PROFIT		PERCENTAGE PRICE INCREASE		REDUCTION IN UNITS SOLD		LOST PROFIT			
		LOWER	UPPER		LOWER	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	UPPER
Cigarettes	Carton (200)	57,414	157,889	$4.93	$283,053	$778,395	0.07%	0.07%	37,503	39,783	$184,889	$196,132	$467,942	$974,527
Cigars	Box of 25	1,608	4,423	$3.84	$6,181	$16,997	0.06%	0.06%	897	898	$3,448	$3,451	$9,629	$20,447
Loose Tobacco	200 grams	2,540	6,986	$4.93	$12,524	$34,441	0.34%	0.34%	8,558	8,564	$42,192	$42,221	$54,716	$76,662
Tobacco Sticks	200 sticks	374	1,029	$4.93	$1,844	$5,071	0.40%	0.40%	1,497	1,498	$7,378	$7,383	$9,222	$12,454
Little Cigars	Carton (200)	806	2,217	$7.76	$6,256	$17,205	0.07%	0.15%	585	1,240	$4,539	$9,629	$10,795	$26,834
Pipe Tobacco	50 gram tin	530	1,458	$1.26	$669	$1,840	0.17%	0.34%	893	1,788	$1,127	$2,256	$1,796	$4,096
Kreteks	Carton (200)	2	7	$4.93	$12	$32	0.07%	0.15%	2	4	$8	$18	$20	$50
Smokeless Products	15 grams	7,456	20,505	$0.44	$3,246	$8,925	0.13%	0.51%	9,420	37,706	$4,100	$16,412	$7,346	$25,337
												GRAND TOTAL	$561,466	$1,140,407

The estimate of profit per unit sold for each tobacco product is subject to significant uncertainty. For cigarettes, the analysis assumes an average profit of $4.93 per carton. This figure is based on the estimate of average profits employed in the 2004 analysis of Health Canada's regulatory proposal for reducing fire risks from cigarettes.[102] Loose tobacco, tobacco sticks, and kreteks are similar to cigarettes and sold in retail units roughly equivalent to cigarette cartons (e.g., 200 sticks or 200 grams); the analysis assumes that the unit profit for these products is the same as that for cigarettes. For the remaining products – cigars, little cigars, pipe tobacco, and smokeless products – the analysis assumes a percentage profit similar to the profit margin for cigarettes. Specifically, we estimate cigarette profits as a percentage of the sales revenue earned per carton of cigarettes (as recorded in Health Canada's Wholesale Database). We then apply this profit margin (14 percent) to the average wholesale price for each product to estimate the average profit per unit sold.

The second component of the profit analysis focuses on reduced demand as a result of a potential increase in product prices. The analysis estimates the potential increase in the price of each product based on the unit compliance costs calculated in Chapter 4. For example, the estimated compliance cost per carton of cigarettes is between $0.051 and $0.054. The addition of these costs to the baseline average retail price for cigarettes – $77.74 per carton, including all taxes and duties – would represent a retail price increase of approximately 0.07 percent.[103]

To evaluate the impact of a price increase on the demand for tobacco products, the analysis draws on economic research on the price elasticity of demand for cigarettes, which characterises the impact of cigarette prices on sales.[104] This research has found a statistically significant negative relationship between the price of cigarettes and the quantity sold. For adults, the estimated price elasticity of demand is approximately -0.4; i.e., a one percent increase in the price of cigarettes will yield a 0.4 percent decrease in the quantity sold. Thus, a 0.07 percent increase in cigarette prices would be expected to result in a decline in demand of approximately 0.03 percent. In the absence of demand elasticity estimates for products other than cigarettes, the analysis applies this figure to all tobacco products. Two important caveats should be noted:

- First, because products such as cigars are generally accepted to be less addictive than cigarettes, the price elasticity of demand for these products may be greater

[102] "Economic Evaluation of Health Canada's Regulatory Proposal for Reducing Fire Risks from Cigarettes," prepared for Economic Analysis and Evaluation Division, Healthy Environments and Consumer Safety Branch, Health Canada, prepared by Industrial Economics, Incorporated, March 2004. The 2004 analysis estimated an average profit of $4.43 (in 2002 dollars) per carton. This is equivalent to $4.93 in 2007 dollars.

[103] The price cited above represents the average retail price for a carton of cigarettes in January 2008, as reported in Statistics Canada's "Average Retail Prices for Food and Other Selected Items." Obtained February 9th, 2009. Available online at http://www40.statcan.gc.ca/l01/cst01/econ155a-eng.htm.

[104] For a summary of the literature, see James M. Nonnemaker et al., A Review of Economics as Used in Tobacco Control: Final Report, Prepared for Health Canada, August, 2002.

than that for cigarettes, suggesting that we may understate the impact of a price increase on sales and profits.[105]

- Second, some consumers may respond to an increase in the price of legal products by switching to illegal cigarettes. To the extent that this occurs, we may understate the impact of price increases on profits derived from the sale of legal cigarettes. As noted above, however, the potential impact of the regulations on product prices is likely to be small. The small magnitude of the price impact, coupled with existing disincentives to purchase illegal products, suggests that any shift in demand to illegal products is likely to be minimal.

As shown in the exhibit, the estimate of profit losses in the year following renewal of the regulations ranges from $0.6 million to $1.1 million. This equates to a 0.07 to 0.14 percent reduction in the estimated annual profits of tobacco products manufacturers. Reductions in the sale of cigarettes and loose tobacco account for the greatest profit loss.

Reduced sales associated with the labelling modifications may influence employment in the tobacco products manufacturing sector. Predicting employment impacts is complex because of the myriad factors affecting corporate employment decisions (e.g., worker productivity, labour contracts, broader trends in parent company sales, etc.). To provide a rough estimate of potential employment impacts, we assume that these impacts will be proportional to changes in sales. The analysis presented above estimates a 0.07 to 0.14 percent decrease in the sale of products manufactured extensively in Canada (cigarettes, tobacco sticks, and loose tobacco). A proportional employment impact would imply the loss of between one and two jobs in Canada's tobacco products manufacturing sector.

LONG-TERM IMPACTS

The preceding discussion focused on impacts in the year immediately following introduction of the new tobacco product labelling regulations. The benefits analysis assumes that the regulations would have their greatest annual impact on tobacco demand during that year, with gradually diminishing effects in each subsequent year. Accordingly, the year-to-year impact of the regulations on tobacco product sales, manufacturers' profits, and employment would be expected to diminish over time. Nonetheless, the cumulative impact of the regulations would exceed the impacts anticipated in any single year.

Exhibit 7-2 summarises the analysis of potential sales and profit impacts ten years after promulgation of the new regulations. As the exhibit shows, profits in that year would be an estimated $2.4 million to $6.8 million lower than at present due to the labelling

[105] One study of tobacco consumption in Spain found an elasticity of -0.7 for cigars. See Escario, Jose Julian and Jose Alberto Molina, "Modeling the Optimal Fiscal Policy on Tobacco Consumption," *Journal of Policy Modeling*, 26 (2004) 81-93, 2004.

EXHIBIT 7-2. IMPACTS ON SALES, PRICES, AND PROFITS RELATIVE TO BASELINE (YEAR 10)

	IMPACT OF REVISED LABELS						IMPACT OF PRICE INCREASE						TOTAL PROFIT LOSS	
PRODUCT	SALES UNIT	REDUCTION IN UNITS SOLD		PROFIT PER UNIT SOLD	LOST PROFIT		PERCENTAGE PRICE INCREASE		REDUCTION IN UNITS SOLD		LOST PROFIT			
		LOWER	UPPER		LOWER	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	UPPER
Cigarettes	Carton (200)	387,547	1,191,348	$4.93	$1,910,606	$5,873,345	0.07%	0.07%	37,233	39,692	$183,557	$195,680	$2,094,163	$6,069,025
Cigars	Box of 25	10,857	33,376	$3.84	$41,719	$128,247	0.06%	0.06%	891	896	$3,424	$3,443	$45,142	$131,690
Loose Tobacco	200 grams	17,148	52,713	$4.93	$84,537	$259,874	0.34%	0.34%	8,496	8,544	$41,888	$42,124	$126,425	$301,998
Tobacco Sticks	200 sticks	2,525	7,761	$4.93	$12,446	$38,261	0.40%	0.40%	1,486	1,494	$7,325	$7,366	$19,771	$45,627
Little Cigars	Carton (200)	5,441	16,725	$7.76	$42,231	$129,820	0.07%	0.15%	580	1,238	$4,506	$9,607	$46,736	$139,427
Pipe Tobacco	50 gram tin	3,580	11,005	$1.26	$4,516	$13,883	0.17%	0.34%	887	1,784	$1,119	$2,250	$5,635	$16,134
Kreteks	Carton (200)	16	49	$4.93	$79	$243	0.07%	0.15%	2	4	$8	$18	$87	$261
Smokeless Products	15 grams	50,331	154,720	$0.44	$21,907	$67,344	0.13%	0.51%	9,352	37,619	$4,071	$16,374	$25,978	$83,718
												GRAND TOTAL	**$2,363,938**	**$6,787,880**

requirements. Relative to baseline conditions, this equates to a 0.29 to 0.87 percent reduction in the estimated annual profits of tobacco products manufacturers. A proportional employment impact would imply, over this ten-year period, the cumulative loss of between four and twelve jobs in Canada's tobacco products manufacturing sector.

TAX REVENUE IMPACTS

To the extent that the new regulations reduce tobacco consumption and sales, reductions in tobacco excise tax revenues will also result.[106] To estimate these impacts, the analysis employs Federal excise rates consistent with the most recent Excise Duty Notice issued by the Canada Revenue Agency.[107] The Provincial tax rates employed are based on information collected from each Province's revenue or finance department web page. We average across Provinces and apply the mean rate for each tobacco product.

The analysis of tax revenue impacts associated with reduced cigar sales is particularly complex. While excise tax rates for most products are stated on a unit basis, cigars are generally taxed on an ad valorem basis, with the value being the manufacturer's sale price or the duty-paid value (for imports). Specifically, Federal rules designate a rate of $18.50 per 1,000 cigars plus an additional duty of either 67 percent of the price or $0.067 per cigar, whichever is greater. Because the ad valorem figure is generally greater, we assume a rate that incorporates the base ($18.50 per 1,000 cigars) plus 67 percent of the price estimated from Health Canada's wholesale database. For the Provincial tax rate, we first take an average of the ad valorem rates charged by the Provinces. We apply this percentage to the average wholesale price per box of 25 cigars to estimate an approximate tax per box. We apply the same approach to estimate Federal and Provincial tax impacts associated with any reduction in the sale of little cigars.

Exhibit 7-3 presents estimates of the potential reduction in excise tax revenues for the year immediately following implementation of the new labelling requirements. As shown, the analysis suggests that excise tax impacts – both Federal and Provincial – would total between $5.8 million and $11.8 million during this year. This represents a total loss in tax revenue of approximately 0.08 percent to 0.18 percent.[108] Federal revenues account for approximately a third ($1.9 million to $3.9 million) of this total, while Provincial revenues account for approximately two-thirds ($3.9 million to $7.9 million).

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[106] Any change in tax revenues would represent an impact on transfer payments (between the government and public) rather than a social cost (i.e., an opportunity cost). As such, the change in tax revenue is a distributional issue.

[107] "Excise Duty Notice Under the Excise Act 2001; Changes to Excise Duty Rates on Tobacco Products – January 1, 2008," November 2007.

[108] Federal and provincial tax revenues from tobacco sales totalled an estimated $6.484 billion in the most recently completed fiscal year. See Physicians for a Smoke-Free Canada, "Tax Revenues from Tobacco Sales," November 2009, obtained online at http://www.smoke-free.ca/factsheets/pdf/totaltax.pdf.

EXHIBIT 7-3. IMPACTS ON EXCISE TAX REVENUES (YEAR 1)

PRODUCT	SALES REDUCTION (RETAIL UNITS)		FEDERAL EXCISE TAX PER RETAIL UNIT	AVERAGE PROVINCIAL TAX PER RETAIL UNIT	TOTAL REVENUE DECLINE	
	LOWER	UPPER			LOWER	UPPER
Cigarettes	94,917	197,673	$17.00	$34.33	$4,872,105	$10,146,544
Cigars	2,506	5,321	$18.52	$21.29	$99,747	$211,815
Loose Tobacco	11,099	15,550	$11.57	$36.29	$531,176	$744,232
Tobacco Sticks	1,871	2,526	$12.65	$34.76	$88,684	$119,765
Little Cigars	1,391	3,457	$40.17[1]	$43.00	$115,671	$287,535
Pipe Tobacco	1,424	3,246	$2.89	$9.07	$17,035	$38,844
Kreteks	4	10	$17.00	$34.33	$210	$522
Smokeless Products	16,876	58,211	$0.87	$2.72	$60,577	$208,947
			TOTAL		**$5,785,204**	**$11,758,204**

Notes:

1. The tax per retail unit for little cigars is larger than that for cigarettes because it is based on the per-unit tax rate for cigars ($18.50 per 1,000 cigars), as cited in "Excise Duty Notice Under the Excise Act 2001; Changes to Excise Duty Rates on Tobacco Products – January 1, 2008," November 2007.

Exhibit 7-4 summarises the analysis of potential excise tax impacts ten years after promulgation of the new regulations. As the exhibit indicates, tax revenues in that year would be an estimated $24.5 million to $70.3 million lower than at present as a result of the labelling requirements. Relative to baseline conditions, this equates to a 0.37 to 1.08 percent reduction in annual tax revenues from tobacco sales.

EXHIBIT 7-4. IMPACTS ON EXCISE TAX REVENUES RELATIVE TO BASELINE (YEAR 10)

PRODUCT	SALES REDUCTION (RETAIL UNITS)		FEDERAL EXCISE TAX PER RETAIL UNIT	AVERAGE PROVINCIAL TAX PER RETAIL UNIT	TOTAL REVENUE DECLINE	
	LOWER	UPPER			LOWER	UPPER
Cigarettes	424,780	1,231,040	$17.00	$34.33	$21,803,932	$63,189,263
Cigars	11,748	34,272	$18.52	$21.29	$467,631	$1,364,177
Loose Tobacco	25,644	61,257	$11.57	$36.29	$1,227,323	$2,931,774
Tobacco Sticks	4,010	9,255	$12.65	$34.76	$190,132	$438,779
Little Cigars	6,021	17,962	$40.171	$43.00	$500,796	$1,494,003
Pipe Tobacco	4,467	12,789	$2.89	$9.07	$53,446	$153,018
Kreteks	18	53	$17.00	$34.33	$909	$2,713
Smokeless Products	59,682	192,339	$0.87	$2.72	$214,230	$690,399
				TOTAL	$24,458,399	$70,264,126

Notes:

1. The tax per retail unit for little cigars is larger than that for cigarettes because it is based on the per-unit tax rate for cigars ($18.50 per 1,000 cigars), as cited in "Excise Duty Notice Under the Excise Act 2001; Changes to Excise Duty Rates on Tobacco Products – January 1, 2008," November 2007.

DISTRIBUTION OF COST IMPACTS

In characterising economic impacts, one important consideration is the distribution of costs among key stakeholders. The discussion below examines the distribution of cost impacts along several dimensions. Specifically, we consider: (1) the likely distribution of compliance costs between tobacco products manufacturers and firms providing printing services; (2) the distribution of costs between domestic and imported products; (3) the geographic distribution of costs for domestic manufacturers; (4) whether any products might be disproportionately affected because of trade impacts; (5) the implications of the new requirements for distributors and retailers of tobacco products; (6) impacts on tobacco growers; and (7) the implications of these impacts for consumers.

IMPACTS ON THE PRINTING INDUSTRY

One key consideration in evaluating the distribution of compliance costs is the impact on firms in the printing and packaging sector. As noted in the industry overview chapter, a relatively small set of firms (concentrated in Ontario and Quebec) provides printing and packaging services to Canadian tobacco manufacturers. To the extent that these firms

depend on the tobacco industry for a significant share of their business, market forces could lead them to absorb a share of the costs associated with the changes in labelling requirements. Past experience, however, suggests that this is unlikely; instead, the cost of new designs and equipment are likely to be passed through to tobacco firms in the form of increased charges for printing services.[109]

A second concern is the ability of the printing sector to meet the demand associated with a change in tobacco labelling requirements in a timely manner. In interviews with Health Canada contractors, tobacco manufacturers raised this issue. In particular, they noted how virtually all of the cylinders used by the relevant printing firms are engraved by one company. The printers interviewed, however, were less concerned with any potential bottleneck. They noted that workflow problems could be addressed if the new labelling requirements are introduced with clear design standards and a reasonable phase-in period to ease the transition.[110] Subsequent interviews with industry representatives support this view. A former operations manager for a prominent printing concern noted that the company has U.S. plants that will likely assist in the adjustment to the new labelling program. He also noted that while managing a major influx of work poses a challenge to printing firms, they can meet the demand through temporary reassignment of workers and payment of overtime.[111]

IMPACTS ON DOMESTIC AND IMPORTED PRODUCTS

All tobacco product manufacturers – domestic or foreign – face three basic options in determining how to respond to new product labelling requirements: (1) comply and absorb the costs; (2) comply and pass some or all of the costs on to consumers; or (3) discontinue production and forgo the market for the product or specific brand. The impacts discussed in this chapter assume that all costs are passed through to consumers. This includes costs incurred by foreign manufacturers, who may raise the prices they charge to Canadian importers.

As described in Chapter 3, a number of tobacco products are produced abroad and imported into Canada. We can develop a rough estimate of the percent of each product that is imported based on the import and sales data presented in Chapter 3.[112] Exhibit 7-5 employs this information to estimate the distribution of annual compliance costs between domestic and imported products (see Exhibit 7-5). Overall, we estimate that domestic products would account for 42 to 46 percent of compliance costs, while imported products would account for 54 to 58 percent.

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[109] Personal communication with Wayne Peachey, Operations Manager at Keating Global, July 27, 2009.

[110] PriceWaterhouseCoopers, *Summary of Stakeholder Survey and Interview Responses Re: Proposed Amendments to the Tobacco Product Information Regulations*, prepared for Health Canada, no date.

[111] Personal communication with Wayne Peachey, Operations Manager at Keating Global, July 27, 2009.

[112] We develop import shares for each major product category. In cases where imported quantities exceed total quantities sold, we assume that the product is entirely imported.

EXHIBIT 7-5. DISTRIBUTION OF COMPLIANCE COSTS: DOMESTIC VS. IMPORTED PRODUCTS

PRODUCT	SHARE IMPORTED	IMPORTED PRODUCT COSTS		DOMESTIC PRODUCT COSTS	
		LOWER	UPPER	LOWER	UPPER
Cigarettes	51%	$3,744,169	$3,969,053	$3,552,553	$3,765,928
Tobacco Sticks	21%	$55,726	$55,726	$206,460	$206,460
Cigars (all)	95%	$309,561	$418,167	$17,481	$23,614
Pipe Tobacco	100%	$55,896	$111,792	$0	$0
Loose Tobacco	59%	$629,560	$629,560	$441,387	$441,387
Smokeless Products	100%	$235,754	$943,015	$0	$0
TOTAL[1]		$5,030,666	$6,127,313	$4,217,882	$4,437,390

Notes:
1. Cost totals differ slightly from those reported in Chapter 4 because of the rounding of import shares.

GEOGRAPHIC DISTRIBUTION OF IMPACTS FOR CANADIAN MANUFACTURERS

Within Canada, the geographic distribution of any impacts associated with an increase in compliance costs will likely be correlated with the geographic distribution of tobacco products production. Canada's largest tobacco product manufacturing facilities are located in southern Quebec, with additional significant production in southern Ontario. The firms operating these plants are all headquartered in Ontario, with the largest two headquartered outside Toronto.

Although the analysis does not anticipate major impacts on the industry overall (see discussion above), small manufacturers lacking significant economies of scale may find it more difficult to comply with the labelling requirements. The headquarters and manufacturing operations of the smaller producers are concentrated in Quebec.

Printers and related firms will likely benefit from the demand for additional printing services associated with the proposed labelling changes. These firms are concentrated in Ontario and Quebec.

DISPROPORTIONATELY AFFECTED PRODUCTS

As noted above, the costs of complying with the revised tobacco product labelling regulations are unlikely in most cases to lead to significant changes in production economics or product pricing. If a large share of a product is imported, however, disproportionate impacts are possible. The primary concern is that foreign producers may forgo the Canadian market rather than incur the costs associated with modifying warning labels on their products. Should this occur, the impact on the market for certain products and brands could prove more substantial. For reasons discussed below, however, the potential for such impacts is confined to a limited set of products.

Representatives of firms importing tobacco products have voiced significant concern over the potential for market impacts on their product lines. In particular, respondents to the Health Canada/PWC survey raised concern over impacts on cigar imports. One cigar importer suggested that it would go out of business because international suppliers would pull out of Canadian markets, while another stated that it would discontinue importing cigar brands if the new labelling requirements were implemented.[113]

Cigar importers interviewed for our research echoed these points. One firm indicated that approximately three of the firm's accounts with European suppliers would likely be eliminated because the Canadian market is a small share of the manufacturers' overall sales. Of the eight cigar importers this respondent knows, four have accounts that would be negatively affected by the new requirements.[114] Another respondent representing a different cigar importer emphasised these same points and highlighted why compliance is especially problematic for foreign cigar manufacturers. In particular, cigars are marketed in a wide variety of package types and package sizes. Due to the fact that the proposed regulations specify labels as a fixed percent of package surface area, cigar manufacturers would need to generate a wide array of label designs for their products. This increases the overall cost of compliance, limiting the incentive for foreign manufacturers to pursue the Canadian market.[115]

These observations suggest that the products most vulnerable to disproportionate impacts are those with several features:

- Products for which a large share of Canadian sales rely on imports (rather than domestic production);
- Products for which the Canadian market is a small element in the foreign manufacturers' base of business; and
- Products sold in a wide variety of package sizes and types.

While data to assess these features are limited, cigars (little cigars and full-size) appear to be most at risk of significant market impacts. About 95 percent of all cigars sold in Canada are imported, including imports from producers in several nations (Denmark, Belgium, The Netherlands) for which European markets are more significant than Canadian markets.[116] Pipe tobacco may be subject to some of the same market impacts. Nearly all pipe tobacco is imported, and major source countries include Denmark, Ireland, and The Netherlands. Pipe tobacco, however, is typically sold in a standard-

[113] PriceWaterhouseCoopers, *Summary of Stakeholder Survey and Interview Responses Re: Proposed Amendments to the Tobacco Product Information Regulations*, prepared for Health Canada, no date.

[114] Personal communication with Phillip Searle, Distribution GVA, July 28, 2009.

[115] Personal communication with Daniel Solomon, Goodman, Solomon, & Gold, legal representative for Havana House, July 28, 2009.

[116] Analysis based on Statistics Canada, Canadian International Merchandise Trade, data obtained online at http://www.statcan.gc.ca/trade/scripts/trade_search.cgi.

sized package (pouches or tins). Likewise, while smokeless products are entirely imported, they come predominantly from U.S. manufacturers for which the Canadian market is significant.

The extent to which Canadian cigar markets could be affected is difficult to assess. A thorough characterisation of the impacts would require identification of affected brands; estimation of the percentage of overall cigar sales accounted for by the affected brands; identification of the importers dealing in these brands; information on competing brands that would remain on the market; information on the profit margins earned by cigar manufacturers, importers, and retailers; and market prices for the affected brands. These data would allow rough estimation of key impacts, including loss of producer surplus for manufacturers, importers, and retailers, as well as potential impacts on cigar smokers. Other potential impacts would include loss of import duties.

At least two considerations counterbalance the concerns noted above. First, market dynamics could mitigate the most severe impacts. For example:

- Foreign suppliers interested in remaining in the Canadian market may consolidate brands and package types to reduce the number of labelling variations and the associated compliance costs.
- Foreign suppliers for which the Canadian market is significant may increase exports to Canada to meet the demand formerly met by any manufacturer who abandons the market.

Second, it is noteworthy that previous rounds of labelling changes have not proved to be a significant impediment to trade. Most foreign suppliers found ways to comply with the 2000 regulations rather than forgo the Canadian market. To date, Health Canada is not aware of any significant loss in product variety due to labelling requirements. Indeed, some new products (e.g., snus) have been introduced, suggesting that labelling regulations pose no barrier to entry for new imports.

Nonetheless, short-term economic losses are possible for manufacturers and sellers of some imported cigar brands. In the longer term, the adjustments also may lead to a redistribution of profits among Canadian cigar importers.

IMPACTS ON DISTRIBUTORS AND RETAILERS

As part of its initial research, Health Canada commissioned surveys and interviews with stakeholders in the tobacco products sector.[117] This research included interviews with a tobacco products distributor and two retail associations. Interviewees emphasised several themes regarding the potential impacts of the proposed labelling changes:

[117] PriceWaterhouseCoopers, Summary of Stakeholder Survey and Interview Responses Re: Proposed Amendments to the Tobacco Product Information Regulations, prepared for Health Canada, no date.

- Interviewees noted the potential for the labelling changes to reduce the quantity of product shipped. This could increase average shipping costs, since distributors would be forced to cover their fixed costs over a smaller volume of products,
- Interviewees expressed concern that labelling changes would lead to price increases, encouraging some consumers to choose illegal cigarettes. As previously noted, however, the cigarette price increases associated with the revised regulations are unlikely to be substantial, and thus unlikely to contribute significantly to increased demand for contraband tobacco.
- Retailers expressed concern with the rotating nature of the proposed labelling system and the associated implications for managing inventory. First, when labels change, customers may perceive some products on the shelf to be dated and/or stale. This may be especially true for small-volume, slow-selling brands, creating an inequity that favours more popular, faster-selling brands. Retailers may decide to limit their exposure by stocking fewer of the small-volume brands. Such changes may be most significant for specialty tobacco shops (see below).
- The change in labelling series may result in unsold product. The losses associated with unsold inventory may be absorbed by manufacturers or retailers, depending on the nature of the supply arrangement. To the extent that retailers must absorb such losses, their profits will decline. Even when the manufacturer absorbs the loss, the need to return unsold inventory may cause disruptions in the supply chain.
- As noted elsewhere in this chapter, foreign suppliers of some tobacco products may choose to forgo the Canadian market rather than comply with new labelling requirements. Retailers noted that this outcome may lead some customers to purchase their products in the U.S.

These types of impacts will be most significant for retail establishments that are heavily dependent upon tobacco sales. As noted in Chapter 3, gas stations and supermarkets account for the greatest shares of tobacco sales; tobacco is likely to be a secondary source of revenue for these establishments. Tobacconists, however, account for a significant share (about 15 percent) of tobacco sales; these retailers are likely to be more vulnerable to potential inventory or supply chain disruptions. In particular, tobacconists specialising in cigars may experience inventory shortages if foreign suppliers withdraw from the Canadian market. Likewise, these retailers may choose to stock fewer small-volume specialty brands. Ultimately, such changes could result in welfare losses for consumers who must seek out preferred products at alternative locations.

Potential impacts on distributors and retailers are unlikely to be concentrated disproportionately in any particular geographic area. Instead, such impacts are likely to mirror the distribution of tobacco product sales nationwide.

IMPACTS ON TOBACCO GROWERS

The analysis suggests that the revised labelling requirements would reduce demand for products made with domestic tobacco (cigarettes, loose tobacco, and tobacco sticks) by less than one percent over a ten-year period. Thus, the new regulations will likely have a minimal impact on Canadian tobacco growers.

NEGATIVE IMPACTS ON TOBACCO CONSUMERS

The revised labelling requirements could adversely affect tobacco consumers in several ways. In particular:

- If tobacco product prices rise as a result of the labelling revisions, those who continue to use the products will bear the additional cost. As discussed above, however, the impact on retail prices is not expected to be significant. As a result, the impact of price increases on consumers (i.e., the reduction in their economic welfare) is likely to be minimal.
- As discussed above, some brands of certain imported products (e.g., cigars) may be eliminated from the market, or brands available from some manufacturers may be consolidated to reduce compliance costs. To the extent that this occurs, the variety of tobacco products available to consumers would be reduced. Those who choose to continue using tobacco could be forced to switch to alternative brands or products (that offer less utility) or to seek out preferred products in less convenient locations.

All of these impacts hinge on individual tastes and preferences and therefore are complex and difficult to analyse quantitatively. The information available, however, suggests that the impacts are not likely to be extensive.

DISTRIBUTION OF HEALTH BENEFITS

The new tobacco product labelling requirements are designed to provide information to consumers that will help them make choices that improve their health and welfare. The likely distribution of health benefits along several socioeconomic dimensions is noted below.

- The analysis assumes that the age of those who successfully cease tobacco use as a result of exposure to the new health warning and health information messages will mirror the distribution, by age, of Canadians who quit smoking within the past five years, as reported in the 2008 Canadian Tobacco Use Monitoring Survey (CTUMS). This suggests that approximately 11.1 percent of those who quit will be 15 to 24 years old; 34.3 percent will be 25 to 34 years old; 19.4 percent will be 35 to 44 years old; 18.5 percent will be 45 to 54 years old; 10.4 percent will be 55 to 64 years old; and 6.3 percent will be 65 or older.
- The 2003 CTUMS showed that across individuals of different employment status, smoking rates were highest (31 percent) among the unemployed. CTUMS

data also indicate that smoking rates are highest among individuals with only secondary education (22.3 percent) or less than secondary education (20.8 percent). Thus, regulations designed to encourage smoking cessation may offer disproportionately higher benefits to the unemployed and those with limited formal education. This may be particularly true in the case of the proposed changes to the tobacco labelling requirements, since the design of the new health warning and health information messages incorporates features intended to enhance their impact on less literate tobacco users.

- The 2008 CTUMS data suggest that smoking rates are slightly higher in Manitoba, Saskatchewan, Alberta, and Newfoundland/Labrador than in other provinces. As a result, the relative benefits of the labelling changes may be greater in these regions. In general, however, the distribution of benefits by province is likely to mirror the distribution of smokers nationwide: Ontario (36 percent); Quebec (25 percent); Alberta (12 percent); British Columbia (11 percent); Manitoba (4 percent); Saskatchewan (3 percent); Nova Scotia (3 percent); New Brunswick (3 percent); Newfoundland/Labrador (2 percent); and Prince Edward Island (less than 1 percent).

OTHER BENEFICIAL IMPACTS

The benefits analysis in Chapter 6 describes a variety of direct health benefits (e.g., reduced mortality) associated with the revised labelling standards. In addition, a number of second-order impacts should be considered in developing a complete benefits characterisation. For example:

- In addition to the benefits for current tobacco users, the change in labelling requirements could yield benefits for non-users as well. Examples include reduced exposure to second-hand smoke, as well as increasing the probability that individuals who have quit smoking will remain abstinent.
- Reduced smoking may decrease the incidence of smoking-related fires and the associated risk of death, injury, and property damage.
- The health improvements associated with reduced tobacco use may reduce the overall demand on Canada's health care system, freeing resources to address other health issues more effectively and efficiently.

Those who quit smoking might also enjoy an improved quality of life, ranging from such relatively minor changes as an improvement in their sense of taste and smell to more dramatic changes, such as an increased capacity to engage in recreational activities that require physical exertion.

SUMMARY

To better characterise the implications of the labelling changes for tobacco product manufacturers, this chapter includes an analysis of effects on manufacturers' sales,

profits, and employment. Taking into account the potential impact of the regulations and associated price increases on the demand for tobacco products, we estimate that profit losses in the year following renewal of the regulations would range from $0.6 million to $1.1 million. This equates to a 0.07 to 0.14 percent reduction in the estimated annual profits of tobacco products manufacturers. The associated loss of employment in the domestic tobacco manufacturing sector is expected to be minimal (approximately one to two jobs). The analysis also examines the cumulative effects of the regulations at the end of the ten-year period for which costs and benefits have been analysed. It indicates that profits in that year would be an estimated $2.4 million to $6.8 million lower than at present due to the labelling requirements. Relative to baseline conditions, this equates to a 0.29 to 0.87 percent reduction in the estimated annual profits of tobacco products manufacturers. A proportional employment impact would imply, over this ten-year period, the cumulative loss of between four and twelve jobs in Canada's tobacco products manufacturing sector.

To the extent that the new regulations reduce tobacco sales, reductions in tobacco excise tax revenues will also result. The analysis suggests that excise tax impacts – both Federal and Provincial – would total between $5.8 million and $11.8 million during the year immediately following implementation of the new labelling requirements. This represents a total loss in revenue of approximately 0.08 percent to 0.18 percent. Ten years after promulgation of the new regulations, tax revenues would be an estimated $24.5 million to $70.3 million lower than at present. Relative to baseline conditions, this equates to a 0.37 to 1.08 percent reduction in annual tax revenues from tobacco sales.

This chapter also examines a set of diverse distributional impacts that may occur as a result of the proposed changes in the tobacco labelling standards. Briefly summarised, these effects include the following:

- Printing and packaging firms contracting with the tobacco products industry are likely to benefit from the labelling changes. Industry representatives suggest that while the influx of new business necessitates careful management, the demand can be met.
- Domestic products would account for approximately 42 to 46 percent of compliance costs, while imported products would account for 54 to 58 percent. Canadian importers would initially bear the cost of any increase in the price of imported products; like domestic manufacturers, importers may choose to pass these costs on to consumers in the form of higher retail prices.
- Industry representatives suggest that foreign manufacturers of some imported products may choose to forgo the Canadian market rather than comply with labelling standards. In particular, this may occur if the Canadian market represents a small share of the manufacturer's overall sales. Cigars and little cigars appear most vulnerable to such impacts; however, consolidation of brands and packaging styles may mitigate such outcomes.

- Retailers and distributors may realise some negative impacts from the labelling changes. Specifically, industry representatives expressed concern that reduced sales of tobacco products may increase average shipping costs. In addition, the rules may force retailers to avoid slower-selling small brands that may go unsold when label series change; likewise, unsold product may reduce retail profits or cause disruptions in the supply chain.
- The proposed regulations may also influence the economic well-being of tobacco product consumers. First, price increases could increase the expenditures that consumers make on tobacco products. Estimated price increases are minimal, however, suggesting that these impacts are unlikely to be significant. Likewise, the labelling changes could affect the import of some products and reduce the diversity of available brands.
- The analysis assumes that the age of those who successfully cease tobacco use as a result of exposure to the new health warning and health information messages will mirror the distribution, by age, of Canadians who quit smoking within the past five years. This suggests that approximately 11.1 percent of those who quit will be 15 to 24 years old; 34.3 percent will be 25 to 34 years old; 19.4 percent will be 35 to 44 years old; 18.5 percent will be 45 to 54 years old; 10.4 percent will be 55 to 64 years old; and 6.3 percent will be 65 or older.
- In general, the distribution of benefits by province is likely to mirror the distribution of smokers nationwide: Ontario (36 percent); Quebec (25 percent); Alberta (12 percent); British Columbia (11 percent); Manitoba (4 percent); Saskatchewan (3 percent); Nova Scotia (3 percent); New Brunswick (3 percent); Newfoundland/Labrador (2 percent); and Prince Edward Island (less than 1 percent
- The labelling changes could produce a variety of second-order benefits associated with reduced tobacco use, such as reducing passive exposure to tobacco smoke; helping former tobacco users remain abstinent; reducing the risk of smoking-related fires; and reducing demands on the nation’s health care system.