

Resources for Health

A Cost-Effective Risk Factor Plan for British Columbia

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Report Prepared For



BC Healthy Living Alliance

working together to promote wellness and prevent chronic disease

By





BC Healthy Living Alliance
working together to promote wellness and prevent chronic disease

Membership

Heart and Stroke Foundation of BC & Yukon
Canadian Cancer Society – BC and Yukon Division
Canadian Diabetes Association, Pacific Area
BC Lung Association
British Columbia Recreation and Parks Association
Dietitians of Canada, BC Region
Public Health Association of BC
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Resources for Health

A Cost-Effective Risk Factor Plan for British Columbia

Executive Summary

In the spring of 2004 the BC Healthy Living Alliance (BCHLA) began the process of developing targets to reduce major risk factors, thus reflecting its mandate “to improve the health of British Columbians through...collaborative action to promote physical activity, healthy eating, and living smoke-free.”

An initial step in the process was to examine the risk factors of smoking, unhealthy eating, physical inactivity, and overweight / obesity, first linking them to chronic diseases such as cancer, heart disease, and diabetes. The associated report also looked at the current status in British Columbia compared to other provinces, and reviewed the target-setting efforts in other jurisdictions.

The second step was to propose 2010 targets for the four risk factors based on a consultative process with the province’s six health regions. These targets were published in January of 2005 in *Healthy Living: Targets for 2010*.

A third step involved gathering information on the effectiveness of interventions used over the years to control these risk factors. Neither time nor resources are unlimited, so it is vital to look for methods which have actually worked. The associated report also recognized that many of the factors inter-relate, and that therefore synergistic programs are likely possible.

The purpose of the current document is to select the most cost-effective interventions for a province-wide program aimed at reducing risk factors and preventing chronic disease. By the end of this report, readers should have a clear understanding of:

- the health consequences and economic costs of the four key risk factors;
- the benefits of achieving the BCHLA indicator targets related to the factors;
- the most cost-effective interventions to achieve the targets by 2010; and
- the investment needed if we are serious as a province about becoming the healthiest hosts ever of an Olympic Games.

A final report, *The Winning Legacy: A Plan for Improving the Health of British Columbians by 2010*, will provide a non-technical summary of the whole project.

BCHLA Targets for 2010

- 9 out of 10 British Columbians aged 12+ will not smoke
- 7 out of 10 British Columbians aged 12+ will eat at least 5 servings of vegetables and fruits a day.
- 7 out of 10 British Columbians aged 12+ will be physically active
- 7 out of 10 British Columbians aged 20-64 will be at a healthy weight.

Tobacco Use and Obesity

Following the lead of our previous report, the major risk factors have been combined into two major categories, tobacco use and obesity. This recognizes that both energy intake and energy expenditure are key components of overweight and obesity. On the other hand, it is important to recognize that physical activity is associated with health effects that are independent of being overweight. Vegetable and fruit intake, while being a key component of energy intake, also produces independent health benefits.

If the Targets Are Achieved

If the targets for risk factor reduction are reached by 2010, then...

- 225,000 fewer British Columbians would smoke
- 948,000 more British Columbians would eat five or more servings of vegetables and fruit per day
- 351,000 more British Columbians would become physically active
- 349,000 more British Columbians would achieve a healthy weight

In addition

- The accumulated direct and indirect costs avoided would be \$2.4 billion.
- An extra \$1 billion in cigarette buying would be saved by former smokers.

Cost-effective Tobacco Control

Five tobacco control initiatives have proven to be highly effective over 40 years of research and intervention:

- Increasing the price of tobacco products (typically through taxation)
- Creating smoke-free public places (a part of “clean air” initiatives)
- Reducing opportunities to promote tobacco products
- Counter-advertising / information dissemination
- Primary care based smoking cessation programs, including pharmacotherapy.

Research also indicates that combining these interventions into a comprehensive strategy in different settings is the most effective way to address tobacco control.

From a cost-effectiveness perspective, a program combining these five interventions is estimated to cost \$274 per quality-adjusted life year saved. This compares to the average intervention in health care which costs approximately \$25,000 per quality adjusted life year saved. A comprehensive tobacco control program with maximum reach into a population costs 1% of the amount for average medical procedures. The extremely low cost of \$274 per year of life saved for a comprehensive, integrated and sustained program of tobacco control provides a further powerful incentive to move forward with significant public investment in this area.

Cost-effective Interventions for Obesity

Compared with interventions leading to smoking cessation, research on achieving weight maintenance and, if necessary, weight loss, is still at an early stage. Given the detrimental health effects of obesity, physical inactivity, and unhealthy eating, making more progress in these areas ought to be a priority. Learning from the lessons of tobacco control, the most promising interventions to try will likely be in the policy arena (e.g., taxation, advertising regulation, nutritional labels), media advocacy, community-based programs (including in schools), environmental changes (such as access to physical activity facilities), and primary care based approaches for individuals seeking to make lifestyle changes.

Primordial prevention, stopping risk factors before they arise, is going to be as important with obesity as it is with smoking. Keeping excess weight off in the first place is especially important in children, as obesity in younger years leads to adverse health effects in adults. At the same time, policy-makers and implementers need to be on the alert for the potential negative impacts of an obesity campaign, such as any temptation towards disordered eating, low self-esteem, or social discrimination.

Economic data for obesity and physical inactivity reduction is even scarcer than the data for effectiveness. In a few studies, nutrition education has demonstrated a good cost-benefit ratio. Increasing physical activity and reducing sedentary pursuits such as TV watching both show promise in preventing weight gain, especially with children. Behavioural skills training in community groups and clinical exercise prescriptions show promise.

Finally, there is value in combining interventions for healthy eating and exercise. While good results for low cost have been seen with lifestyle counselling in the clinical setting and in family programs, the most complete economic analysis has been conducted for a school program aimed at averting obesity.

BC Risk Factor Intervention Plan

Combining the solid data found on good outcomes (as measured by actual risk factor reduction) and cost-effectiveness, and adding in our best understanding of promising approaches with obesity control, we have assembled 30 recommended actions for chronic disease prevention in British Columbia. The interventions are organized around key categories that we introduced earlier in this project.

Regulatory and Economic Interventions

- Consider incentives and taxation to encourage greater involvement of children in physical activities
- Advocate for the federal implementation of a standardized system of nutrition information for products that includes all foods (not just packaged), including at point-of-purchase. This could include a provincial program of certification of restaurant menu items and portion control.
- Implement consistent, comprehensive smoke-free legislation in the province, including 100% workplace bans in the hospitality industry. Lobby pharmacies to stop selling cigarettes.
- Increase the price of cigarettes by \$2.00 per carton per year

- Consider restrictions on food advertising aimed at children
- Consider a focused trial of taxation measures for specific unhealthy foods
- Continue to protect against creative attempts by the tobacco industry to market their product, e.g., retail “power walls,” product placements, smoking in movies & magazines
- Improve compliance with restrictions on tobacco sales to minors

Community-Based Interventions

- Establish Community Action Coordinators (2 per electoral riding) to mobilize strategies for risk factor reduction
- Provide modest funding for up to 1,200 community groups throughout the province with ideas on how to address risk factors
- Develop a strategic media plan with clear, common messages for different at-risk populations with well-conceived short and long term advocacy goals
- Consider subsidizing pedometers as a source of instant feedback to individuals who are attempting to become more physically active
- Implement “point-of-decision” prompts to encourage healthy behaviours
- Encourage and support walking groups and physical activity events
- Enhance access to places of physical activity; both indoor and outdoor

School-Based Interventions

- Expand *Action Schools! BC* program and encourage a more rapid implementation of some of its recommendations, plus coordination with anti-smoking resources, to move towards significant levels of primordial prevention among young people
- Focus on environmental approaches to risk factor interventions, including options for promoting healthy foods, curtailing access to unhealthy foods, creating opportunities for physical activity and tobacco free sites.

Workplace-Based Interventions

- In partnership with WCB, unions, business and others, offer funding to assist employers and employees to create a healthier work environment, from stairway walking campaigns to exercise facilities and healthy food choices

Clinical Interventions and Management

- Implement a program of ‘prevention detailing’ to provide education and feedback to enable primary health care providers to more fully address risk factors
- Cover out-of-pocket expenses for nicotine replacement therapy initiated within a recognized clinical program
- Provide reimbursement for lifestyle counselling around physical activity, healthy eating and living smoke free
- Provide compensation to primary health care providers for lifestyle counselling around physical activity, healthy eating and living smoke free

Special Populations

- Support health promotion programs for special populations, including low income populations, pregnant/breastfeeding women, the mentally ill, First Nations People, new Canadians.

Surveillance, Evaluation and Other Administrative Costs

- Provide adequate resources for appropriate surveillance and timely community-level feedback
- Provide adequate resources for the evaluation of new interventions and the dissemination of findings, particularly in those areas where the effectiveness information is promising, but limited
- Provide adequate resources to administer the overall plan to ensure a coordinated, comprehensive approach
- Encourage behaviour change research that focuses on the application of what we already know and considers the individual in the context of a population health approach

Resources for Health

Setting targets is one thing. Achieving them is another. Paying for the plan can seem like a whole other issue, but it is not. A well-intentioned set of strategies on paper will stay on paper without the financial and human resources to put it into action.

Achievement of the risk factor targets and chronic disease reduction requires a commitment to funding. And it needs to be a *full* commitment.

The estimated cost of the interventions in the BC Risk Factor Intervention Plan between 2005/06 and 2010/11 is summarized in the following table.

	Summary						6 Year Total
	Estimated Cost (in Million\$)						
	Fiscal Year						
	2005/06	2006/07	2007/08	2008/09	2009/2010	2010/11	
Regulatory and Economic Interventions							
Net Taxation of Cigarettes	\$ (7.37)	\$ (12.16)	\$ (14.20)	\$ (13.03)	\$ (8.65)	\$ (0.95)	\$ (56.37)
Tax Incentives - Physical Activity	\$ 4.42	\$ 4.38	\$ 4.34	\$ 4.30	\$ 4.27	\$ 4.24	\$ 25.95
Community-based Interventions							
Mass Media Campaign	\$ 26.81	\$ 27.61	\$ 28.44	\$ 29.30	\$ 30.17	\$ 31.08	\$ 173.42
Community Action Coordinators	\$ 6.93	\$ 13.63	\$ 14.04	\$ 14.46	\$ 14.89	\$ 15.34	\$ 79.28
Community-Based Funding	\$ 4.50	\$ 9.27	\$ 9.55	\$ 9.83	\$ 10.13	\$ 10.43	\$ 53.72
Pedometers	\$ 0.81	\$ 0.87	\$ 0.92	\$ 0.97	\$ 1.03	\$ 1.08	\$ 5.69
School-based Interventions							
Allocation to Schools	\$ 33.86	\$ 34.53	\$ 35.18	\$ 35.82	\$ 36.53	\$ 37.31	\$ 213.25
Clinical Intervention & Management							
Prevention Detailing	\$ 2.35	\$ 2.50	\$ 2.66	\$ 2.83	\$ 3.02	\$ 3.14	\$ 16.49
Primary Care Based Smoking	\$ 6.41	\$ 9.66	\$ 13.13	\$ 15.40	\$ 16.25	\$ 17.16	\$ 78.00
Cost of NRT	\$ 6.51	\$ 9.51	\$ 12.56	\$ 14.30	\$ 14.65	\$ 15.02	\$ 72.54
Lifestyle Counselling	\$ 8.42	\$ 13.49	\$ 19.04	\$ 25.12	\$ 26.50	\$ 27.95	\$ 120.52
Special Populations	\$ 20.00	\$ 20.60	\$ 21.22	\$ 21.85	\$ 22.51	\$ 23.19	\$ 129.37
Miscellaneous Costs	\$ 10.00	\$ 10.30	\$ 10.61	\$ 10.93	\$ 11.26	\$ 11.59	\$ 64.68
Administration, Surveillance, Evaluation	\$ 12.37	\$ 14.42	\$ 15.75	\$ 17.21	\$ 18.25	\$ 19.66	\$ 97.65
Total Cost	\$136.03	\$158.61	\$173.22	\$189.27	\$200.80	\$216.24	\$1,074.18

The Plan is projected to cost \$136 million in the first year, increasing to \$216 million in 2010/11, for a total of \$1.1 billion over the course of the campaign. This public expenditure equates to \$41 per British Columbian per year.

The Winning Legacy

Why tackle risk factors and chronic disease so vigorously in British Columbia in the time leading to the 2010 Olympic Games and beyond? The reasons include vital aspects of quality of life for individuals and the whole population, as well as potentially enormous gains for the provincial economy.

The paramount benefit of achieving the BCHLA targets is a substantially healthier population in the province.

- Smoking cessation has major and immediate health impacts; former smokers have less risk of chronic disease onset, and thus they live longer on average than continuing smokers.
- It is even better to never start smoking in the first place (and certainly easier than quitting). If young people do not take up smoking before age 19, *they are unlikely ever to become regular users of tobacco.*
- Intentional weight loss to control overweight or obesity leads to lower mortality. The best health results are seen with modest weight loss (which happens to be the sort of weight loss most people achieve).
- Again, it is better to work towards healthy weight maintenance in children through good nutrition and a less sedentary lifestyle, avoiding obesity problems altogether.
- Independent of weight control, there are other significant health benefits from increasing physical activity or eating healthier food in moderate quantities.

The benefits of achieving the BCHLA targets also include significant cost avoidance in both direct healthcare and indirect costs.

During the six years leading up to the 2010 Winter Olympics, as much as \$2.4 billion in direct and indirect costs could be avoided if the BCHLA targets are achieved. In addition, almost \$1.0 billion would remain in former smokers' pockets due to decreased personal expenditures on cigarettes.

The Finish Line

In the lead up to the Olympics, there is the potential for greatness almost without parallel in BC history. What is needed to reach the "finish line" of a healthier population and set an example for the country and, by 2010, the whole world?

- A perspective and commitment which extends to 2010 and well beyond. Current gains in tobacco control have taken 40 years to achieve.
- Employing the most effective strategies, and developing new evidence.
- A comprehensive, simultaneous approach to multiple risk factors.
- Sufficient, sustained resources to support a comprehensive risk factor prevention strategy.

Background and Purpose

In the spring of 2004 the BC Healthy Living Alliance (BCHLA) initiated the process of developing targets to reduce major risk factors. Both the process and the key risk factors arose directly from the Alliance's mandate, namely, "to improve the health of British Columbians through leadership that enhances collaborative action to promote physical activity, healthy eating and living smoke-free." In this broad task, the Healthy Living Alliance finds itself in the forefront of a certain momentum in the province, and in concert with health promotion and disease prevention efforts being launched in many different jurisdictions around the world.

An initial step in the process was to examine the behavioural risk factors of smoking, unhealthy eating, and physical inactivity, as well as the closely related risk factor of overweight/obesity. The associated report titled *2010 Target Setting for Risk Factors For Chronic Disease Project: Background Document for Consultation* (published in September of 2004) linked the factors to chronic diseases such as cancer, heart disease, and diabetes, identified appropriate indicators, examined the current status in BC compared to other provinces, and reviewed the target-setting efforts in other jurisdictions.

The second step was to propose 2010 targets for the four risk factors based on a consultative process with the province's six health regions. These targets were published in January of 2005 in *Healthy Living: Targets for 2010*.

BCHLA Targets for 2010

- 9 out of 10 British Columbians aged 12+ will not smoke
- 7 out of 10 British Columbians aged 12+ will eat at least 5 servings of vegetables and fruits a day
- 7 out of 10 British Columbians aged 12+ will be physically active
- 7 out of 10 British Columbians aged 20-64 will be at a healthy weight

A third step involved gathering and presenting information on the effectiveness of interventions used over the years to control or reduce these risk factors. The aim was to identify the best evidence-based interventions. Neither time nor resources are unlimited, so the task of looking for methods which have actually worked is an important one. This report, *Risk Factor Interventions: An Overview of Their Effectiveness*, published in February of 2005, also considered how to approach the risk factors in a combined way, recognizing that many of the factors inter-relate and that synergistic programs are likely possible. This report also reviewed information on the effectiveness of approaches to address exposure to ultraviolet radiation and exposure to occupational and environmental carcinogens.

The purpose of the current document is to use the information in the *Risk Factor Interventions: An Overview of Their Effectiveness* report, combined with an economic analysis, to select the most cost-effective interventions for a province-wide program aimed at reducing risk factors and preventing chronic disease. This report will propose specific interventions to apply in British Columbia, will outline the costs of implementing these interventions over the next six years, and will estimate the projected personal and economic benefits which will flow from substantially improving the health of British Columbians by 2010.

By the end of this report, readers should have a clear understanding of:

- the health consequences and economic costs of the four key risk factors;
- the benefits of achieving the BCHLA indicator targets related to the factors;
- the most cost-effective interventions to achieve the targets by 2010; and
- the investment needed if we are serious as a province about becoming the healthiest hosts ever of an Olympic Games.

A final report, *The Winning Legacy: A Plan for Improving the Health of British Columbians by 2010*, will provide a non-technical summary of the following four reports:

- *2010 Target Setting for Risk Factors For Chronic Disease Project: Background Document for Consultation*
- *Healthy Living: Targets for 2010*
- *Risk Factor Interventions: An Overview of Their Effectiveness*
- *Resources for Health: A Cost-Effective Risk Factor Plan for British Columbia*

Transition: Risk Factors, Indicators and Economics

This project has evolved, as one might expect given the breadth of the topic and the nature of collaborative processes. The key organizational feature was already noticeable in our previous report: the major risk factors of interest since the beginning of the project have been coalesced into two major categories, tobacco and overweight/obesity. What this gains is a clear, simple message which is able to be grasped and acted upon by policy-makers and the public alike. What it loses, at least to some extent, is the *independent* role of healthy eating and physical activity in health.

To be sure, the risk factors of unhealthy eating and physical inactivity are still very much part of the project, for energy intake and expenditure are the key variables in obesity control. Thus, for our purposes, interventions related to diet and other forms of energy intake management, as well as to physical activity, will be seen as subsets of the campaign to reduce the prevalence of obesity in British Columbia.

In a sense, then, tracking physical activity rates becomes part of the obesity story. At the same time, it is fully recognized that physical activity is associated with health effects that are independent of obesity (see the detailed description of this below). So the economic analysis flowing from increasing physical activity rates will take this into account and be fully reported as part of the benefits to the province.

Tracking vegetable and fruit consumption is a more complex issue. First, in terms of serving the obesity cause, one might think that other indicators would be more directly useful, e.g., daily caloric intake. However, it turns out that measuring vegetable and fruit consumption represents more than simply “making do” with the indicator that is available through the Canadian Community Health Survey. Vegetable and fruit intake, as well as having independent health benefits (again, see below), is increasingly being seen as a suitable proxy for a generally healthy diet and, more significantly, for an “anti-obesogenic” diet. Simply put, eating vegetables and fruits can be one of the dietary contributors to, and markers of, moderate energy intake, reduced body fat storage, and, thus, lower obesity rates. So, even if interventions designed to increase vegetable and fruit consumption are not necessarily the first place we turn for obesity control, vegetable and fruit consumption is still a very good indicator of whether or not *other* weight-reducing dietary interventions are in place.

The final point that should be made is that the analysis of activity levels and vegetable and fruit consumption must diverge in the end. The program of analyzing economic costs and benefits of obesity, and then of physical inactivity in its own right, cannot yet be extended to the vegetable and fruit indicator. It is useful to track the indicator as a sign of public health progress, but the current state of research does not yet allow for a cost-benefit assessment of vegetable and fruit consumption. This is also part of the reason why cost-effective interventions related to vegetable and fruit intake have not been specifically highlighted in the present report. In sum, then, vegetable and fruit consumption will be tracked as a direct health indicator, as well as an indirect sign of progress on obesity, but will not explicitly figure in the economic story which follows.

BC Healthy Living Alliance Indicator Targets

As described in *2010 Target Setting for Risk Factors For Chronic Disease Project: Background Document for Consultation*, a critical part of the process has been setting targets for key health indicators. The targets established through the BC Healthy Living Alliance's consultative process with the province's six health regions are summarized on the following table (see Appendix A for details). The targets are presented in both a positive (e.g., *increasing* the proportion of the population that are *non-smokers*) and a negative (e.g., *decreasing* the proportion of the population that are *smokers*) framework.

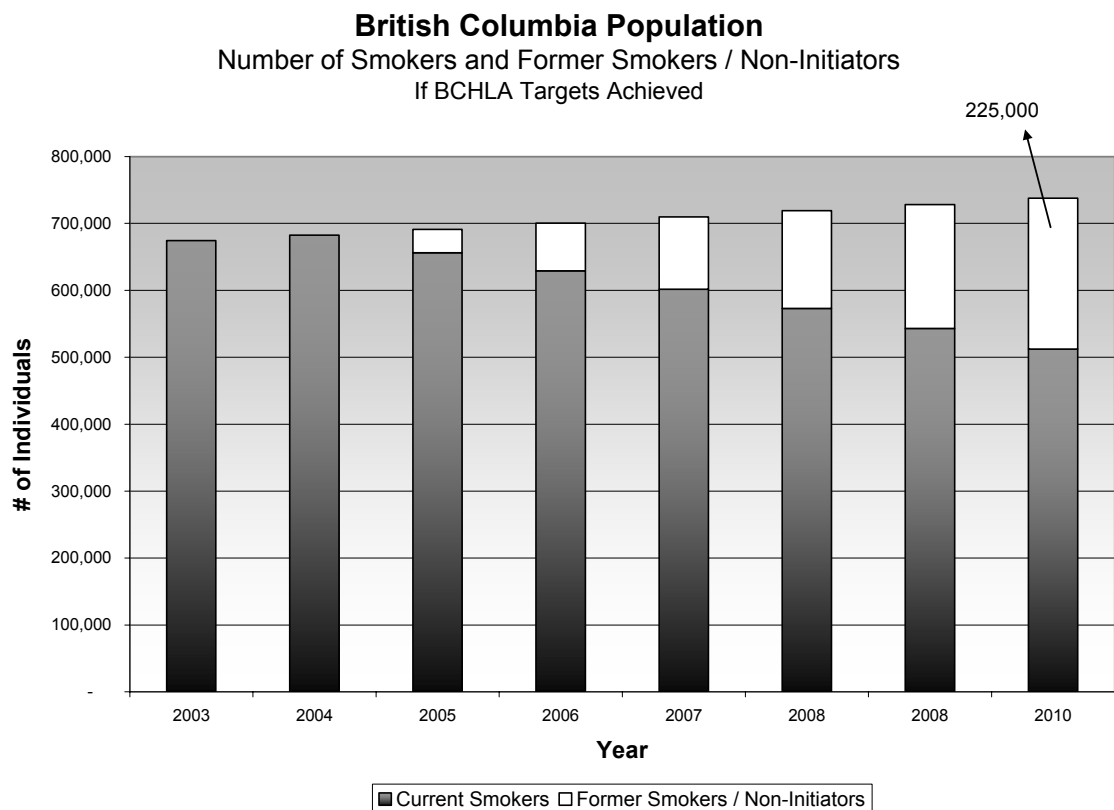
British Columbia BCHLA Risk Factor Targets Based on 2003 Baseline Results			
	Current Situation	BCHLA 2010 Target	% Change
B.C. Total (Positive)			
Non Smokers	0.81	0.87	7%
Healthy Diet	0.40	0.70	74%
Physically Active	0.58	0.70	20%
Healthy Weight	0.52	0.70	34%
B.C. Total (Negative)			
Smokers	0.19	0.13	-30%
LT 5 F&V / Day	0.54	0.30	-44%
Inactive	0.39	0.30	-23%
Overweight (BMI 25 - 29)	0.31	0.22	-29%
Obese (BMI ≥ 30)	0.12	0.08	-29%

Part of the evolution of this project has included a recognition that, for economic purposes, it is useful to focus on the prevalence of obesity per se (BMI ≥ 30), eliminating the category of overweight from the calculations. This explains why there are two “negative” targets described for adiposity or body fat, one for overweight and one for obesity. See the fuller description in the relevant section of this report.

Population Health Changes to Achieve Targets

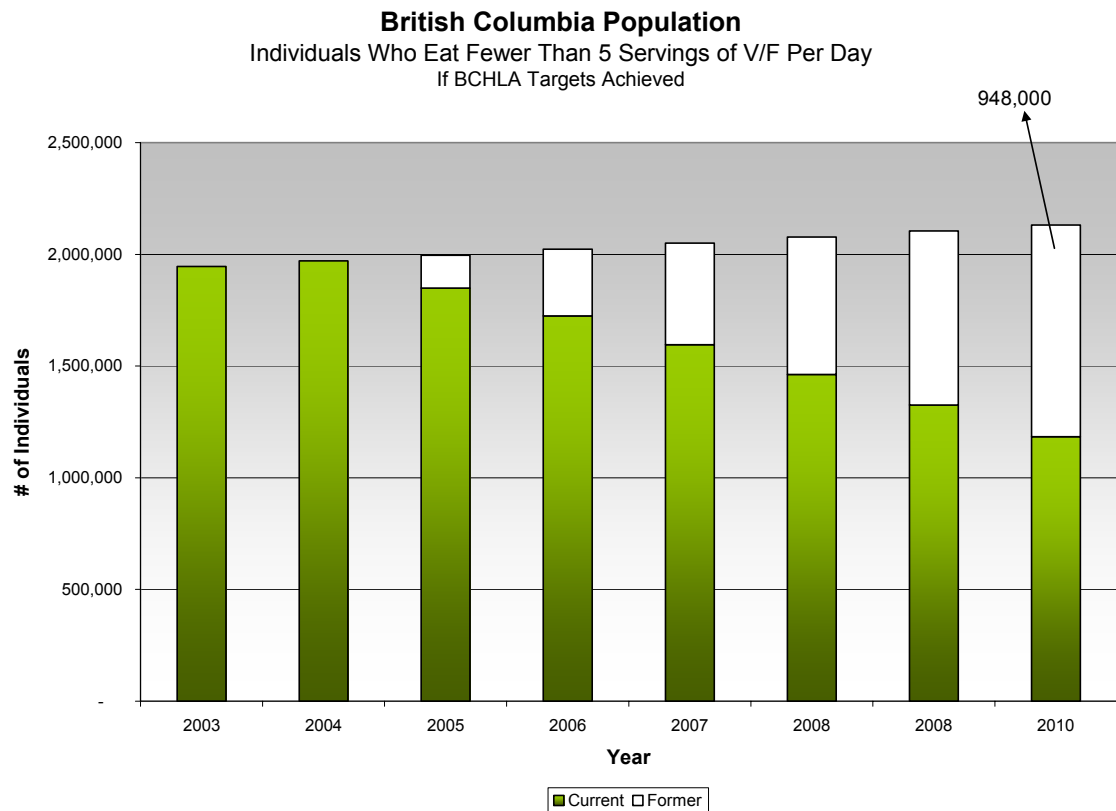
Cigarette Smoking

In 2003, an estimated 674,000 British Columbians over the age of 12 were daily or occasional smokers (or 18.7% of the population). Given estimated population growth and no change in the 18.7% of the population who smoke, by 2010 approximately 738,000 British Columbians would be smokers. To reduce this proportion from 18.7% to 13.0% by 2010 would result in 225,000 British Columbians changing their smoking status to former smokers or to not initiate the habit. These results are shown on the following chart.



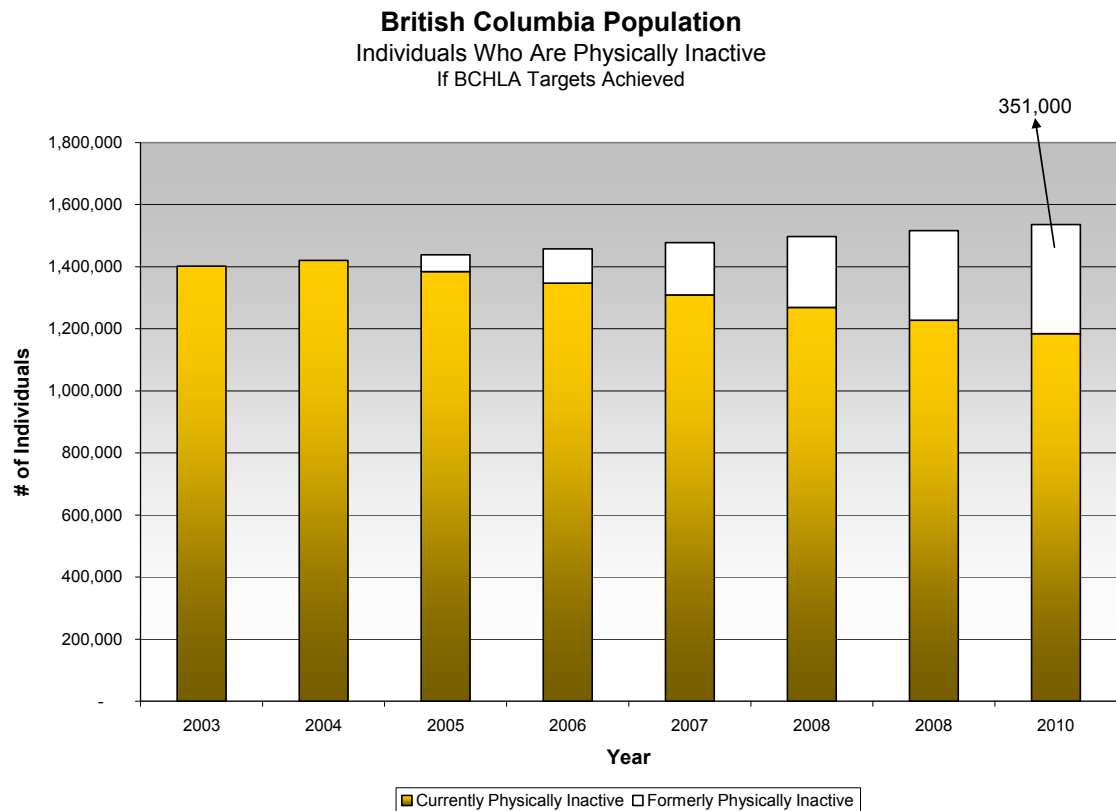
Fewer Than Five Servings of Vegetables and Fruits per Day

In 2003, an estimated 1.95 million British Columbians over the age of 12 consumed fewer than 5 servings of vegetables and fruits per day (or 54% of the population). By 2010, 2.13 million British Columbians would eat fewer than 5 servings of vegetables and fruits per day if this 54% proportion was maintained. To reduce this proportion from 54% to 30% by 2010 would result in an additional 948,000 British Columbians changing their eating habits. These results are shown on the following chart.



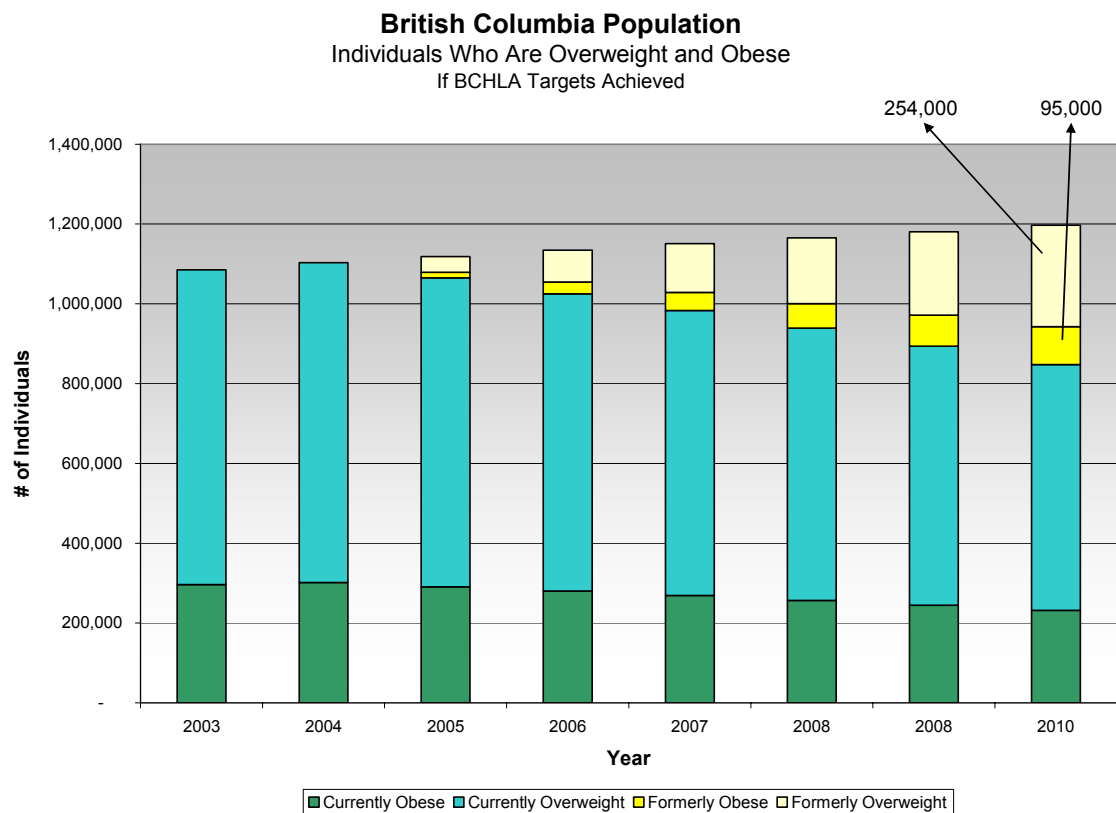
Physical Inactivity

In 2003, an estimated 1.40 million British Columbians over the age of 12 were physically inactive (or 38.9% of the population). By 2010, 1.54 million British Columbians would be physically inactive if this 38.9% was maintained. To reduce this proportion from 38.9% to 30.0% by 2010 would result in an additional 351,000 British Columbians improving their physical activity levels. These results are shown on the following chart.



Obesity & Overweight

In 2003, an estimated 296,000 British Columbians between the ages of 20 and 64 (excluding pregnant women) were obese (BMI ≥ 30) and a further 789,000 were overweight (BMI of 25.0 – 29.9). This represents 11.6% and 30.8% of the population, respectively. By 2010, 327,000 individuals would be obese and 870,000 would be overweight, if the current proportions remained the same. To reduce the proportion of the population that was obese from 11.6% to 8.2% by 2010 would result in 95,000 British Columbians moving from the obese to the healthy weight category. To reduce the proportion of the population that was overweight from 30.8% to 21.8% by 2010 would result in 254,000 British Columbians moving from the overweight to the healthy weight category. These results are shown on the following chart.



Economic Costs and Potential Cost Avoidance

Key Points

- The estimated *annual* combined costs of smoking, obesity, and physical inactivity in BC is approximately \$3.8 billion.
- If a person quits smoking, the average savings they will realize by not buying cigarettes is \$2,235 per year.
- If the BCHLA risk factor targets are achieved, the accumulated costs avoided by 2010 would be \$2.4 billion.
- An additional \$1 billion would be saved by former smokers by not buying cigarettes during this time.

Although a primary motivation in a caring and just society is to maximize health and minimize suffering and disability in the population, the prevailing fact of limited economic resources will never go away. Therefore it is important to know how much the disease burden attributed to the risk factors actually costs the province of BC, and what kind of cost avoidance meeting the indicator targets might produce.

The following analysis covers the total economic costs to the province of smoking, obesity, and physical inactivity, plus three main categories of savings / cost avoidance:

- Reduced personal expenditures on cigarettes
- Costs avoided in the healthcare sector
- Productivity and premature mortality costs avoided

Smoking Costs

In Canada, recent studies by GPI Atlantic and Health Canada have estimated the cost of smoking in a number of the provinces, including New Brunswick¹ and British Columbia². The results of these studies are summarized on the following table.

Smoking in British Columbia and New Brunswick Estimated Costs (in Million\$) in 2001/02		
	B.C. Total	N.B. Total
Direct Costs	\$ 525.00	\$ 120.00
Indirect Costs		
<i>Losses in Productivity</i>		
Increased Life Insurance Premiums	\$ 27.28	\$ 7.20
Designated Smoking Areas	\$ 30.90	\$ 8.00
Absenteeism	\$ 89.00	\$ 18.20
Unscheduled Smoking Breaks	\$ 514.00	\$ 174.90
<i>Subtotal Losses in Productivity</i>	\$ 661.18	\$ 208.30
<i>Premature Mortality</i>	\$ 904.00	\$ 218.00
Subtotal Indirect	\$ 1,565.18	\$ 426.30
Total Costs	\$ 2,090.18	\$ 546.30
Number of Smokers	542,240	153,500
Estimated Cost per Smoker (in \$)		
Direct Cost	\$ 968.21	\$ 781.76
Indirect Costs - Productivity	\$ 1,219.35	\$ 1,357.00
Indirect Costs - Premature Mortality	\$ 1,667.16	\$ 1,420.20
Total	\$ 3,854.71	\$ 3,558.96
B.C. estimates are based on Bridge J. and Turpin B. <i>The cost of smoking in British Columbia and the economics of tobacco control</i> . Health Canada, February 2004.		
N.B. estimates are based on Coleman R., Rainer R. and Wilson J. <i>The cost of smoking in New Brunswick and the economics of tobacco control</i> . GPI Atlantic, April 2003.		
<i>Year of Cost Estimate</i>	2002	2001
Adjusting Costs to 2004\$ (use 'Health and Personal Care' component of the Canadian CPI)		
Direct Costs	\$ 995.21	\$ 794.55
Indirect Costs - Productivity	\$ 1,253.36	\$ 1,379.21
Indirect Costs - Premature Mortality	\$ 1,713.66	\$ 1,443.44
Total	\$ 3,962.23	\$ 3,617.20

These studies are somewhat unique in that they include estimated costs for items such as providing designated smoking areas and unscheduled smoking breaks. Based on these studies, the annual costs in British Columbia in 2002 were estimated at just over \$2 billion, while the annual costs in New Brunswick in 2001 were estimated at \$546 million. Using this information, we calculated a cost per smoker and adjusted to 2004\$. The estimated annual cost per smoker in 2004 is \$3,962 in British Columbia, compared to \$3,617 in Nova Scotia.

¹ Coleman R, Rainer R, Wilson J. *The Cost of Smoking in New Brunswick & the Economics of Tobacco Control*, GPI Atlantic, April 2003.

² Bridge J, Turpin B. *The Cost of Smoking in British Columbia & the Economics of Tobacco Control*, Health Canada, February, 2004.

Additional perspective on the costs related to smoking may be found in Appendix B.

Obesity Costs

The increased use of health care services and costs by overweight individuals is well documented.³ In addition, overweight increases the risk of early mortality and disability, resulting in a significant impact on indirect costs (e.g., the value of economic output lost because of illness, disability or premature death).

In their recent analysis, Katzmarzyk and Janssen⁴ provide an estimate of the direct and indirect cost of obesity (BMI ≥ 30) in Canada. This estimate is summarized on the following table.

Estimated Cost for Obesity Canada, 2001 (in millions\$)							
	PAF%	Total Costs			Attributable Costs		
		Direct	Indirect	Total	Direct	Indirect	Total
Obesity (BMI ≥30)							
Coronary heart disease	15.4%	\$ 2,429.6	\$ 6,296.0	\$ 8,725.6	\$ 374.6	\$ 970.7	\$ 1,345.3
Stroke	6.8%	\$ 1,691.5	\$ 1,458.4	\$ 3,149.9	\$ 115.8	\$ 99.9	\$ 215.7
Hypertension	34.0%	\$ 1,530.2	\$ 1,352.9	\$ 2,883.1	\$ 519.8	\$ 459.6	\$ 979.4
Colon cancer	6.2%	\$ 278.9	\$ 1,331.9	\$ 1,610.8	\$ 17.3	\$ 82.6	\$ 99.9
Postmenopausal breast cancer	6.5%	\$ 350.1	\$ 1,671.5	\$ 2,021.6	\$ 22.6	\$ 108.0	\$ 130.6
Type 2 diabetes	28.6%	\$ 800.8	\$ 588.7	\$ 1,389.5	\$ 229.3	\$ 168.6	\$ 397.9
Gall bladder disease	25.5%	\$ 691.4	\$ 452.0	\$ 1,143.4	\$ 176.4	\$ 115.3	\$ 291.7
Osteoarthritis	12.7%	\$ 1,121.3	\$ 5,814.4	\$ 6,935.7	\$ 142.5	\$ 738.7	\$ 881.2
Total	15.6%	\$ 8,893.8	\$ 18,965.8	\$ 27,859.6	\$ 1,598.3	\$ 2,743.4	\$ 4,341.7

Source:
Katzmarzyk P.T. and I. Janssen. The economic cost associated with physical inactivity and obesity in Canada: An update, *Canadian Journal of Applied Physiology*. 2004, 29(1): 90-115.

2,787,406 2000/01 CCHS number of people in Canada who are obese (BMI ≥30)

Estimated Cost per Individual with the Risk Factor in Canada			
	Direct	Indirect	Total
2001\$	\$ 573.40	\$ 984.21	\$ 1,557.61
2004\$	\$ 598.00	\$ 1,026.44	\$ 1,624.45

(use 'Health and Personal Care' component of the Canadian CPI)

In total, obesity is estimated to cost the Canadian economy \$4.3 billion in 2001. We have used this information and calculated the annual cost per obese individual in 2004 dollars. Based on this analysis, the annual cost directly attributable to obesity is \$1,624 per obese individual.

By focusing only on obesity (BMI ≥ 30), Katzmarzyk and Janssen recognize that they “underestimate the economic impact of excess body weight in Canada.”

³ See, for example, Birmingham CL, Muller JL, Palepu A et al. The cost of obesity in Canada. *Canadian Medical Association Journal*. 1999; 160: 483-8.

Trakas K, Lawrence K, Shear N. Utilization of health care resources by obese Canadians. *Canadian Medical Association Journal*. 1999; 160: 1457-62.

Raebel M, Malone D, Conner D et al. Health services use and health care costs of obese and nonobese individuals. *Archives of Internal Medicine*. 2004; 164: 2135-40.

Daviglus M, Liu K, Yan L et al. Relation of body mass index in young adulthood and middle age to Medicare expenditures in older age. *Journal of the American Medical Association*. 2004; 292: 2743-49.

⁴ Katzmarzyk PT, Janssen I. The economic cost associated with physical inactivity and obesity in Canada: An update. *Canadian Journal of Applied Physiology*. 2004; 29: 90-115.

In developing their results, Katzmarzyk and Janssen surveyed the available literature. They note that since studies on obesity did not usually include physical inactivity as a covariate, the obesity results are partially influenced by physical inactivity. By focussing on the health care costs and consequences of those individuals with a BMI ≥ 30 , this potential to 'double-count' costs first for obesity and then for physical inactivity is reduced.⁵ More research such as that by Hu et al⁶ (described below) is required to begin to untangle the independent effects of overweight/obesity and physical inactivity.

⁵ Previous work by Ronald Coleman (*Cost of Obesity in British Columbia*, GPI Atlantic, January 2001) used a BMI of >25.0 in estimating the costs of overweight and obesity in British Columbia. For this project we have chosen to use the work by Katzmarzyk and Janssen (2004) due to their more conservative cut-off for obesity.

⁶ Hu FB, Willett WC, Tricia L et al. Adiposity as compared with physical activity in predicting mortality among women. *New England Journal of Medicine*. 2004; 351: 2694-703.

Physical Inactivity Costs

Physical inactivity is associated with an increased use of health care services and costs.⁷ In addition, physical inactivity increases the risk of early mortality and disability, resulting in a significant impact on indirect costs (e.g. the value of economic output lost because of illness, disability, or premature death).

In their recent analysis, Katzmarzyk and Janssen⁸ provide an estimate of the direct and indirect cost of physical inactivity in Canada. This estimate is summarized on the following table.

Estimated Cost for Physical Inactivity Canada, 2001 (in millions\$)							
	PAF%	Total Costs			Attributable Costs		
		Direct	Indirect	Total	Direct	Indirect	Total
Physical Inactivity							
Coronary heart disease	19.4%	\$ 2,429.6	\$ 6,296.0	\$ 8,725.6	\$ 471.4	\$ 1,221.7	\$ 1,693.1
Stroke	24.3%	\$ 1,691.5	\$ 1,458.4	\$ 3,149.9	\$ 411.0	\$ 354.4	\$ 765.4
Hypertension	13.8%	\$ 1,530.2	\$ 1,352.9	\$ 2,883.1	\$ 211.6	\$ 187.1	\$ 398.7
Colon cancer	18.0%	\$ 278.9	\$ 1,331.9	\$ 1,610.8	\$ 50.2	\$ 239.6	\$ 289.8
Breast cancer	14.2%	\$ 448.8	\$ 2,143.0	\$ 2,591.8	\$ 63.8	\$ 304.5	\$ 368.3
Type 2 diabetes	21.1%	\$ 800.8	\$ 588.7	\$ 1,389.5	\$ 169.0	\$ 124.2	\$ 293.2
Osteoporosis	24.0%	\$ 1,012.0	\$ 5,247.7	\$ 6,259.7	\$ 242.8	\$ 1,259.0	\$ 1,501.8
Total	20.0%	\$ 8,191.8	\$ 18,418.6	\$ 26,610.4	\$ 1,619.8	\$ 3,690.5	\$ 5,310.3
Source:							
Katzmarzyk P.T. and I. Janssen. The economic cost associated with physical inactivity and obesity in Canada: An update, <i>Canadian Journal of Applied Physiology</i> . 2004, 29(1): 90-115.							
12,661,729 2000/01 CCHS number of people in Canada who are physically inactive.							
Estimated Cost per Individual with the Risk Factor in Canada							
		Direct	Indirect	Total			
2001\$		\$ 127.93	\$ 291.47	\$ 419.40			
2004\$		\$ 133.42	\$ 303.97	\$ 437.39	(use 'Health and Personal Care' component of the Canadian CPI)		

In total, physical inactivity was estimated to cost the Canadian economy \$5.3 billion in 2001. We have used this information and calculated the annual cost per physically inactive individual in 2004 dollars. Based on this analysis, the annual cost directly attributable to physical inactivity is \$437 per sedentary individual.

A comparison with another analysis (with similar results) is found in Appendix B.

Annual Costs per

- Smoker - \$3,962
- Obese Individual - \$1,624
- Sedentary Individual - \$437

⁷ See, for example,

Katzmarzyk PT, Gledhill N, Shephard RJ. The economic burden of physical inactivity in Canada. *Canadian Medical Association Journal*. 2000; 163(11): 1435-40.

Garrett NA, Brasure M, Schmitz KH et al. Physical inactivity: Direct cost to a health plan. *American Journal of Preventative Medicine*. 2004; 27(4): 304-9.

⁸ Katzmarzyk PT, Janssen I. The economic cost associated with physical inactivity and obesity in Canada: An update. *Canadian Journal of Applied Physiology*. 2004; 29: 90-115.

Summary – Cost of Smoking, Obesity and Physical Inactivity in 2004

To estimate the annual economic cost of smoking, physical inactivity, and obesity in British Columbia, we used information on the estimated number of individuals with the risk factor in British Columbia (see Appendix A) multiplied by the estimated excess cost per individual with the risk factor (see each section above). The results are summarized on the following table.

Estimated Cost of Risk Factors In British Columbia, 2004		
	Est. Annual \$ per Individual	Est. Total \$ in 2004 (\$million)
Smoking		
Direct Costs	\$ 995	\$ 679
Indirect Costs - Productivity	\$ 1,253	\$ 856
Indirect Costs - Premature Mortality	\$ 1,714	\$ 1,170
Total Smoking	\$ 3,962	\$ 2,705
Physical Inactivity		
Direct Costs	\$ 133	\$ 189
Indirect Costs	\$ 304	\$ 432
Total Physical Inactivity	\$ 437	\$ 621
Obesity (BMI ≥ 30, does not include overweight with BMI of 25.0-29.9)		
Direct Costs	\$ 598	\$ 180
Indirect Costs	\$ 1,026	\$ 309
Total Physical Inactivity	\$ 1,624	\$ 489
Total		\$ 3,816

In 2004, smoking cost the BC economy an estimated \$2.7 billion, physical inactivity cost an estimated \$621 million, and obesity cost an estimated \$489 million, for a total of \$3.8 billion. To put this number in context, in 2003/04, the provincial government budgeted \$4.9 billion for all primary and secondary education in the province.⁹

In simply adding these costs together, it is recognized that there are numerous individuals in British Columbia that have more than one of these risk factors. The manner in which the costs for physical inactivity were calculated (see above) reflects the fact that they can be considered to be independent of the effects of obesity. Though the interaction between them is not yet fully clarified, we know that both physical inactivity and obesity are independent risk factors for chronic diseases (see below). For the costs of obesity, we only focused on BMI ≥ 30 in order to eliminate the

Smoking, physical inactivity, and obesity cost the province an estimated \$3.8 billion per year. To put this number in context, in 2003/04, the provincial government budgeted \$4.9 billion for all primary and secondary education in the province.

⁹ See http://www.bcbudget.gov.bc.ca/bfp/bgt2004_part1_table-1-5.htm (accessed January 2005)

possibility of double-counting the costs of being overweight (BMI of 25.0 to 29.9) and physical inactive, i.e., where both risk factors exist in the same individual. This represents a conservative assumption that may in fact underestimate the total economic impact of these four risk factors.

Smoking is also an independent risk factor for chronic diseases. In studies of physical inactivity and obesity, smoking status is invariably controlled in the analysis. Thus we can assume that the risks identified for physical inactivity and obesity are independent of smoking status. What is not fully understood is the potential interaction of obesity and/or physical inactivity with smoking in one individual. In totalling the costs, we have made the assumption that the costs are additive. That is, a smoker who is also physically inactive and/or obese has a higher risk than a smoker who is active and of normal weight.

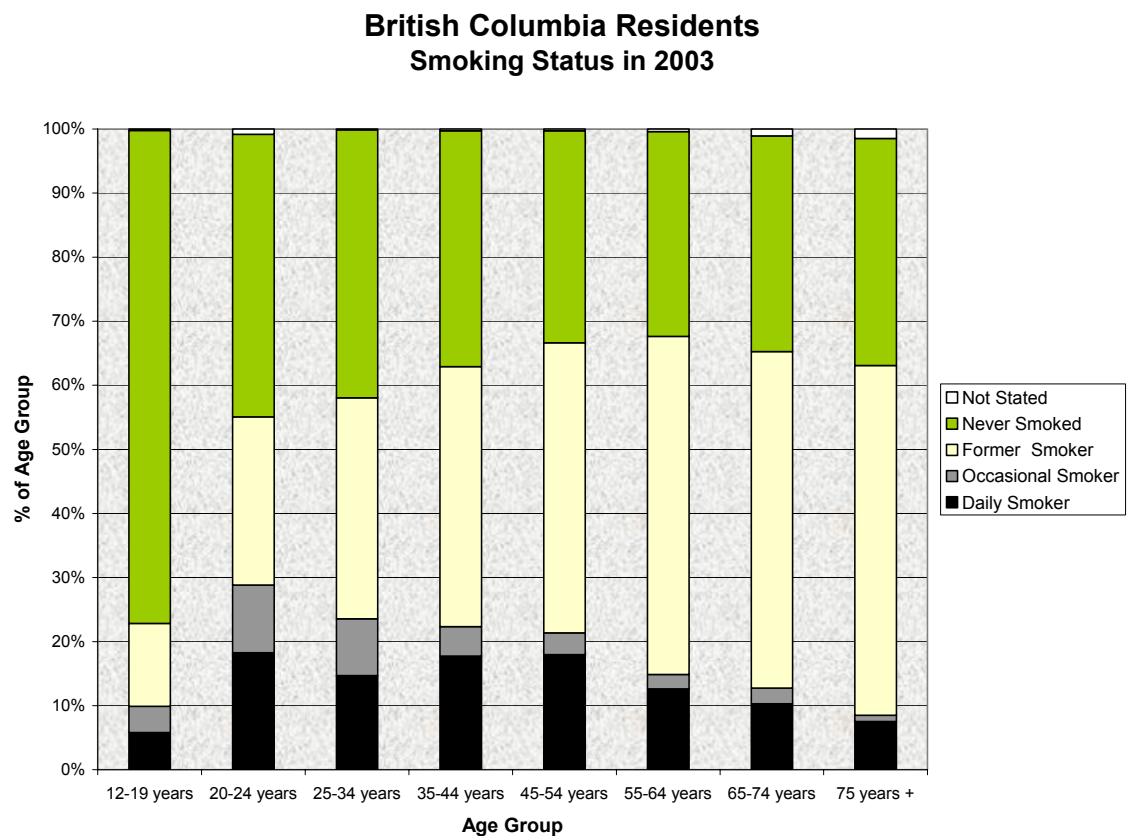
Economic Benefits of Achieving BCHLA Targets

The health benefits of smoking cessation, being physically active, and losing weight will be outlined below. For now, it is salient to complete the economic analysis and determine the economic benefits of achieving the BCHLA targets for the risk factors.

Decreased Personal Expenditures on Cigarettes

One of the clear economic benefits from smoking cessation is the reduction in costs to individuals of purchasing cigarettes.

The smoking status for BC residents in 2003 is indicated on the following table (see Appendix C for details).



In 2003, a total of 493,000 British Columbians (14.0% of the population) were daily smokers while a further 166,000 (4.7% of the population) were occasional smokers. In calculating the estimated savings due to reduced personal expenditures on cigarettes, we made the following assumptions:

- An annual increase in provincial taxes of \$2.00 per carton with no increase in federal taxes
- Estimate of an average of 15 cigarettes per daily smoker
- Excluded any potential savings associated with occasional smokers, resulting in a conservative estimate of savings
- BCHLA targets for smoking are achieved.

The results of this analysis are indicated on the following table.

British Columbia Decreased Personal Expenditures Due to Smoking Cessation 2005/06 to 2010/11							
Year	Cost / Carton	Reduced # of Cartons	Estimated Savings	Cigs/ Day	Est. Cartons/ Year	# of Daily Smokers	# of Smokers
1999/00				16.0			
2000/01	Annual Increase of \$2.00 ↓			14.8			701,636 CCHS Actual
2001/02				14.6			
2002/03				16.3			
2003/04				15.8		492,926	674,292 CCHS Actual
2004/05	\$ 72.92			15.0	13,661,639	499,055	682,676 BCHLA Target
2005/06	\$ 74.92	527,798	\$ 39,542,615	15.0	13,133,841	479,775	656,302 BCHLA Target
2006/07	\$ 76.92	1,067,559	\$ 82,116,670	15.0	12,594,080	460,058	629,330 BCHLA Target
2007/08	\$ 78.92	1,621,237	\$ 127,947,989	15.0	12,040,403	439,832	601,663 BCHLA Target
2008/09	\$ 80.92	2,197,675	\$ 177,835,889	15.0	11,463,964	418,775	572,858 BCHLA Target
2009/10	\$ 82.92	2,794,039	\$ 231,681,732	15.0	10,867,600	396,990	543,057 BCHLA Target
2010/11	\$ 84.92	3,409,786	\$ 289,559,055	15.0	10,251,853	374,497	512,288 BCHLA Target

Sources:
 2) Cigarettes per day is from CTUMS (based on daily smokers aged 15+)
 3) Number of smokers in 2000 and 2003 is from CCHS and includes daily and occasional smokers age 12+.
 4) The number of daily smokers for 2004/05 and future years is based on a 73.1% daily to total smokers in 2003.

If BCHLA smoking cessation targets for 2010 are achieved, a conservative estimate of personal savings to former smokers would be \$40 million in 2005, increasing to \$290 million in 2010. Over the six year period from 2005 to 2010, total personal savings would be close to one billion dollars (\$949 million). The average annual savings per former smoker would be \$2,235.

Average annual savings to the pocket book of a former smoker from not buying cigarettes would be \$2,235.

Estimating Direct Health Care Costs Avoided

Smoking, physical inactivity, and obesity are all associated with an increase in morbidity, resulting in an increased use of health care services and costs. What would the potential costs avoided be in the health care system if the BCHLA targets were achieved?

To derive this estimate, we made the following assumptions:

- Only half of the potential targeted reductions would be achieved in 2005, due to the time required to implement a comprehensive provincial prevention program
- Health care utilization would be the same for physically inactive individuals who became physically active as for those who are currently physically active
- Health care utilization would be the same for obese individuals who became non-obese normal weight as for those who are currently non-obese normal weight
- Health care costs for smokers are roughly divided between cancers (40%), circulatory diseases (40%) and respiratory diseases (20%).
- Reductions in smoking-related direct costs are based on the lower excess risk associated with the number of years since smoking cessation for lung cancer (as representative of the cancers), coronary heart disease (as representative of the circulatory diseases), and chronic obstructive pulmonary disease (for respiratory diseases).

Based on the above assumptions, estimated annual costs avoided in the health care system would be just over \$12 million in 2005, increasing to \$177 million in 2010 (see following table).

BCHLA Risk Factor Targets Estimated Health Care Cost Avoidance								
		Calendar Year						
		2005	2006	2007	2008	2008	2010	
Potential Savings (in million\$)								
Smoking	\$	4.3	\$ 14.6	\$ 27.8	\$ 43.8	\$ 62.0	\$ 83.0	
Inactivity	\$	3.6	\$ 11.0	\$ 18.6	\$ 26.4	\$ 34.5	\$ 42.7	
Obesity	\$	4.3	\$ 13.2	\$ 22.5	\$ 32.0	\$ 41.7	\$ 51.7	
Total	\$	12.3	\$ 38.8	\$ 68.9	\$ 102.2	\$ 138.2	\$ 177.4	

Estimating Indirect Costs Avoided

Besides an increase in morbidity, smoking, physical inactivity, and obesity are also all associated with an increase in premature mortality, resulting in a significant impact on indirect costs (e.g. the value of economic output lost because of illness, injury-related work disability or premature death). What potential economic costs could be avoided if the BCHLA targets were achieved?

To derive this estimate, we made the following assumptions:

- Only half of the targeted reductions would be achieved in 2005, due to the time required to implement a comprehensive provincial prevention program
- Mortality rates would be the same for physically inactive individuals who became physically active as for those who are currently physically active
- Mortality rates would be the same for obese individuals who became normal weight as for those who are currently normal weight
- Health care costs for smokers are roughly divided into 40% due to cancers, 40% due to circulatory diseases and 20% due to respiratory diseases.
- Reductions in smoking related indirect costs (primarily due to premature mortality) are based on the excess risk associated with the number of years since smoking cessation for lung cancer (as representative of the cancers), coronary heart disease (as representative of the circulatory diseases) and chronic obstructive pulmonary disease (for respiratory diseases)
- Reductions in smoking related indirect productivity costs (employers increased life insurance premiums, work absenteeism, provision of designated smoking areas and unscheduled smoking breaks) for former smokers are assumed to be the same after cessation as for never smokers.

Based on the above assumptions, estimated annual indirect economic costs avoided would be just under \$45 million in 2005, increasing to \$586 million in 2010 (see following table).

BCHLA Risk Factor Targets Estimated Indirect Cost Avoidance							
		Calendar Year					
		2005	2006	2007	2008	2008	2010
<i>Potential Savings (in million\$)</i>							
Smoking	\$	29.2	\$ 91.3	\$ 160.1	\$ 234.8	\$ 314.6	\$ 400.3
Inactivity	\$	8.3	\$ 25.1	\$ 42.4	\$ 60.2	\$ 78.5	\$ 97.2
Obesity	\$	7.4	\$ 22.7	\$ 38.6	\$ 54.9	\$ 71.6	\$ 88.7
Total	\$	44.9	\$ 139.0	\$ 241.1	\$ 349.9	\$ 464.7	\$ 586.2

Summary of Potential Costs Avoided

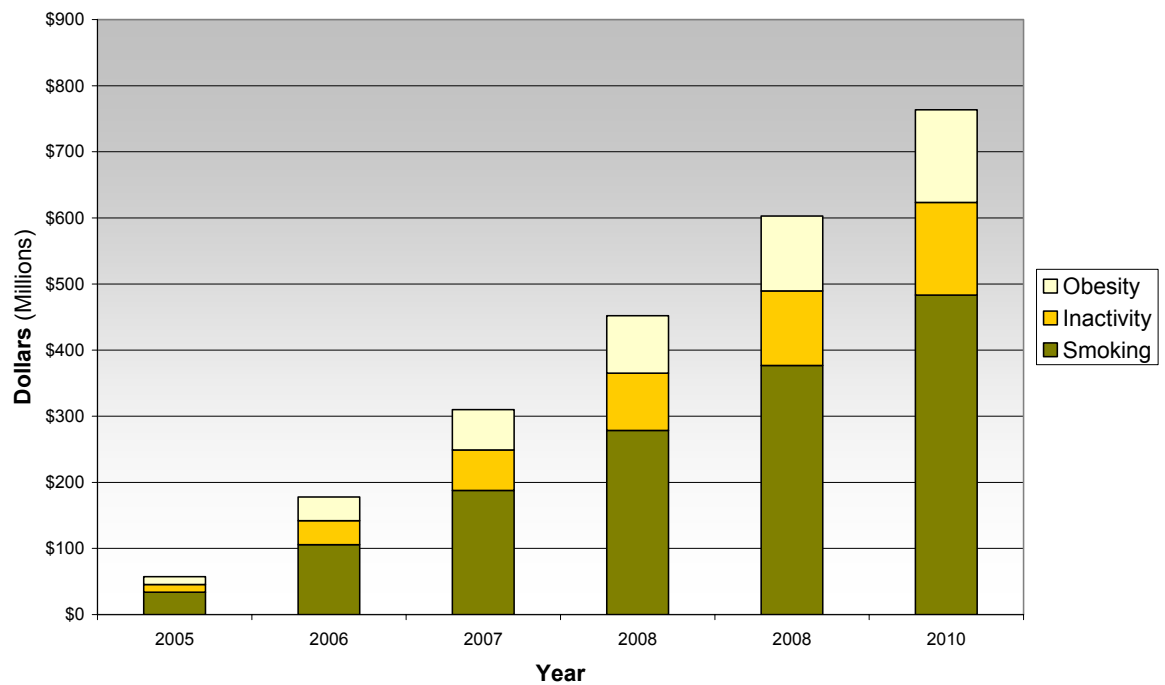
When direct health care costs and indirect costs associated with productivity and premature mortality are combined, estimated annual costs avoided would be just over \$57 million in 2005, increasing to \$764 million in 2010.

During the six years leading up to the 2010 Winter Olympics, \$2.4 billion in direct and indirect costs could be avoided if the BCHLA targets are achieved (see following table).

BCHLA Risk Factor Targets Estimated Cost Avoidance														
		Calendar Year												
		2005	2006	2007	2008	2008	2010	Total						
Potential Savings (in million\$)														
Smoking														
Direct	\$	4.3	\$	14.6	\$	27.8	\$	43.8	\$	62.0	\$	83.0	\$	235.5
Indirect	\$	7.5	\$	25.1	\$	47.9	\$	75.3	\$	106.8	\$	142.9	\$	405.5
Productivity	\$	21.7	\$	66.2	\$	112.2	\$	159.4	\$	207.8	\$	257.4	\$	824.8
Total	\$	33.6	\$	105.8	\$	187.9	\$	278.5	\$	376.6	\$	483.3	\$	1,465.8
Inactivity														
Direct	\$	3.6	\$	11.0	\$	18.6	\$	26.4	\$	34.5	\$	42.7	\$	136.8
Indirect	\$	8.3	\$	25.1	\$	42.4	\$	60.2	\$	78.5	\$	97.2	\$	311.7
Total	\$	11.9	\$	36.1	\$	61.1	\$	86.7	\$	113.0	\$	139.9	\$	448.5
Obesity														
Direct	\$	4.3	\$	13.2	\$	22.5	\$	32.0	\$	41.7	\$	51.7	\$	165.3
Indirect	\$	7.4	\$	22.7	\$	38.6	\$	54.9	\$	71.6	\$	88.7	\$	283.8
Total	\$	11.7	\$	35.9	\$	61.0	\$	86.8	\$	113.3	\$	140.4	\$	449.1
Total														
Direct	\$	12.3	\$	38.8	\$	68.9	\$	102.2	\$	138.2	\$	177.4	\$	537.7
Indirect	\$	23.1	\$	72.8	\$	128.9	\$	190.5	\$	256.9	\$	328.9	\$	1,001.0
Productivity	\$	21.7	\$	66.2	\$	112.2	\$	159.4	\$	207.8	\$	257.4	\$	824.8
Total	\$	57.2	\$	177.8	\$	310.0	\$	452.1	\$	602.9	\$	763.6	\$	2,363.5

This cumulative \$2.4 billion in costs avoided is in addition to the almost \$1.0 billion that would remain in former smokers pockets due to decreased personal expenditures on cigarettes. The information presented above on projected annual savings is also summarized on the following chart by risk factor.

**Estimated Cost Avoidance
Associated with Achieving BCHLA Targets
By Risk Factor**



Improving Health through Tobacco Control

Whatever the economic benefits of tackling the risk factors may be (and they are considerable), it is important to also emphasize the primary motivation in any healthcare system: the reduction of disease burden. Indeed, the alleviation of suffering and disability are often uppermost in the mind of individuals, rather than rarefied economic analysis and references to billions of dollars.

Health Consequences of Smoking

The negative health consequences caused by smoking are indisputable.¹⁰ Single et al¹¹ estimated that 16.5% of all deaths in Canada in 1995 were directly attributable to tobacco use. In 1998, Illing and Kaiserman¹² increased this estimate to 21.8%. The estimated number of deaths in Canada and British Columbia directly attributable to tobacco use, based on Illing and Kaiserman's work, can be seen in the following table.

Smoking Attributable Mortality Canada and British Columbia: 1998				
	Canada	% of Total	B.C.	% of Total
Cancers				
Lip, Oral Cavity, Pharynx	817	1.7%	94	1.6%
Esophagus	1,005	2.1%	153	2.7%
Pancreas	955	2.0%	118	2.1%
Larynx	382	0.8%	36	0.6%
Trachea, Lung, Bronchus	13,951	29.3%	1,714	29.9%
Cervix Uteri	136	0.3%	14	0.2%
Urinary Bladder	628	1.3%	73	1.3%
Kidney, Other Urinary	475	1.0%	57	1.0%
Total Cancers	18,349	38.6%	2,259	39.4%
Circulatory Diseases				
Rheumatic Heart Disease	96	0.2%	15	0.3%
Hypertension	298	0.6%	37	0.6%
Ischemic Heart Disease	9,289	19.5%	944	16.5%
Pulmonary Heart Disease	200	0.4%	27	0.5%
Other Heart Diseases	2,779	5.8%	387	6.8%
Cerebrovascular Disease	2,452	5.2%	301	5.3%
Atherosclerosis	630	1.3%	60	1.0%
Aortic Aneurysm	1,075	2.3%	139	2.4%
Other Arterial Diseases	595	1.3%	75	1.3%
Total Circulatory Diseases	17,414	36.6%	1,985	34.6%
Respiratory Disease				
Respiratory Tuberculosis	26	0.1%	3	0.1%
Pneumonia, Influenza	2,782	5.8%	425	7.4%
Chronic Bronchitis, Emphysema	1,224	2.6%	144	2.5%
Asthma	130	0.3%	22	0.4%
Chronic Airway Obstruction	6,457	13.6%	779	13.6%
Total Respiratory Diseases	10,619	22.3%	1,373	24.0%
Perinatal Conditions (< 1 Year Old)				
Low Birth Weight	31	0.1%	2	0.0%
Respiratory Distress Syndrome	14	0.0%	1	0.0%
Other Respiratory Conditions of Newborn	21	0.0%	2	0.0%
Sudden Infant Death Syndrome	30	0.1%	2	0.0%
Total Perinatal Conditions	96	0.2%	7	0.1%
Secondhand Smoke Deaths				
Lung Cancer	361	0.8%	38	0.7%
Ischemic Heart Disease	746	1.6%	70	1.2%
Total	47,585	100.0%	5,732	100.0%

Source: Illing and Kaiserman C/JPH (2004)

¹⁰ See, for example Vineas P, Alavanja P, Buffler E et al. Tobacco and cancer: Recent epidemiological evidence. *Journal of the National Cancer Institute*. 2004; 96: 99-106.

¹¹ Single E, Rehm J, Robson L, Truong MV. The relative risks and etiologic fractions of different causes of death and disease attributable to alcohol, tobacco and illicit drug use in Canada. *Canadian Medical Association Journal*. 2000; 162: 1669-75.

¹² Illing E, Kaiserman M. Mortality attributable to tobacco use in Canada and its regions, 1998. *Canadian Journal of Public Health*. 2004; 95(1): 38-44.

In 1998, 47,585 deaths in Canada and 5,732 deaths in British Columbia were attributable to tobacco use. The diseases accounting for almost 40% of deaths attributable to tobacco use were cancers, predominantly lung cancers. Another 37% of deaths resulted from circulatory diseases, while a further 22% were the result of respiratory ailments. Included in the total Canadian deaths are an estimated 96 infants who died as a result of smoking-related causes and 1,110 individuals whose deaths were attributable to exposure to second-hand smoke.

As a comparison, the 2004 US Surgeon General's report¹³ estimated that 440,000 people died in the US *annually* from exposure to first- and second-hand smoke between 1995 and 1999. The following summary, taken from that report, is comparable to the Illing and Kaiserman data but also includes information on total deaths attributable to a given disease, the proportion of these total deaths that are attributable to tobacco use, and the years of potential life lost as a result of smoking attributable mortality.

¹³ U.S. Department of Health and Human Services. *The Health Consequences of Smoking: A Report of the Surgeon General*. Atlanta, GA. 2004.

Annual Smoking Attributable Mortality And Years of Potential Life Lost United States: 1995 - 1999					
	Total Deaths	Total SAM	SAM %	YPLL	YPLL % of Total
Cancers					
Lip, Oral Cavity, Pharynx	7,800	5,200	67%	84,600	1.6%
Esophagus	11,400	7,900	69%	118,700	2.2%
Stomach	12,900	2,800	22%	39,200	0.7%
Pancreas	27,700	6,500	23%	95,900	1.8%
Larynx	3,800	3,100	82%	48,100	0.9%
Trachea, Lung, Bronchus	152,900	124,800	82%	1,826,000	33.5%
Cervix Uteri	4,100	500	12%	13,400	0.2%
Urinary Bladder	11,600	4,800	41%	52,700	1.0%
Kidney, Other Urinary	11,600	3,000	26%	45,900	0.8%
Acute Myeloid Leukemia	5,900	1,100	19%	15,600	0.3%
Total Cancers	249,700	159,700	64%	2,340,100	43.0%
Circulatory Diseases					
Ischemic Heart Disease	481,600	82,000	17%	1,160,100	21.3%
Other Heart Diseases	215,700	29,300	14%	366,200	6.7%
Cerebrovascular Disease	157,700	17,500	11%	278,200	5.1%
Atherosclerosis	19,100	2,500	13%	22,600	0.4%
Aortic Aneurysm	16,200	9,600	59%	113,800	2.1%
Other Arterial Diseases	10,900	1,600	15%	20,300	0.4%
Total Circulatory Diseases	901,200	142,500	16%	1,961,200	36.0%
Respiratory Disease					
Pneumonia, Influenza	85,700	15,600	18%	154,000	2.8%
Chronic Bronchitis, Emphysema	20,500	17,700	86%	208,800	3.8%
Chronic Airway Obstruction	82,500	64,700	78%	706,400	13.0%
Total Respiratory Diseases	188,700	98,000	52%	1,069,200	19.6%
Perinatal Conditions (< 1 Year Old)					
Short Gestation, Low Birth Weight	3,970	400	10%	29,840	0.5%
Respiratory Distress Syndrome	1,570	60	4%	4,530	0.1%
Other Respiratory Conditions of Newborn	1,560	80	5%	6,110	0.1%
Sudden Infant Death Syndrome	2,970	440	15%	32,810	0.6%
Total Perinatal Conditions	10,070	980	10%	73,290	1.3%
Total (excl burns and secondhand smoke)	1,349,670	401,180	30%	5,443,790	100.0%
Burn Deaths					
	NA	970		10,500	
Secondhand Smoke Deaths					
Lung Cancer	NA	3,000		NA	
Ischemic Heart Disease	NA	35,000		NA	
Source: U.S. Department of Health and Human Services. <i>The Health Consequences of Smoking: A Report of the</i> SAM - Smoking Attributable Mortality Sam%- The percent of total disease attributable to smoking YPLL - Years of Potential Life Lost					

For example, in the United States 7,800 people die annually from cancers of the lip, oral cavity and pharynx, of which 5,200 (67% of the 7,800) deaths are directly attributable to smoking. These 5,200 smoking attributable deaths resulted in an estimated 84,600 years of potential life lost (YPLL).¹⁴ In the US, an estimated 64% of the identified cancers, 16% of the identified circulatory diseases, and 52% of the identified respiratory diseases are directly attributable to smoking.

Current research suggests that the “risks for persistent smoking are substantially larger than previously suspected.”¹⁵ Doll, Peto, and colleagues have followed a cohort of British male doctors since 1951. Their latest analysis¹⁶ indicates that

¹⁴ Calculated in the Surgeon General’s report as the time between premature death and life expectancy at the time (age) of death summed over all premature deaths. YPLL provides an estimate of the burden of premature death in a given population.

¹⁵ Stampfer M. New insights from the British doctors study: Risks for persistent smoking are substantially larger than previously suspected. *British Medical Journal*. 2004; 328: 1507.

¹⁶ Doll R, Peto R, Boreham J, Sutherland I. Mortality in relation to smoking: 50 years’ observations on male British doctors. *British Medical Journal*. 2004; 328: 1519-28.

between half and two thirds of persistent smokers will eventually be killed by their habit. Their data also show that death rates climb dramatically with earlier ages of smoking initiation. This relationship is particularly ominous given current patterns. Many smokers in the 1950s and 60s took up smoking in adulthood or even middle age, while the usual age of initiation now is the early teens.

Between half and two thirds of persistent smokers will eventually be killed by their habit.

Benefits of Smoking Cessation

The 1990 US Surgeon General's report¹⁷ focussed on the health benefits of smoking cessation. The major conclusions of the report are:

- Smoking cessation has major and immediate health benefits for men and women of all ages. Benefits apply to persons with and without smoking-related disease.
- Former smokers live longer than continuing smokers.
- Smoking cessation decreases the risk of lung cancer and other cancers, heart attack, stroke, and chronic lung disease.
- Women who stop smoking before pregnancy or during the first 3 to 4 months of pregnancy reduce the risk of having a low birth weight baby to that of women who never smoked.
- The health benefits of smoking cessation far exceed any risks from the average 2 kg-weight gain, as well as any adverse psychological effects that may follow quitting.

The Surgeon General's report notes that the risk of lung cancer is approximately 22 times higher in male smokers and 12 times higher in female smokers compared to people who have never smoked. Furthermore, "the risk of lung cancer declines steadily in people who quit smoking; after 10 years of abstinence, the risk of lung cancer is about 30 to 50 percent of the risk of continuing smokers."

Smokers have about twice the risk of dying from coronary heart disease (CHD). "This excess risk is reduced by about half among ex-smokers after only 1 year of smoking abstinence and declines gradually thereafter. After 15 years of abstinence the risk of CHD is similar to that of persons who have never smoked."

Smokers also have twice the risk of dying from stroke. "After quitting smoking, the risk of stroke returns to the level of people who have never smoked" within 5 to 15 years of cessation.

The report also notes that smoking cessation reduces the higher risks seen in continuing smokers for chronic obstructive pulmonary disease (COPD), influenza and pneumonia, peripheral artery occlusive disease, abdominal aortic aneurism, ulcers, and so on.

More recent research continues to support the findings of the Surgeon General's report on the benefits of smoking cessation. Based on 50 years of follow-up with British male physicians, Doll and colleagues¹⁸ have found that, on average, smokers die approximately 10 years earlier

On average, smokers die 10 years earlier than non-smokers.

¹⁷ U.S. Department of Health and Human Services. *The Health Benefits of Smoking Cessation: A Report of the Surgeon General*. DHHS Publication No. (CDC) 90-8416. 1990.

¹⁸ Doll R, Peto R, Boreham J, Sutherland I. Mortality in relation to smoking: 50 years' observations on male British doctors. *British Medical Journal*. 2004; 328: 1519-28.

Smoking cessation by middle age reverses almost all of the excess mortality associated with smoking.

than non-smokers. Smoking cessation, on the other hand, results in gains of about 3, 6, 9 and 10 years of life expectancy if the cessation began at age 60, 50, 40 or 30, respectively. That is, stopping by middle-age reverses almost all of the excess mortality associated with smoking.

As noted by the Surgeon General, the risk of death from lung cancer remains somewhat elevated for individuals who have smoked. At age 75, the risk of lung cancer for men who continue to smoke is estimated by Peto and co-authors¹⁹ at 15.9%. The risk decreases to 9.9%, 6.0%, 3.0% and 1.7% for those who stopped smoking around 60, 50, 40 and 30 years of age, respectively. The 1.7% lung cancer rate for former smokers who quit by age 30 remains approximately 3 times higher than that of lifelong non-smokers.

The 1990 Surgeon General's report even found a benefit of smoking cessation among those with pre-existing diseases, particularly patients with coronary heart disease. This finding has been confirmed in a meta-analysis conducted by Critchley and Capewell of 20 studies assessing the impact of smoking cessation in patients with diagnosed coronary heart disease.²⁰ They found a 36% reduction in the risk of mortality for those who quit versus those who continued to smoke.

A widespread opinion is that the early death of smokers serves to spare them from poor health at the end of their life. On the contrary, a Danish study by Hansen and Juel²¹ found that not only did smoking decrease life expectancy; it also decreased the number of self-rated years of good health.

Not only does smoking decrease life expectancy; it also decreases the number of self-rated years of good health.

The 2004 US Surgeon General's report, noted earlier, indicated that cancers account for 43% of YPLL due to smoking, circulatory diseases for a further 36%, and respiratory diseases for 20%. Within these broad categories, lung cancers account for 34% of YPLL, coronary heart disease for 28%, and chronic obstructive pulmonary disease for 13%. That is, these three conditions together account for 75% of total YPLL attributable to smoking.

The following chart provides an estimate of the residual excess mortality risk with increasing duration of smoking cessation for these three conditions, based on the 1990 US Surgeon General's report and a more recent study by Burns.²²

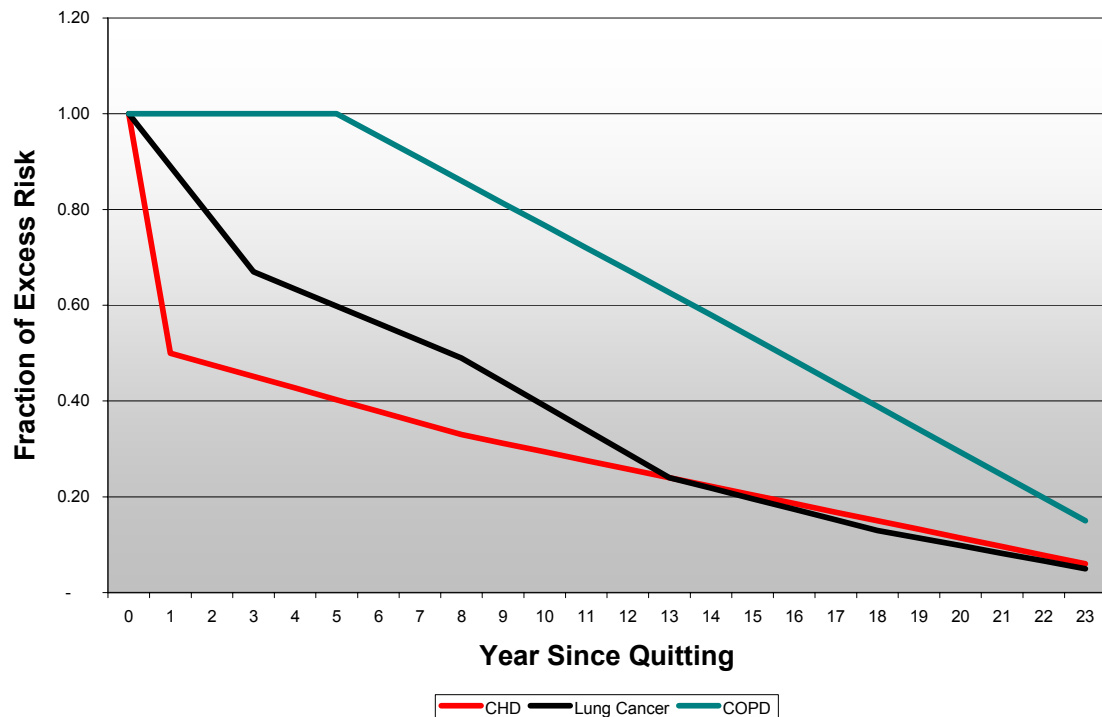
¹⁹ Peto R, Darby S, Deo H et al. Smoking, smoking cessation, and lung cancer in the UK since 1950: Combination of national statistics with two case-control studies. *British Medical Journal*. 2000; 321: 323-9.

²⁰ Critchley J, Capewell S. Smoking cessation for the secondary prevention of coronary heart disease. *The Cochrane Database of Systematic Reviews*. 2004.

²¹ Bronnum-Hansen H, Jule K. Abstention from smoking extends life and compresses morbidity: A population based study of health expectancy among smokers and never smokers in Demark. *Tobacco Control*. 2001; 10: 273-278.

²² Burns D. Primary prevention, smoking, and smoking cessation. *Cancer*. 2000; 89: 2506-9.

Reduced Risk of Death After Quitting Smoking By Cause of Death



These estimated trends are only based on individuals who do not have a history of chronic disease or report being sick, thus eliminating the spike in early post-cessation mortality (and health care costs) when smoking cessation coincides with a major health event. There is a substantial early decline in excess risk of mortality from coronary heart disease (CHD) upon smoking cessation. The decline in excess risk of mortality from lung cancer follows a steadier pattern over the years. The decline in excess risk of mortality from chronic obstructive pulmonary disease (COPD) takes more time to manifest itself. While the health benefits of smoking cessation are manifestly clear, it is important to note that some excess risk remains, even over the longer term. In summarizing his paper, Burns notes that “it would be a tragedy if the additional prevention needs of these former smokers were ignored once they had accomplished the difficult task of cessation.”

Summary of Effective Tobacco Control Interventions

Setting targets to achieve health benefits is one thing; hitting those targets is another.

In the companion document *Risk Factor Interventions: An Overview of Their Effectiveness*, we provided a comprehensive overview of the effectiveness of interventions introduced in various jurisdictions to reduce smoking rates. The results of that review are summarized here.

Reducing Smoking Initiation Rates

Adolescents are at the highest risk of initiating smoking behaviour. Indeed, few individuals start smoking after the age of 20. It is this reality that has resulted in the aggressive targeting of adolescents by the tobacco industry in its marketing campaigns.

Preventing the uptake of smoking among youth thus stands out as one of the most vital efforts in public health. The immediate and aggregate benefits over generations can be significant, especially given the demonstrable “multiplier effects” of prevention: non-smoking teens influence their peers in the direction of abstinence; non-smoking adults (and smoke-free homes) influence children similarly. The result of such cumulative trends over a society is a “denormalization” of tobacco, that is, the creation of a social stigma against smoking (and against the tobacco industry) which continues the momentum towards abstinence.

The school environment is a natural platform for health promotion. Unfortunately, the assessment of the many school anti-smoking programs has been somewhat pessimistic. Small positive results have been seen with a social influence training approach, which includes tobacco resistance skills education, recognizing high-risk situations, and so on.

Community-wide campaigns that include counter-advertising, and are sometimes linked to school programs, show more promise. In such cases, the design of the advertising may be the key. Studies show that anti-smoking advertisements should stress the manipulation of tobacco companies and the addictive nature of nicotine even more than health effects per se, since disease impacts many years in the future are highly “discounted” by youth and adults alike.

The most effective interventions to reduce initiation rates, however, are in the arena of regulatory and economic controls. These fall into three main categories:

- regulation of tobacco sales to minors
- regulations on advertising
- taxation to increase the unit price of cigarettes

Of these three, controlling tobacco sales to minors is the weakest intervention. The main gap in the policy is not recalcitrant shop owners, but the fact that motivated (especially addicted) teens are adept at overcoming all institutional barriers to accessing tobacco. On the other hand, taxation is a highly effective intervention (even today, the financial means of youth are limited), and advertising regulations are an important complement to counter-advertising. An intriguing subset of marketing

directed at youth which needs more attention is the influence of tobacco introduced as product placement in movies and television.

Increasing Smoking Cessation Rates

While increased taxation is a very effective intervention to reduce initiation rates, it is also very successful in increasing cessation rates. In fact changing the price of tobacco through taxation is probably the single most effective intervention to reduce the prevalence of tobacco use.

Mass media education / counter-advertising campaigns are also an important component of a comprehensive program but tend to have minimal effectiveness on their own.

There is enough support for the effect of smoking restrictions in workplaces, which are now very common, to continue to encourage this form of intervention. Not only do they reduce exposure of non-smokers to second hand smoke, but they also reduce the amount consumed by smokers, possibly leading to increased cessation rates.

Interventions for smoking cessation directed at individuals are varied in format and impact. Counselling a patient to quit, given by a primary care provider, is quite successful, especially when an appropriate level of support is provided and nicotine replacement therapy is utilized. Group therapy can match the results of more intensified one-to-one counselling. A major impediment, however, is the lack of appropriate funding mechanisms to provide financial support for these interventions.

An important “window of opportunity” to counsel smoking cessation may exist when patients face a major health event. In addition, post-surgical results are improved if smokers ‘fast’ from their habit for at least six months prior to surgery.

Broader-based interventions such as proactive telephone support lines and self-help materials have a marginal effect on cessation rates. The evidence for the impact of web-based resources such as ‘QuitNet’ is not yet available. Each of these interventions, however, has the advantage of potentially reaching a large number of people at minimal cost. They may also be important in supporting the large percentage of people who manage to quit on their own.

Reducing Exposure to Second Hand Smoke

Interventions related to second-hand smoke, apart from the impact of smoking bans in workplaces noted earlier, have focused on settings where children in particular are exposed and more generally on public spaces. Bans on smoking in public places have been a fixture in British Columbia since 1992 and are now well-accepted in many developed countries. The extension to formerly excluded locations in the hospitality industry should be made relatively easily given the independent research which shows no negative impact on revenue or employment in these establishments.

Pulling it Together: Five Pillars of a Comprehensive Program

Increasing the Price of Tobacco Products

This is generally reported to be the single most effective weapon in the tobacco control arsenal. The means by which product price is increased is often taxation. In terms of increasing cessation or preventing uptake, price increases work for all segments of the population, including important at-risk subgroups such as teens and pregnant women. Generally, a 10% price increase leads to a 3 to 5% reduction in demand, with adolescents being even more price sensitive (10% price increase leading to a 6 to 10% reduction in demand).

Creating Smoke-free Public Places

Increased efforts to enforce smoke-free public places are vital both to protect non-smokers from dangerous second-hand smoke and also to continue the process of “denormalizing” smoking, i.e., developing a social stigma around the habit. While the focus of these policies is on harm reduction for innocent second parties, there is another spin-offs. Smoking bans lead to a reduction in the number of cigarettes smoked and possibly increase cessation attempts.

Reducing Opportunities to Promote Tobacco Products

Controlling corporate activities that promote tobacco consumption, as a further step towards “denormalizing” both smoking and the image of the tobacco industry, is all part of the environmental changes needed to produce a sustained shift in population health behaviour. Part of the mandate with this intervention is being on guard for the ever-creative attempts of the industry to get their message out. The latest frontline is product placements in television programs and movies, which are aimed at attaching “glamour” or “coolness” to the image of smoking.

Counter-advertising

High-impact media advocacy works best when counter-advertising is part of a comprehensive strategy which includes the best community, school, and workplace based programs, plus initiatives tailored for special populations. Research indicates that young people, a primary audience for this counter-advertising, do not place a high value on learning about the future health consequences of smoking. A more effective approach is to focus on the complicity and manipulation of the tobacco industry.

Primary Care Based Cessation Programs

In order to “catch” those who are motivated by the preceding interventions to actually make a quit attempt, it is important to see increased involvement of all primary care providers in clinical cessation efforts for all smokers, and especially for at-risk target groups (e.g., the mentally ill, pregnant women, those recovering from illness or preparing for surgery).

Although the “reach” of clinical interventions into the population is currently low, they still represent some of the most effective approaches to achieve smoking cessation. For instance, it is known that unsupported quit attempts work just 5-10% of the time, whereas 4 to 8 counselling sessions combined with nicotine replacement therapy can increase the quit rate to 20% or more. The psychological impact of this increased success rate is the difference between trying 4 to 5 times per successful cessation and trying 10 to 20 times.

Cost-Effectiveness of Tobacco Control Interventions

Information on the cost-effectiveness of tobacco control interventions is more limited than information on the effectiveness of interventions.²³ Indeed, reports from the early 1990s typically pointed to a “paucity of studies.”²⁴ This is beginning to change, at least in the arena of tobacco control intervention. A recent comprehensive census of the literature between 1990 and 2001 revealed 41 cost-effectiveness studies related to tobacco control, or 10% of the total economic papers in the area of health promotion.²⁵ Although the figures suggest an increased rate of publishing in this area, the volume of studies is still well below that found in other spheres of healthcare.

Experience suggests that cost-effectiveness arguments, as well as evidence of effectiveness, are essential in persuading governments to allocate funding for smoking cessation policies and interventions. WHO European Strategy for Smoking Cessation Policy

Three general limitations in the cost-effectiveness literature have been identified:

- Much of the economic evidence has been concentrated in established areas of health promotion such as lifestyle interventions. As a team led by Canadian researcher Bonnie Rush recently summarized, “the shift that is evident in health promotion thinking towards an ecological and integrated approach that encompasses both upstream and downstream determinants of health has yet to have an impact on the associated economic literature.”²⁶
- As public health promotion interventions have become increasingly complex (in response to complex health problems), the economic evaluation designs have not necessarily kept pace; some commentators have even suggested that attempts to evaluate the cost-effectiveness of population health interventions are futile.²⁷
- Even the evaluation of simpler “mainstream” interventions needs more work; for example, relatively little is known about the cost-effectiveness of counter-marketing on smoking rates.²⁸

The general and specific research gaps need to be acknowledged, while fully taking advantage of the literature that is available. The development of high-quality

²³ Naidoo B, Warm D, Quigley R, Taylor L. *Smoking and Public Health: A Review of Reviews of Interventions to Increase Smoking Cessation, Reduce Smoking Initiation and Prevent Further Uptake of Smoking*. Health Development Agency, 2004. Available at http://www.hda-online.org.uk/documents/smoking_evidence_briefing.pdf (accessed December 2004).

²⁴ Cohen D, Fowler G. Economic implications of smoking cessation therapies: a review of economic appraisals. *Pharmacoeconomics*. 1993; 4(5): 331-44.

²⁵ Rush B, Shiell A, Hawe P. A census of economic evaluations in health promotion. *Health Education Research*. 2004; 19(6): 707-19.

²⁶ Rush B, Shiell A, Hawe P. A census of economic evaluations in health promotion. *Health Education Research*. 2004; 19(6): 707-19.

²⁷ Rush B, Shiell A, Hawe P. A census of economic evaluations in health promotion. *Health Education Research*. 2004; 19(6): 707-19.

²⁸ Warner K. Tobacco control policy: from action to evidence and back again. *American Journal of Preventive Medicine*. 2001; 20(2 Suppl): 2-5.

economic analysis for public health interventions will never be finished. In light of the preceding points, policy planners need to learn how best to use incomplete, uncertain, or even contested evidence of cost-effectiveness.²⁹

²⁹ Rush B, Shiell A, Hawe P. A census of economic evaluations in health promotion. *Health Education Research*. 2004; 19(6): 707-19.

Cost-Effectiveness in Context

How attractive, from a cost-effectiveness perspective, does an intervention need to be to warrant its adoption? Laupacis and colleagues³⁰ attempted to answer this question by suggesting a classification grid with the following five levels:

Grade A – Intervention is both more effective and cheaper than the existing one

Grade B – Intervention is more effective and costs less than \$20,000 per QALY

Grade C – Intervention is more effective and costs between \$20,000 and \$100,000 per QALY

Grade D – Intervention is more effective and costs more than \$100,000 per QALY

Grade E – Intervention is less or equally effective but costs more than the existing one

They note that there are many factors beyond the cost-effectiveness of an intervention, such as political and ethical considerations, which need to be taken into account in adopting an intervention.

While the approach of Laupacis et al has been criticised³¹, it does allow for a general grouping of interventions. An important condition in any evaluation is that the research on cost-effectiveness is of high quality and thus the results are dependable.

The Harvard School of Public Health maintains a comprehensive cost-effectiveness data base³² in order to help in standardizing the methods and practices of cost-effectiveness analysis. This database includes a review of available cost-effectiveness studies (from 1976 to 2001) with outcomes presented as a cost per QALY given in 2002 US\$. To provide a context for the following sections on the cost-effectiveness of interventions, we have selected several interventions that are routinely applied and provided that information on the following table.

<i>Intervention</i>	<i>Cost / QALY (2002 US\$)</i>
Bypass surgery vs. medical management	\$35-48,000
Hypertension treatment vs. no treatment	\$15-210,000
End-stage renal disease treatments vs. no treatment	\$67,000
Mammography screening vs. no population based screening in 45-69 year old women	\$19,000
Driver side air bags vs. no air bags	\$30,000

³⁰ Laupacis A, Feeny D, Detsky A, Tugwell P. How attractive does a new technology have to be to warrant adoption and utilization? Tentative guidelines for using clinical and economic evaluations. *Canadian Medical Association Journal*. 1992; 146(4): 473-81.

³¹ Gafni A, Birch S. Guidelines for the adoption of new technologies: A prescription for uncontrolled growth in expenditures and how to avoid the problem. *Canadian Medical Association Journal*. 1992; 148(6): 913-7.

³² See <http://www.hsph.harvard.edu/cearegistry/> (accessed January, 2005).

Increased Taxation

Increasing the taxes on cigarette and other tobacco products represents the “perfect storm” in terms of public health interventions. First, the measure produces increased cessation and reduced consumption, with the health benefits that follow; even better, this formula is strongest for at-risk populations such as pregnant women and youth. Second, in contrast with other programs that use resources to obtain a health benefit, tobacco taxation does not add cost, and in fact produces revenue that could be largely recycled into public health initiatives.³³ Third, it represents a component of the overall “denormalization” of smoking and the tobacco industry; taxes are strongly associated with an unfavourable image.

Sugar, rum, and tobacco are commodities which are nowhere necessities of life, which are become objects of almost universal consumption, and which are therefore extremely proper subjects of taxation...

Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, 1776, Book V, Chapter III, p. 474.

The connection between price increases and reduced tobacco consumption is one of the most established effects in public health. In 2001, the Canadian Cancer Society presented evidence of the relationship between taxation and consumption to the House of Commons Standing Committee on Finance, citing fully *300 studies and reports*. The “real world” experience has been clear in Canada and other jurisdictions since the early 1980s. As a result of taxation and manufacturer price increases, cigarette prices increased in real terms (after adjusting for inflation) for the first time in 30 years, and sales began to fall.³⁴

The resistance to sustaining and increasing taxation has traditionally come from a few clear sources, including the tobacco industry and tobacco-growers, e.g., Ontario, which is the largest producer of tobacco in North America after North Carolina and Kentucky. In response to this increased taxation, the tobacco industry fought back with a focus on cigarette smuggling ‘caused’ by increased taxation. A tragic irony that emerged during this era was the actual complicity of the tobacco industry itself in smuggling operations. In February of 1994 the federal government drastically cut taxes resulting in an immediate and dramatic increase in cigarette consumption, especially among younger consumers.

A helpful summary of the research in the area of prices increase and tobacco consumption is provided by Pacula and Chaloupka.³⁵ Their review estimates that a 10% increase in the price of a pack of cigarettes would lead to a 3-5% reduction in the demand for cigarettes. Responsiveness to price increases is different in various subgroups of the population. Adolescents, men, and those with a lower socioeconomic status have been found to be more price responsive.

³³ Taxation and banning advertising and promotion are sometimes called “stroke-of-the-pen” interventions with virtually no attendant cost; however, conservative estimates will always assume substantial implementation and administrative costs.

³⁴ Sweanor D, Kyle K. *Legislation and applied economics in the pursuit of public health: Canada*. Available at <http://www1.worldbank.org/tobacco/pdf/2850-Ch04.pdf> (accessed October 2004).

³⁵ Pacula R, Chaloupka F. The effects of macro-level interventions on addictive behavior. *Substance Use & Abuse*. 2001; 36(13): 1901-22.

Adolescents have been a special focus of concern, as a long-term solution to the problem of tobacco use will definitely include action to inhibit teens from taking up or continuing with smoking. This subgroup of the population may be up to 3 times more price sensitive than adults, with a 10% price increase expected to reduce the demand for cigarettes in teens by 6-10%.^{36,37} There has, however, been mixed evidence on the impact of price increases on smoking initiation in female adolescents, possible reflecting issues around body weight and the slimming effect of smoking.³⁸ The sensitivity to price may be somewhat reduced by the time a person reaches young adulthood with increased earning power with a 10% price increase resulting in a 3.5% decrease in demand among those in their early 20s.³⁹

How much of this reduced demand is due to lower initiation rates, increased cessation or simply a reduction in the number of cigarettes smoked per day? While it is difficult to tease out these contributing factors, estimates suggest that about half of the decrease in demand is from fewer smokers and half from reduced consumption by current smokers.^{40,41,42}

Price increases stand out as by far the most cost-effective intervention for smoking cessation, yielding significant results at minimal⁴³ or no cost. One concern raised, however, is the possible regressive nature of tobacco taxes. Since the poor tend to smoke more than wealthier individuals, these taxes place a disproportionately higher burden on poor households. It is this sensitivity to price though that is a key component of the effectiveness of this intervention.

Price increases stand out as by far the most cost-effective intervention for both reducing smoking initiation and encouraging smoking cessation, yielding significant results at minimal or no cost.

³⁶ Chaloupka F, Pacula R. The impact of price on youth tobacco use. In *Changing Adolescent Smoking Prevalence*. Monograph No. 14, National Cancer Institute, 2001.

³⁷ Ross H, Chaloupka F. The effect of cigarette prices on youth smoking. *Health Economics*. 2003; 12: 217-30.

³⁸ Cawley J, Markowitz S, Tauras J. Lighting up and slimming down: the effects of body weight and cigarette prices on adolescent smoking initiation. *Journal of Health Economics*. 2003; 23: 293-311.

³⁹ Tauras J. Public policy and smoking cessation among young adults in the United States. *Health Policy*. 2004; 68: 321-32.

⁴⁰ Chaloupka F. How effective are taxes in reducing tobacco consumption? Available at http://tiger.uic.edu/~fjc/Presentations/Papers/taxes_consump_rev.pdf (accessed January 2005).

⁴¹ Wasserman J, Manning W, Newhouse J, Winkler J. The effects of excise taxes and regulations on cigarette smoking. *Journal of Health Economics*. 1991; 10(1): 43-64.

⁴² Tauras J. Public policy and smoking cessation among young adults in the United States. *Health Policy*. 2004; 68: 321-32.

⁴³ Some analysis have included the cost of enforcing and collecting taxes into their analysis. See, for example, Ranson M, Jha P, Chaloupka F, Nguyen S. Global and regional estimates of the effectiveness and cost-effectiveness of price increases and other tobacco control policies. *Nicotine & Tobacco Research*. 2002; 4: 311-9.

Clinical Interventions and Management

The economic literature on clinical interventions for smoking cessation is as extensive as any other area, except taxation measures. Validated smoking cessation interventions have been shown to be highly cost-effective means of reducing tobacco use and consequent disease; the evidence is strong enough to apply the “gold standard” label to cessation when compared with the range of preventive healthcare interventions.⁴⁴

There is heterogeneity in the way outcomes of cost effectiveness are reported, which makes comparability a problem. The common methods of presentation are cost per quitter, cost per life-year saved, and cost per quality-adjusted life year (QALY) or disability-adjusted life (DALY) year saved. Sometimes the incremental cost-effectiveness of an intervention is the focus, which some would argue as the preferred approach.

Counselling

In 1997, 15 recommended smoking cessation interventions from the 1996 US Agency for Health Care Policy and Research (AHCPR) guidelines were analyzed to determine their relative cost-effectiveness.⁴⁵ A range of 5 counselling methods were modelled in detail, demonstrating that the cost per QALY averaged \$1,915⁴⁶, a very low figure compared with standard healthcare practice. The general conclusion was that the most effective methods were generally more intensive; the most cost-effective approach was group counselling, as seen in the following table, though very few smokers opted for this type of program.

<i>Counselling Type</i>	<i>Cost per life-year saved (1995 US\$)</i>	<i>Cost per QALY (1995 US\$)</i>	<i>Cost per QALY⁴⁷ (2001 US\$)</i>
Minimal counselling	\$5,423	\$4,015	\$4,666
Intensive individual	\$2,461	\$1,822	\$2,117
Group counselling	\$1,496	\$1,108	\$1,288

An earlier US study perhaps suggested a contrary conclusion; the least intensive measure, brief physician advice, only cost from \$705 to \$988 per year of life saved for men, and \$1,204 to \$2,058 for women. The upper limit with sensitivity analysis was still under \$6,000, and for a follow-up visit, under \$10,000.⁴⁸ The overall conclusion was the same: physician counselling against smoking is at least as cost-effective as several other preventive interventions in healthcare.

⁴⁴ Warner K. Cost effectiveness of smoking-cessation therapies. Interpretation of the evidence-and implications for coverage. *Pharmacoeconomics*. 1997; 11(6): 538-49.

⁴⁵ Cromwell J, Bartosch W, Fiore M et al. Cost-effectiveness of the clinical practice recommendations in the AHCPR guideline for smoking cessation. Agency for Health Care Policy and Research. *Journal of the American Medical Association*..1997; 278(21): 1759-66. Note that the guidelines, but not the economic analysis, were updated in 2000. See *Treating Tobacco Use and Dependence*.

⁴⁶ All costs in the cost-effectiveness section of this report are provided in US dollars unless otherwise noted.

⁴⁷ Updated to 2001 figures at the website <http://www.treatobacco.net/health/showReference.cfm?kid=98&sid=2> (accessed January 2005).

⁴⁸ Cummings S, Rubin S, Oster G. The cost-effectiveness of counselling smokers to quit. *Journal of the American Medical Association*..1989; 261(1): 75-9.

The comparable 1998 British clinical cessation guidelines were accompanied by an analysis which substantially concurs with the US assessment of cost-effectiveness.⁴⁹ The conclusion was that the cost per year of life saved only ranged from £248 (\$575 Can⁵⁰) to £303 (\$703 Can).⁵¹ This result was matched by a 1993 Welsh study, which suggested that brief advice only cost £167 (\$387 Can) per QALY.⁵² In 2001, a UK model estimated that brief advice from a physician only cost \$144 per quitter.⁵³

Two recent reviews of cessation interventions, one for the World Health Organization (WHO) and one for the World Bank, included cost-effectiveness summaries. The WHO report covers the same material noted above, but also provided some economic data specific to nicotine replacement therapy (see below). The World Bank report included a wider range of studies; unfortunately, comparison is difficult as a variety of outcome measures were employed.⁵⁴ The outcome measure is important; calculating costs according to years of life saved rather than allowing for changes in quality of life can underestimate the cost effectiveness of smoking cessation by almost 50%.⁵⁵

The three studies included in the World Bank review which evaluated costs per quitter showed a range of \$150 to \$411 (limited to projects where the intervention was offered to all smokers).^{56,57,58} This compares with data from another recent study of cessation counselling offered by family physicians, where costs per quitter ranged from \$281 to \$496 depending on whether training expenses were included.⁵⁹ These

⁴⁹ Parrott S, Godfrey C, Raw M et al. Guidance for commissioners on the cost effectiveness of smoking cessation interventions. Health Educational Authority. *Thorax*. 1998; 53(Suppl 5 Pt 2): S1-38. Note that the guidelines (but not the economic analysis) were also updated, just like the US version, in 2000. See West R, McNeill A, Raw M. Smoking cessation guidelines for health professionals: an update. Health Education Authority. *Thorax*. 2000; 55(12): 987-99.

⁵⁰ Currency conversion into Canadian dollars is based on the exchange rate on February 10, 2005.

⁵¹ Discounting is a method of adjusting for the fact that individuals prefer to incur costs in later periods and enjoy benefits in the current period. Applying a discount rate transforms future values into current values. Parrott S, Godfrey C. Economics of smoking cessation. *British Medical Journal*. 2004; 328(7445): 947-9. This paper provided a 2001-2002 update of the cost figures, which are quoted in our report.

⁵² Cohen D, Fowler G. Economic implications of smoking cessation therapies: a review of economic appraisals. *Pharmacoeconomics*. 1993; 4(5): 331-44.

⁵³ Orme M, Hogue S, Kennedy L et al. Development of health and economic consequences of smoking interactive model. *Tobacco Control*. 2001; 10: 55-61. As summarized in Song F, Raftery J, Aveyard P et al. Cost-effectiveness of pharmacological interventions for smoking cessation: a literature review and a decision analytic analysis. *Medical Decision Making*. 2002; 22(5 Suppl): S26-37.

⁵⁴ Ronckers S, Ament A. *Cost-effectiveness of Treatment for Tobacco Dependence*. World Bank, 2003. Available at <http://www1.worldbank.org/tobacco/pdf/Ronckers-Cost%20Effectiveness-whole.pdf> (accessed December 2004).

⁵⁵ Parrott S, Godfrey C. Economics of smoking cessation. *British Medical Journal*. 2004; 328(7445): 947-9.

⁵⁶ Altman D, Flora J, Fortmann S, Farquhar J. The cost-effectiveness of three smoking cessation programs. *American Journal of Public Health*. 1987; 77(2): 162-5.

⁵⁷ Bertera R, Oehl L, Telephak J. Self help versus group approaches to smoking cessation in the workplace: eighteen-month follow-up and cost analysis. *American Journal of Health Promotion*. 1990; 4: 187-92.

⁵⁸ Parrott S, Godfrey C, Raw M et al. Guidance for commissioners on the cost effectiveness of smoking cessation interventions. Health Educational Authority. *Thorax*. 1998; 53(Suppl 5 Pt 2): S1-38.

⁵⁹ Buck D, Richmond R, Mendelsohn C. Cost-effectiveness analysis of a family physician delivered smoking cessation program. *Preventive Medicine*. 2000; 31(6): 641-8.

figures are significantly lower than the 1997 US review quoted above, where the cost per quitter ranged from \$2,186 to \$7,922.⁶⁰

Although smoking cessation services offered to specific groups are reported to be more cost effective in certain cases,⁶¹ this does not seem to apply to cohorts consisting of heavy smokers or those with established disease. The data summarized by the World Bank review suggests that the cost per year of life saved for such patients can range from \$480 to \$7,444.⁶² The upper limit reported in one study for myocardial infarction survivors was \$19,000 per year of life saved; a sensitivity analysis dropped the costs to less than \$10,000 per year of life saved if the cessation program cost \$2,000 per participant and if an additional 12 smokers quit per 100 enrollees.⁶³

Pharmacology

Pharmacological approaches to cessation include transdermal patches (commonly referred to as nicotine patches), nicotine chewing gum, nicotine nasal sprays, lozenges, aerosol inhalers, and some classes of antidepressants, including bupropion. A 1999 Canadian review⁶⁴ of nicotine replacement therapy (NRT) cost-effectiveness cited 4 full economic analyses^{65,66,67,68} of pharmacological approaches to cessation from the US. A 2002 British review added 5 more studies.⁶⁹ Most economic work assessing bupropion (Zyban) dates from 2000 onwards.

Nicotine Replacement Therapy

The analysis of NRT generally assumes that the drug is being used in conjunction with physician care, at least the offer of brief advice.

⁶⁰ Cromwell J, Bartosch W, Fiore M et al. Cost-effectiveness of the clinical practice recommendations in the AHCPR guideline for smoking cessation. Agency for Health Care Policy and Research. *Journal of the American Medical Association*. 1997; 278(21): 1759-66.

⁶¹ Cohen D, Fowler G. Economic implications of smoking cessation therapies: a review of economic appraisals. *Pharmacoeconomics*. 1993; 4(5): 331-44.

⁶² Ronckers S, Ament A. *Cost-effectiveness of Treatment for Tobacco Dependence*. World Bank, 2003. Available at <http://www1.worldbank.org/tobacco/pdf/Ronckers-Cost%20Effectiveness-whole.pdf> (accessed December 2004).

⁶³ Krumholz H, Cohen B, Tsevat J et al. Cost-effectiveness of a smoking cessation program after myocardial infarction. *Journal of the American College of Cardiology*. 1993; 22(6): 1697-702.

⁶⁴ Reid R, Coyle D, Papadakis S, Boucher K. *Nicotine Replacement Therapies in Smoking Cessation*. Canadian Council on Tobacco Control, 1999.

⁶⁵ Oster G, Huse D, Delea T, Colditz G. Cost-effectiveness of nicotine gum as an adjunct to physician's advice against cigarette smoking. *Journal of the American Medical Association*. 1986; 256(10): 1315-8.

⁶⁶ Fiscella K, Franks P. Cost-effectiveness of the transdermal nicotine patch as an adjunct to physicians' smoking cessation counselling. *Journal of the American Medical Association*. 1996; 275(16): 1247-51.

⁶⁷ Cromwell J, Bartosch W, Fiore M et al. Cost-effectiveness of the clinical practice recommendations in the AHCPR guideline for smoking cessation. Agency for Health Care Policy and Research. *Journal of the American Medical Association*. 1997; 278(21): 1759-66.

⁶⁸ Wasley M, McNaghy S, Phillips V, Ahluwalia J. The cost-effectiveness of the nicotine transdermal patch for smoking cessation. *Preventive Medicine*. 1997; 26(2): 264-70.

⁶⁹ Song F, Raftery J, Aveyard P et al. Cost-effectiveness of pharmacological interventions for smoking cessation: a literature review and a decision analytic analysis. *Medical Decision Making*. 2002; 22(5 Suppl): S26-37.

The following table is based on the work by Cromwell et al⁷⁰ which incorporates the work of Fiscella & Franks⁷¹ and has been more recently updated to 2001 US dollars.⁷²

<i>Counselling Type</i>	<i>Patch: Cost per life-year saved</i>	<i>Patch: Cost per QALY</i>	<i>Gum: Cost per life-year saved</i>	<i>Gum: Cost per QALY</i>
Minimal counselling	\$3,775	\$2,795	\$7,130	\$5,278
Intensive individual	\$2,288	\$1,691	\$3,505	\$2,595
Group counselling	\$1,837	\$1,361	\$2,860	\$2,117

A comparison with Oster et al is useful: the cost per life-year saved with nicotine gum was \$4,113 to \$6,465 for men and \$6,880 to \$9,473 for women, depending on age.⁷³ Wasley and colleagues also found that costs per life-year saved with the transdermal patch were lower than with gum.^{74,75} A small study in a US military setting suggested that the cost per quitter with transdermal patch therapy was \$779 to \$984 (depending on which 6-month outcome measure was used).⁷⁶

While the methods and results of these studies vary, they all indicate that the cost per life-year saved or cost per QALY is well under \$10,000 in each case, and therefore NRT is highly cost effective by usual healthcare standards. Another significant result emerges from the data when comparing the NRT treatments against counselling by itself. It is clear that the addition of NRT, at least using a transdermal patch, leads to lower costs per QALY in most cases.

⁷⁰ Cromwell J, Bartosch W, Fiore M et al. Cost-effectiveness of the clinical practice recommendations in the AHCPR guideline for smoking cessation. Agency for Health Care Policy and Research. *Journal of the American Medical Association*. 1997; 278(21): 1759-66.

⁷¹ Fiscella K, Franks P. Cost-effectiveness of the transdermal nicotine patch as an adjunct to physicians' smoking cessation counselling. *Journal of the American Medical Association*. 1996; 275(16): 1247-51.

⁷² Update of original 1995 figures provided at <http://www.treatobacco.net/health/showReference.cfm?kid=98&sid=2> (accessed January 2005).

⁷³ Oster G, Huse D, Delea T, Colditz G. Cost-effectiveness of nicotine gum as an adjunct to physician's advice against cigarette smoking. *Journal of the American Medical Association*. 1986; 256(10): 1315-8.

⁷⁴ Wasley M, McNaghy S, Phillips V, Ahluwalia J. The cost-effectiveness of the nicotine transdermal patch for smoking cessation. *Preventive Medicine*. 1997; 26(2): 264-70.

⁷⁵ See the comment in Stapleton J. Re: Cost-effectiveness of the nicotine transdermal patch. *Preventive Medicine*. 1998; 27: 304. The correction was accepted by the original authors.

⁷⁶ Miller M, Draugalis J, Ortmeier B, Leischow S. A retrospective analysis of the costs and consequences of a tobacco-cessation program for active duty service members. *Military Medicine*. 1996; 161(7): 420-4.

The British evidence deviates somewhat from the US data. Contrary to the US data, the most intensive (and effective) interventions were found to be *less* cost-effective in a parallel review by Parrott and colleagues, as shown in the following table.⁷⁷

<i>Type of Intervention</i>	<i>Cost per life-year saved</i>
Brief advice	£248
Brief advice + self-help	£303
Brief advice + self-help + NRT	£815
Brief advice + self-help + NRT in a specialist clinic	£1,022

This result was matched in a 2001 modelling study from the UK, where adding pharmacological therapy to physician advice cost 7 times more per quitter.⁷⁸ It is not clear which conditions or assumptions would have produced the different results in the UK and the US. It is important to note that even the most expensive intervention, i.e., specialist smoking cessation support (with NRT and self-help materials), compared favourably to a review of 310 medical interventions, where the median cost was £17,000 (US\$25,500) per life year gained.⁷⁹ The focus on specialist smoking cessation services in this study was important, as they currently form the cornerstone of the National Health Service tobacco control strategy for each health authority in Britain. A comparison can be made with a Welsh hospital setting, where a specialist counsellor was found to produce an additional quitter at a cost of £851 (\$1,973 Can)(or £340 [\$788 Can] to £426 [\$988 Can] per life-year saved).⁸⁰

Other UK research includes two 1994 studies by Akehurst and Piercy which looked at the incremental cost per extra life-year saved for transdermal patch (£4,526 or \$10,495 Can) and nasal spray (£1,527 or \$3,541 Can).^{81,82} Although nicotine spray seems more cost-effective, there have been concerns about persistent dependence on the treatment in users.⁸³ In another UK comparison, from 1999, Stapleton and colleagues analyzed what the incremental cost per life-year saved would be if

⁷⁷ Parrott S, Godfrey C, Raw M et al. Guidance for commissioners on the cost effectiveness of smoking cessation interventions. Health Educational Authority. *Thorax*. 1998; 53(Suppl 5 Pt 2): S1-38. Updated to 2001-2002 pounds in Parrott S, Godfrey C. Economics of smoking cessation. *British Medical Journal*. 2004; 328(7445): 947-9.

⁷⁸ Orme M, Hogue S, Kennedy L et al. Development of health and economic consequences of smoking interactive model. *Tobacco Control*. 2001; 10: 55-61. As summarized in Song F, Raftery J, Aveyard P et al. Cost-effectiveness of pharmacological interventions for smoking cessation: a literature review and a decision analytic analysis. *Medical Decision Making*. 2002; 22(5 Suppl): S26-37.

⁷⁹ Tengs T, Adams M, Pilskin J et al. Five hundred life saving interventions and their cost-effectiveness. *Risk Analysis*. 1995; 15: 369-90.

⁸⁰ Prathiba B, Tjeder S, Phillips C, Campbell I. A smoking cessation counsellor: should every hospital have one? *Journal of the Royal Society of Health*. 1998; 118(6): 356-9.

⁸¹ Akehurst R, Piercy J. Cost-effectiveness of the use of transdermal Nicorette patches relative to GP counselling and nicotine gum in the prevention of smoking related diseases. *British Journal of Medical Economics*. 1994; 7: 115-22.

⁸² Akehurst R, Piercy J. Cost-effectiveness of the use of Nicorette nasal spray to assist quitting smoking among heavy smokers. *British Journal of Medical Economics*. 1994; 7: 155-84.

⁸³ Cheung A, Tsevat J. Economic evaluations of smoking interventions. *Preventive Medicine*. 1997; 26: 271-273.

physicians could prescribe transdermal patches at no cost to the patient for up to 12 weeks.⁸⁴ The incremental cost ranged from £398 (\$923 Can) to £785 (1,820), depending on the age of the patient.

Based on the available information, the World Health Organization has calculated the average cost of NRT added to counselling to be \$2,164 per disability-adjusted life-year (DALY).⁸⁵

Additional data is available through analyses in managed care organizations. One 1998 study showed that the average annual combined cost for the patient and health plan per user who quit smoking was \$928 for those with standard insurance coverage who elected NRT and / or behavioural therapy. The average cost increased to \$1,127 for those with partial coverage and \$1,192 for those with full coverage for smoking cessation services.⁸⁶ The increased costs arose because, even though more people sign up for the program when all their costs are covered, their quit rate is significantly lower (one explanation for this being that such people were less motivated than those who had to make co-payments). By comparison, two large managed care organizations in California demonstrated that the cost per quitter was \$965 to \$1,495⁸⁷ and, in a 2004 study, the estimate of direct coverage costs for managed care cessation treatment (per life-year saved) was US\$3,417.⁸⁸ When managed care plans in the US cover NRT, they often require members to enrol in a complete smoking cessation class as a condition of coverage.⁸⁹

Coverage of NRT

Contrary to the result suggested above, studies from over a decade ago showed that providing free NRT not only enhanced usage but also increased abstinence rates.^{90,91} Even over-the-counter use of NRT may respond in the same way to subsidization,⁹² although healthcare is the more usual setting where it has been tested. In 2004, a significant study of a Maryland health department's free NRT program showed that, though enrolment and short-term quit rates increased, long-term quit rates were not

⁸⁴ Stapleton J, Lowin A, Russell M. Prescription of transdermal nicotine patches for smoking cessation in general practice: evaluation of cost-effectiveness. *Lancet*. 1999; 354(9174): 210-5.

⁸⁵ *WHO European Strategy for Smoking Cessation Policy*. World Health Organization, revised 2004.

⁸⁶ Curry S, Grothaus L, McAfee T, Pabiniak C. Use and cost effectiveness of smoking-cessation services under four insurance plans in a health maintenance organization. *New England Journal of Medicine*. 1998; 339(10): 673-9.

⁸⁷ Schauffler H, McMenamin S, Olson K et al. Variations in treatment benefits influence smoking cessation: results of a randomised controlled trial. *Tobacco Control*. 2001; 10(2): 175-80.

⁸⁸ Warner K, Mendez D, Smith D. The financial implications of smoking cessation treatment by managed care organizations. *Inquiry*. 2004; 41(1): 57-69.

⁸⁹ Novotny T, Clare Cohen J, Yurekli A et al. Smoking cessation and nicotine-replacement therapies. In *Tobacco Control in Developing Countries*. World Bank, 1999.

⁹⁰ Cox J, McKenna J. Nicotine gum: does providing it free in a smoking cessation program alter success rates? *Journal of Family Practice*. 1990; 31(3): 278-80.

⁹¹ Hughes J, Wadland W, Fenwick J et al. Effect of cost on the self-administration and efficacy of nicotine gum: a preliminary study. *Preventive Medicine*. 1991; 20(4): 486-96.

⁹² Tauras J, Chaloupka F. The demand for nicotine replacement therapies. *Nicotine & Tobacco Research*. 2003; 5(2): 237-43.

improved. It was suggested that the relapse rate could be reversed if the use of the patches was extended beyond the 6-week free supply.⁹³

One suggested approach to paying for a comprehensive public NRT program would be a tax increase. One study showed that a 10% increase in the tax on cigarettes could cover NRT for 3 to 30% of smokers in developed countries. The specific estimate for Canada was that a subsidy would be generated for 9.4% of smokers.⁹⁴

Conclusion

Following the British consensus, the conclusion of the World Health Organization is that adding NRT to counselling reduces cost-effectiveness.⁹⁵ Nevertheless, effectiveness is considerably increased and smoking cessation interventions using NRT compare favourably with other common preventive interventions. So the “bottom line” is that NRT is certainly justifiable, and even essential, in improving cessation rates.⁹⁶

This explains in part why various jurisdictions, including Quebec, are experimenting with or considering offering free NRT, at least according to a means test. A trial program in Oregon that was supposed to last until June, 2005, had to be suspended because demand exceeded supply.⁹⁷ A widely reported free NRT program launched at the end of 2003 in New York City apparently helped a third of its 34,000 enrollees to be abstinent at 6 months.⁹⁸ Although such short-term campaigns may increase in popularity (especially when pharmaceutical companies donate products), policy-makers need to face the fact that many insurance programs for the poor still do not cover smoking cessation therapy.⁹⁹

The most substantial trial program offering free NRT has been in place for several years in parts of the UK. The cost effectiveness in this “real world” setting has been estimated to be between £600 and £870 per life-year saved.^{100,101} In spite of the success of this program, an editorial from 2001 pointed out the fragility of funding, i.e., the fact that the cessation services were not “embedded” permanently in the public health infrastructure, meant that all the gains could be quickly lost.¹⁰²

⁹³ Alberg A, Stashefsky Margalit R, Burke A et al. The influence of offering free transdermal nicotine patches on quit rates in a local health department's smoking cessation program. *Addictive Behavior*. 2004; 29(9): 1763-78.

⁹⁴ Novotny T, Clare Cohen J, Yurekli A et al. Smoking cessation and nicotine-replacement therapies. In *Tobacco Control in Developing Countries*. World Bank, 1999.

⁹⁵ World Health Organization. *World Health Report 2002: Reducing the Risks, Promoting Healthy Life*.

⁹⁶ Smeeth L, Fowler G. Nicotine replacement therapy for a healthier nation. *British Medical Journal*. 1998; 317: 1266-7.

⁹⁷ News story available at <http://www.katu.com/printstory.asp?ID=73602> (accessed January 2005).

⁹⁸ News story available at http://www.cbsnewyork.com/topstories/topstoriesny_story_113102105.html (accessed January 2005).

⁹⁹ Novotny T, Clare Cohen J, Yurekli A et al. Smoking cessation and nicotine-replacement therapies. In *Tobacco Control in Developing Countries*. World Bank, 1999.

¹⁰⁰ Stapleton J. Cost effectiveness of NHS smoking cessation services. Available at <http://www.ash.org.uk/html/cessation/ashcost.pdf> (accessed December 2004).

¹⁰¹ *Statistics on Smoking Cessation Services in the Health Action Zones in England, April 1999 to March 2000*. London: The Government Statistical Service, 2001.

¹⁰² Raw M, McNeill A, Watt J, Raw D. National smoking cessation services at risk. *British Medical Journal*. 2001; 323: 1140-1.

An alternative to free NRT is providing a partial subsidy. The World Bank estimated the cost-effectiveness of 25% public coverage of NRT at around US\$300 per DALY.¹⁰³

Bupropion

As of 2001, there were no studies evaluating the relative cost effectiveness of bupropion (trade name Zyban) when used for smoking cessation. Since then, sophisticated modelling has been applied to pharmacological approaches in two major studies, which helpfully both used the outcome measure of incremental costs per life-year saved.

Song and colleagues estimated the incremental costs per life year saved shown in the following table (in 2001 US dollars).¹⁰⁴

<i>Intervention</i>	<i>Advice or counselling alone</i>	<i>Advice/ counselling + NRT</i>	<i>Advice/ counselling + bupropion</i>
Advice + NRT	\$3,455		
Advice + Bupropion	\$2,150		
Advice + Both drugs	\$2,836	\$2,391	\$4,322
Counsel + NRT	\$1,441		
Counsel + Bupropion	\$920		
Counsel + Both drugs	\$1,282	\$1,156	\$2,123

That is, the addition of bupropion to cessation advice added an incremental cost of \$2,150, less than the \$3,455 if NRT was added to cessation advice.

The other study, from Switzerland in 2003, evaluated a range of NRT approaches as well as bupropion. The following table presents the results for men and women (in Euro), with the range in each case relating to different age groups.¹⁰⁵

<i>Gender</i>	<i>Patch</i>	<i>Gum</i>	<i>Spray</i>	<i>Inhaler</i>	<i>Bupropion</i>
Men	€3,113 to 5,021 ¹⁰⁶	€4,266 to 6,879	€3,669 to 5,918	€3,700 to 5,968	€1,768 to 2,851
Women	€3,779 to 6,423	€5,178 to 8,799	€4,454 to 7,570	€4,492 to 7,634	€2,146 to 3,646

¹⁰³ *Curbing the Epidemic. Governments and the Economics of Tobacco Control*. World Bank, 1999.

Note that this book is an abridgment of *Tobacco Control in Developing Countries*.

¹⁰⁴ Song F, Raftery J, Aveyard P et al. Cost-effectiveness of pharmacological interventions for smoking cessation: a literature review and a decision analytic analysis. *Medical Decision Making*. 2002; 22(5 Suppl): S26-37. The same decision analytic analysis was used by Woolacott N, Jones L, Forbes C et al. The clinical effectiveness and cost-effectiveness of bupropion and nicotine replacement therapy for smoking cessation: a systematic review and economic evaluation. *Health Technology Assessment (Winchester, England)*. 2002; 6(16): 1-245, with the results also being summarized by the *National Institute for Clinical Effectiveness*.

¹⁰⁵ Cornuz J, Pinget C, Gilbert A, Paccaud F. Cost-effectiveness analysis of the first-line therapies for nicotine dependence. *European Journal of Clinical Pharmacology*. 2003; 59(3): 201-6.

¹⁰⁶ One Euro is valued at \$1.60 Canadian on February 10, 2005.

The incremental cost-effectiveness of bupropion is generally better than that of NRT (or even bupropion added to NRT), though such a conclusion must be treated with caution given the limited efficacy data and no economic analysis of adverse drug effects.¹⁰⁷

The conclusion of a randomized controlled trial confirms the basic cost-effectiveness of bupropion. The use of 150-mg of bupropion daily resulted in a cost per QALY of less than \$1,100.¹⁰⁸

In sum, the cost-effectiveness evidence strongly supports the use of NRT and bupropion in smoking cessation. They are not, however, solutions by themselves, but rather “must be considered as part of comprehensive prevention and cessation programs.”¹⁰⁹ We will now turn to the other aspects of such programs.

A narrow range of approaches to reducing the prevalence of smoking has been evaluated for cost effectiveness.¹¹⁰ At least, that was the consensus 15 years ago. It seems, according to one recent review, that the situation has not changed much: “There is a dearth of cost-effectiveness analysis for most of the principle tobacco control interventions, namely non-price measures other than NRT such as consumer education, smoking restrictions, and advertising bans.”¹¹¹

Non-Price Policy Approaches

The direct evidence of effectiveness for advertising bans and youth access restrictions is weak, which may partly explain why there is little cost-effectiveness analysis of these approaches in the literature. One World Health Organization estimate put the cost per DALY of comprehensive advertising bans at \$189.¹¹² A 2001 study calculated that to compete with the cost-effectiveness of clinical cessation, enforcement of youth tobacco access laws would have to produce a 5% reduction in adolescent smoking prevalence and cost no more than \$250 per vendor.¹¹³

Few data were found on the cost-effectiveness of bans on smoking in public places and private workplaces. As one recent review concluded: “Cost implications to employers with different workplace ETS policies are unclear because little information exists in the literature regarding costs and cost-effectiveness of workplace smoking policies. In a related area, better assessments are needed of the

¹⁰⁷ Woolacott N, Jones L, Forbes C et al. The clinical effectiveness and cost-effectiveness of bupropion and nicotine replacement therapy for smoking cessation: a systematic review and economic evaluation. *Health Technology Assessment (Winchester, England)*. 2002; 6(16): 1-245.

¹⁰⁸ Javitz H, Swan G, Zbikowski S et al. Cost-effectiveness of different combinations of bupropion SR dose and behavioral treatment for smoking cessation: a societal perspective. *American Journal of Managed Care*. 2004; 10(3): 217-26.

¹⁰⁹ Novotny T, Clare Cohen J, Yurekli A et al. Smoking cessation and nicotine-replacement therapies. In *Tobacco Control in Developing Countries*. World Bank, 1999.

¹¹⁰ Elixhauser A. The costs of smoking and the cost effectiveness of smoking-cessation programs. *Journal of Public Health Policy*. 1990; 11(2): 218-37.

¹¹¹ Gilbert A, Cornuz J. Which are the most effective and cost-effective interventions for tobacco control? World Health Organization, 2003.

¹¹² WHO *European Strategy for Smoking Cessation Policy*. World Health Organization, revised 2004.

¹¹³ DiFranza J, Peck R, Radecki T, Savageau J. What is the potential cost-effectiveness of enforcing a prohibition on the sale of tobacco to minors? *Preventive Medicine*. 2001; 32(2): 168-74.

effects of smoking bans on workplace productivity.”¹¹⁴ One World Health Organization estimate put the cost per DALY of enforcing clean indoor air laws at \$358.¹¹⁵

Mass Media and Other Community-Wide Initiatives

Mass media advocacy has often taken the form of counter-advertising, including warning labels on tobacco products. Very few economic analyses have been done of pure information dissemination. A 4-year mass media campaign directed towards students demonstrated a cost per life-year saved of \$696; it was estimated that the cost would be reduced to \$138 if the campaign was expanded across the US, showing the benefit of “economies of scale.”¹¹⁶ This result compares with the World Health Organization estimate for information dissemination, which showed a cost per DALY of \$337.

Media campaigns were often paired with contests in an earlier era; such “Quit and Win” strategies were popular in Scandinavia, including the North Karelia project in Finland.¹¹⁷ The cost effectiveness of such campaigns showed a wide variation, from \$24 to \$428 per quitter, and \$188 to \$1,222 per life-year saved.^{118,119,120,121} Anti-tobacco advertising is usually an aspect of a more comprehensive campaign; sometimes the media messages are aimed in part at recruiting for other intervention programs.¹²² As was noted in our previous report, it is difficult to isolate how much a particular component contributes towards effectiveness; the cost-effectiveness of each component is thus also difficult to determine.

¹¹⁴ Brownson R, Hopkins D, Wakefield M. Effects of smoking restrictions in the workplace. *Annual Review of Public Health*. 2002; 23: 333-48.

¹¹⁵ WHO European Strategy for Smoking Cessation Policy. World Health Organization, revised 2004.

¹¹⁶ Secker-Walker R, Worden J, Holland R et al. A mass media programme to prevent smoking among adolescents: costs and cost effectiveness. *Tobacco Control*. 1997; 6(3): 207-12.

¹¹⁷ See a Canadian overview of such programs in Bains N, Pickett W, Laundry B, Mercredy D. Predictors of smoking cessation in an incentive-based community intervention. *Chronic Diseases in Canada*. 2000; 21(2).

¹¹⁸ Altman D, Flora J, Fortmann S, Farquhar J. The cost-effectiveness of three smoking cessation programs. *American Journal of Public Health*. 1987; 77(2): 162-5.

¹¹⁹ Korhonen H, Niemensivu H, Piha T et al. National TV smoking cessation program and contest in Finland. *Preventive Medicine*. 1992; 21(1): 74-87. The results are summarized in Ronckers S, Ament A. *Cost-effectiveness of Treatment for Tobacco Dependence*. World Bank, 2003. Available at <http://www1.worldbank.org/tobacco/pdf/Ronckers-Cost%20Effectiveness-whole.pdf> (accessed December 2004).

¹²⁰ Shipley R, Hartwell T, Austin W et al. Community stop-smoking contests in the COMMIT trial: relationship of participation to costs. Community Intervention trials. *Preventive Medicine*. 1995; 24(3): 286-92.

¹²¹ Tillgren P, Rosen M, Haglund B et al. Cost-effectiveness of a tobacco ‘quit and win’ contest in Sweden. *Health Policy*. 1993; 26(1): 43-53.

¹²² See, for example, McDonald P. A low-cost, practical method for increasing smokers’ interest in smoking cessation programs. *Canadian Journal of Public Health*. 2004; 95(1): 50-3.

One campaign included advertising, a telephone quit line, and a self-help booklet; the estimated cost per life-year saved was \$407 to \$733.¹²³ A similar project involving telephone counselling reported in 2004 that the cost per quitter was about \$1,300.¹²⁴ In a Dutch initiative, publicity was combined with a quit line, a television clinic, and group programs; based on effectiveness projections derived from surveys before and after the campaign, the cost per quitter was only \$12 (which suggests that costs may have been highly underestimated).¹²⁵ A Swedish quit line which is connected to programs which cover NRT expenses demonstrated a cost per quitter of \$1,052 to \$1,360. The cost per life-year saved was \$283.¹²⁶

It was suggested earlier in this report that targeted interventions can be cost-effective. An encouraging result from a UK study within a high-risk population of London (namely the Turks, among whom an alarming 74% of men smoked) showed that a community campaign which included publicity, theatre, and self-help information (all in Turkish) had a cost-effectiveness of £105 (\$244 Can) per life-year saved.¹²⁷

In sum, this range of cost-effectiveness for mass media and other community-wide campaigns rivals the “low-end” results for the clinical cessation interventions. An earlier summary suggested that some UK community-wide programs have ranged much higher in cost, up to \$5,800 per life-year saved.¹²⁸ This merely underscores the wide variability in program design and expense, not to mention possible differences in analytical methodology.

Self-Help Programs

Self-help materials have already been mentioned above as a low-intensity intervention which may have lower effectiveness than clinical approaches, but also cost a lot less per participant.¹²⁹ The economic benefit of self-help programs is also extended in that they provide greater reach into the population of smokers.¹³⁰

¹²³ Ratcliffe J, Cairns J, Platt S. Cost effectiveness of a mass media-led anti-smoking campaign in Scotland. *Tobacco Control*. 1997; 6(2): 104-10. Prices converted by Ronckers S, Ament A. *Cost-effectiveness of Treatment for Tobacco Dependence*. World Bank, 2003. Available at <http://www1.worldbank.org/tobacco/pdf/Ronckers-Cost%20Effectiveness-whole.pdf> (accessed December 2004).

¹²⁴ McAlister A, Rabi V, Geiger A et al. Telephone assistance for smoking cessation: one year cost effectiveness estimations. *Tobacco Control*. 2004; 13: 85-86.

¹²⁵ Mudde A, De Vries H. The reach and effectiveness of a national mass media-led smoking cessation campaign in The Netherlands. *American Journal of Public Health*. 1999; 89(3): 346-50.

¹²⁶ Tomson T, Helgason A, Gilljam H. Quitline in smoking cessation: a cost-effectiveness analysis. *International Journal of Technology Assessment in Health Care*. 2004; 20(4): 469-74.

¹²⁷ Stevens W, Thorogood M, Kayikki S. Cost-effectiveness of a community anti-smoking campaign targeted at a high risk group in London. *Health Promotion International*. 2002; 17(1): 43-50.

¹²⁸ Buck D, Godfrey C, Parrott S, Raw M. *Cost-effectiveness of Smoking Cessation Interventions*. Health Education Authority, 1997. Summarized in Ranson M, Jha P, Chaloupka F, Nguyen S. Global and regional estimates of the effectiveness and cost-effectiveness of price increases and other tobacco control policies. *Nicotine & Tobacco Research*. 2002; 4: 311-9.

¹²⁹ Warner K. Cost effectiveness of smoking-cessation therapies. Interpretation of the evidence-and implications for coverage. *Pharmacoeconomics*. 1997; 11(6): 538-49.

¹³⁰ Curry S. Self-help interventions for smoking cessation. *Journal of Consulting & Clinical Psychology*. 1993; 61(5): 790-803.

Of course, self-help materials need to get into the hands of smokers. This either happens strictly in the clinical setting, with the cost-effectiveness analysis thus being rolled together with counselling, NRT, etc. (see above), or in community-wide programs. Elixhauser evaluated mass media and self-help programs 15 years ago, and found that they cost from \$27 to \$921 per quitter at 1 year follow-up.¹³¹

Self-help programs seem to be very cost-effective. One study estimated the cost per quitter as \$22 to \$144.¹³² Another program in the Netherlands demonstrated that, at \$37 to \$66 per quitter, self-help materials were at least 3 times more cost-effective than a group cessation program.¹³³ A 2004 study showed that relapse-prevention booklets were more effective and thus more cost-effective than increasing contact with a healthcare provider.¹³⁴

Workplace Setting

The Cochrane review on smoking cessation in the workplace suggests that few cost-effectiveness analyses have been done within that setting.¹³⁵ Employers instead have been relying on the extensive cost-benefit literature to motivate their corporate policies concerning cessation programs.¹³⁶ A recent Nova Scotia report suggested that 1 dollar of investment in cessation programs could yield nearly 9 dollars in long-term benefits.¹³⁷

The use of bupropion has been one intervention assessed in workplaces. A study by Halpern and others showed that every \$1.00 spent on bupropion treatment returned \$5.00 to \$6.50 in direct and indirect savings.¹³⁸ A 2004 randomized trial confirmed a positive rate of return from such therapy.¹³⁹

¹³¹ Elixhauser A. The costs of smoking and the cost effectiveness of smoking-cessation programs. *Journal of Public Health Policy*. 1990; 11(2): 218-37. Results summarized in Mudde A, De Vries H. The reach and effectiveness of a national mass media-led smoking cessation campaign in The Netherlands. *American Journal of Public Health*. 1999; 89(3): 346-50.

¹³² Altman D, Flora J, Fortmann S, Farquhar J. The cost-effectiveness of three smoking cessation programs. *American Journal of Public Health*. 1987; 77(2): 162-5.

¹³³ Mudde A, de Vries H, Strecher V. Cost-effectiveness of smoking cessation modalities: comparing apples with oranges? *Preventive Medicine*. 1996; 25(6): 708-16.

¹³⁴ Brandon T, Meade C, Herzog T et al. Efficacy and cost-effectiveness of a minimal intervention to prevent smoking relapse: dismantling the effects of amount of content versus contact. *Journal of Consulting & Clinical Psychology*. 2004; 72(5): 797-808.

¹³⁵ Moher M, Hey K, Lancaster, T. Workplace interventions for smoking cessation Cochrane Tobacco Addiction Group *Cochrane Database of Systematic Reviews*. 3, 2004.

¹³⁶ Parrott S, Godfrey C, Raw M. Costs of employee smoking in the workplace in Scotland. [Journal Article] *Tobacco Control*. 2000; 9(2): 187-92.

¹³⁷ *Cost of Tobacco in Your Workplace*. Available at <http://cancercare.ns.ca/media/documents/TobaccoInWorkplace.pdf> (accessed January 2005). This figure was derived from a 1996 simulation model described in Warner K, Smith R, Smith D, Fries B. Health and economic implications of a work-site smoking-cessation program: a situation analysis. *Journal of Occupational & Environmental Medicine*. 1996; 38(10): 981-92.

¹³⁸ Halpern M, Khan Z, Young T, Battista C. Economic model of sustained-release bupropion hydrochloride in health plan and work site smoking-cessation programs. *American Journal of Health-System Pharmacy*. 2000; 57(15): 1421-9.

¹³⁹ Javitz H, Swan G, Zbikowski S et al. Return on investment of different combinations of bupropion SR dose and behavioral treatment for smoking cessation in a health care setting: an employer's perspective. *Value in Health*. 2004; 7(5): 535-43.

School Setting

The literature on cost-effectiveness of tobacco control in school settings is, if anything, even more limited than for workplaces. One study of a “social influence” program called Project Toward No Tobacco Use (TNT), which in fact demonstrated only marginal effectiveness, apparently still produced a cost-saving result upon economic analysis.¹⁴⁰ A Canadian cost-benefit analysis of school programs confirms such a conclusion; assuming that a modest 4% reduction in smoking prevalence was maintained indefinitely, the benefit-cost ratio would be 15.4, which translates into lifetime savings of \$17,400 (Can) per person.¹⁴¹

The main concern about school-based prevention strategies is that the outcomes seem to dissipate in 1 to 4 years; in other words, youth smoking initiation is only delayed, not prevented. Nevertheless, a simulation model assuming a 30% effectiveness that dissipated in 4 years still suggested a cost-effectiveness of around \$20,000 per QALY.¹⁴²

Hospital and Community Pharmacy Settings

Two hospital-based smoking cessation programs have been evaluated for cost-effectiveness. At the Mayo Clinic, a non-physician counsellor developed an individual nicotine dependence treatment plan, which could include NRT, follow-up, group therapy, and even an inpatient program. The cost-effectiveness was \$6,828 per life-year saved.¹⁴³

At another centre, the intervention was more modest, featuring a video, self-help material, and follow-up calls. The incremental cost per quitter was \$3,697 and the incremental cost per life-year saved was \$3,680. The researchers maintained that much larger economies could be achieved if the program was replicated among more participants.¹⁴⁴

A pharmacist-supported approach to cessation was compared to self-directed methods, yielding the results in the following table for incremental costs per additional quitter.¹⁴⁵

<i>Cessation aid</i>	<i>Incremental cost (US dollars)</i>
None ('cold turkey')	\$236
Nicotine patch	\$936
Nicotine gum	\$1,232
Bupropion	\$1,150

¹⁴⁰ Wang L, Crossett L, Lowry R et al. Cost-effectiveness of a school-based tobacco-use prevention program. *Archives of Pediatrics & Adolescent Medicine*. 2001; 155(9): 1043-50.

¹⁴¹ Stephens T, Kaiserman M, McCall D, Sutherland-Brown C. School-based smoking prevention: economic costs versus benefits. *Chronic Diseases in Canada*. 2000; 21(2).

¹⁴² Tengs T, Osgood N, Chen L. The cost-effectiveness of intensive national school-based anti-tobacco education: results from the tobacco policy model. *Preventive Medicine*. 2001; 33(6): 558-70.

¹⁴³ Croghan I, Offord K, Evans R et al. Cost-effectiveness of treating nicotine dependence: the Mayo Clinic experience. *Mayo Clinic Proceedings*. 1997; 72(10): 917-24.

¹⁴⁴ Meenan R, Stevens V, Hornbrook M et al. Cost-effectiveness of a hospital-based smoking cessation intervention. *Medical Care*. 1998; 36(5): 670-8.

¹⁴⁵ Tran M, Holdford D, Kennedy D, Small R. Modeling the cost-effectiveness of a smoking-cessation program in a community pharmacy practice. *Pharmacotherapy*. 2002; 22(12): 1623-3.

A pharmacist program in the UK, focusing on counselling without cessation aids, demonstrated costs per life-year saved of £197 (\$457 Can) to £351 (\$814) for men, and £181 (\$420 Can) to £772 (\$1,791 Can) for women.¹⁴⁶

Pregnant Women

Programs targeted at pregnant women who smoke tend to be analysed from a cost-benefit approach, mainly looking at the health care cost savings from reducing the number of low birth weight babies.¹⁴⁷ A 1999 study demonstrated that even a 1% drop annually in the prevalence of pregnant women smokers in the US would save half a billion dollars in costs over 7 years.¹⁴⁸ In an older study, a low-intensity program of brief counselling was calculated to produce \$6 of savings for every \$1 invested.¹⁴⁹ Home-based self-help programs were evaluated 20 years ago and found to produce savings 2 to 3 times that of the program costs.^{150,151} The cost-benefit ratio can be improved by adding components such as follow-up letters and social support.¹⁵² Early cost-effectiveness studies in this area determined that pregnancy-specific self-help materials were superior to generic cessation information.¹⁵³

The cost-effectiveness literature, noted to be lacking in 1988,¹⁵⁴ still seems remarkably scarce. Although not quite a full cost-effectiveness analysis, some studies have estimated the “break even” point for a cessation program with pregnant women; with moderate assumptions, the figures ranged from \$32 to \$80 per participant.^{155,156}

¹⁴⁶ Crealey G, McElroy J, Maguire T, O'Neill C. Costs and effects associated with a community pharmacy-based smoking-cessation programme. *Pharmacoeconomics*. 1998; 14(3): 323-33.

¹⁴⁷ Cohen D, Fowler G. Economic implications of smoking cessation therapies: a review of economic appraisals. *Pharmacoeconomics*. 1993; 4(5): 331-44.

¹⁴⁸ Lightwood J, Phibbs C, Glantz S. Short-term health and economic benefits of smoking cessation: low birth weight. *Pediatrics*. 1999; 104(6): 1312-20.

¹⁴⁹ Marks J, Koplan J, Hogue C, Dalmat M. A cost-benefit/cost-effectiveness analysis of smoking cessation for pregnant women. *American Journal of Preventive Medicine*. 1990; 6(5): 282-9. The conclusions of this study with reference to low birthweight costs were confirmed by the Centres for Disease Control. Data summarized at http://www.cdc.gov/tobacco/research_data/economics/health_econ_impact.pdf (accessed January 2005).

¹⁵⁰ Ershoff D, Aaronson N, Danaher B, Wasserman F. Behavioral, health, and cost outcomes of an HMO-based prenatal health education program. *Public Health Reports*. 1983; 98(6): 536-4.

¹⁵¹ Ershoff D, Quinn V, Mullen P, Lairson D. Pregnancy and medical cost outcomes of a self-help prenatal smoking cessation program in a HMO. *Public Health Reports*. 1990; 105(4): 340-7.

¹⁵² Windsor R, Lowe J, Perkins L et al. Health education for pregnant smokers: its behavioral impact and cost benefit. *American Journal of Public Health*. 1993; 83(2): 201-6.

¹⁵³ Windsor R, Warner K, Cutter G. A cost-effectiveness analysis of self-help smoking cessation methods for pregnant women. *Public Health Reports*. 1988; 103(1): 83-8.

¹⁵⁴ Windsor R, Warner K, Cutter G. A cost-effectiveness analysis of self-help smoking cessation methods for pregnant women. *Public Health Reports*. 1988; 103(1): 83-8.

¹⁵⁵ Shipp M, Croughan-Minihane M, Petitti D, Washington A. Estimation of the break-even point for smoking cessation programs in pregnancy. *American Journal of Public Health*. 1992; 82(3): 383-90.

¹⁵⁶ Hueston W, Mainous A, Farrell J. A cost-benefit analysis of smoking cessation programs during the first trimester of pregnancy for the prevention of low birthweight. *Journal of Family Practice*. 1994; 39(4): 353-7.

A unique study, relevant to this area and to the topic of prevention detailing, showed that an “education outreach” visit to health professionals was cost-effective compared to direct-mail strategies for promoting cessation among pregnant women smokers.¹⁵⁷

Finally, recent work has confirmed that pregnant women who smoke are more sensitive to tobacco product prices than the general population, demonstrating price elasticities of -0.5 to -0.7.¹⁵⁸ That is, every 10% increase in price would result in a 5-7% decrease in cigarette consumption. One study pegged the responsiveness even higher, suggesting that a 10% increase in cigarette price would increase the probability of a woman quitting by 10%; a similar effect was noted on the prevention of relapse.¹⁵⁹

Combined Smoking Interventions

The difficulty of isolating cost-effectiveness in multi-component programs was already noted in the discussion of community-wide initiatives above. A recent World Health Organization report takes a different approach, calculating the aggregate cost-effectiveness when interventions are combined. The following table offers a comparison of cost-effectiveness for various approaches to tobacco control, and the synergies that can be created when interventions are combined; though the figures apply to the most developed countries of Europe, the results are largely transferable to the Canadian context.¹⁶⁰

<i>Intervention(s)</i>	<i>Cost / DALY (US\$)</i>
A. Tax increase to 89% of retail price	\$13
B. Clean indoor air enforcement	\$358
C. Comprehensive advertising ban	\$189
D. Information dissemination	\$337
E. NRT / counselling	\$2,164
A plus D	\$45
A plus B plus D	\$79
A plus C plus D	\$58
A plus C	\$28
A plus B plus C	\$63
A plus B plus C plus D	\$90
A plus B plus C plus D plus E	\$274

¹⁵⁷ McParlane E, Mullen P, DeNino L. The cost effectiveness of an education outreach representative to OB practitioners to promote smoking cessation counselling. *Patient Education & Counselling*. 1987; 9(3): 263-74.

¹⁵⁸ Ringel J, Evans W. Cigarette taxes and smoking during pregnancy. *American Journal of Public Health*. 2001; 91(11): 1851-6.

¹⁵⁹ Colman G, Grossman M, Joyce T. The effect of cigarette excise taxes on smoking before, during and after pregnancy. *Journal of Health Economics*. 2003; 22(6): 1053-72.

¹⁶⁰ WHO European Strategy for Smoking Cessation Policy. World Health Organization, revised 2004.

Conclusion

In 2003, the World Health Organization in Europe highlighted all 5 interventions found in the final category of the preceding table, namely, price increases through higher taxes, smoking restrictions, advertising and promotion bans, consumer education campaigns, and smoking cessation therapies. After 40 years of global tobacco control experience and evaluation, the authors of that report maintained that this list represented the key priorities for any public health program related to smoking.¹⁶¹ *In a completely independent process of exhaustive research, the BC Healthy Living Alliance arrived at precisely the same 5 priorities* (see the *Conclusion* of our previous report). Thus, the extremely low cost per DALY of US\$274 for a comprehensive, integrated and sustained program of tobacco control, one aimed squarely at reducing smoking prevalence and concomitant chronic disease, provides a further powerful incentive to move forward with significant public investment in the health of British Columbians.

The extremely low cost of \$274 per year of life saved for a comprehensive, integrated and sustained program of tobacco control provides a further powerful incentive to move forward with significant public investment in this area.

¹⁶¹ Gilbert A, Cornuz J. Which are the most effective and cost-effective interventions for tobacco control? World Health Organization, 2003.

BC's Current Tobacco Control Strategy

The Ministry of Health Services in BC published *Targeting Our Efforts, BC's Tobacco Control Strategy*, in May, 2004. The plan follows the framework of *New Directions for Tobacco Control in Canada—A National Strategy*.¹⁶² The four goals of both the national and provincial programs are:

- preventing tobacco use among young people
- persuading and helping smokers to stop using tobacco products
- eliminating exposure to second-hand smoke
- shaping social attitudes to reflect the hazardous, addictive nature of tobacco

The first three goals are consistent with the outline of tobacco control interventions provided in *Risk Factor Interventions: An Overview of Their Effectiveness*.

The last goal, sometimes called denormalization, has been featured in various places in the effectiveness report. The BC plan acknowledges that its denormalization efforts will focus more on the use of tobacco products and their harmful effects rather than on the unfair or manipulative practices of the tobacco industry.¹⁶³ This limitation does not fit with the best evidence currently available. Even as it stands, the fourth goal is perhaps supposed to be further developed, as it is yet not reflected in the explicit targets or objectives of the provincial strategy.¹⁶⁴

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The intention of *Targeting Our Efforts* is precisely to *target*, to focus efforts on three main objectives: stop young people from starting to use tobacco; encourage and assist smokers to quit, especially those in three large population cohorts with the highest smoking rates; and protect people, especially infants and children, from exposure to second-hand smoke. The organization of interventions in our effectiveness report closely matches these objectives, making the application of our data and evaluating the provincial government strategy a relatively simple process.¹⁶⁵ Using such effectiveness data in the ongoing prevention planning process should be a high priority, given the government's stated principle of using *best practices*, and then evaluating the resulting outcomes, in order to make *best use of limited resources*.

¹⁶² Source: http://www.hc-sc.gc.ca/hecs-sesc/tobacco/policy/new_directions/index.html (accessed November 2004).

¹⁶³ Ministry of Health Services. *Targeting Our Efforts: BC's Tobacco Control Strategy*, 2004, p. 4.

¹⁶⁴ Although denormalization is woven into the overarching principles of the strategy, as well as the vision for a Tobacco Free BC.

¹⁶⁵ The main deviations in the present report from the BC strategy is the lack of focus on young adult and middle-aged target groups, and inclusion of two other high-risk target groups, pregnant women and the mentally ill who are smokers (though pregnant women do appear in BC's action plan).

Inventory of Proposed Government Interventions

The strategies (and some outcomes) suggested around each objective in *Targeting Our Efforts* comprise:

➤ *Stop Young People from Starting to Use Tobacco*

- place tobacco prevention materials in all schools
- improve websites targeted to young people
- stronger legislation to limit youth access to tobacco
- eliminate smoking on school grounds
- increase awareness of the dangers of spit tobacco
- promote Tobacco Free Sports

➤ *Encourage and Assist Tobacco Users to Quit*

- improve access to telephone cessation help-lines
- develop a cessation website
- work with young people to develop age-specific cessation tools
- promote cessation programs for pregnant women and new mothers
- develop cessation programs at post-secondary schools
- expand the *Honour Your Health Challenge* to more aboriginal communities
- provide and promote the right cessation tools for the right people

➤ *Protect British Columbians from Exposure to Second Hand Smoke*

- encourage smoke-free homes, vehicles, and public places, especially in reference to infants and children.
- ensure a tobacco-free 2010 Olympics.
- promote a Tobacco-free BC

Additional action plans are implied in the opening principles and in vision portrayed at the end of the report for a *Tobacco-free BC*

- provide mass media education and /or widely-distributed self-help materials offering information about the health effects of tobacco and effective interventions for individuals
- Offer universal smoking prevention programs for every child in schools and / or in the community
- hold the tobacco industry accountable
- maintain tobacco taxes at high levels

Evaluating the BC Tobacco Control Strategy

A grid of five major intervention categories for tobacco control appears at the end of our previous report, *Risk Factor Interventions: An Overview of Their Effectiveness*. It represents what the effectiveness evidence says over an assessment period of 40 years, the “irreducible minimum” for any serious response to smoking and health. This is not only confirmed by our comprehensive literature survey, but by reviewers and policy-makers both global (e.g., World Health Organization) and home-grown

(e.g., Nova Scotia). As such, the grid provides a helpful measuring stick to test any tobacco control policy. The five intervention categories are:

1. Increased Taxation on Tobacco Products

“Tax is maintained at a high level” appears in the government’s strategy, but only as the last statement in the Vision for a tobacco-free BC. The approach involving taxes needs to be strengthened in at least three ways:

- higher prominence and consistent emphasis; though taxation appears as a category of interest on page 3, it does not appear in the list of vital strategies at the end of that same page.
- the taxation initiative needs to be stated as a proactive plan, with a rationale that refers to its potential role in some of the province’s avowed objectives and target groups, from youth to pregnant women (both of which have been shown to be very “price sensitive”).
- most importantly, the approach needs to move from maintaining the status quo to a clear and unequivocal commitment to significantly *increased* taxes on cigarettes and other tobacco products.

2. Increased Control of Tobacco Promotion

Again, the statement “hold the tobacco industry accountable” appears as the second to last line in the body of the government’s report. However, the government’s strategy does not include one of the acknowledged cornerstones of curtailing the industry’s influence, namely, a sustained and responsive program to stop tobacco marketing. The need to be responsive arises because the industry has shown itself both willing and able to circumvent any new promotion controls.

The uptake of smoking among adolescents is vital to the perpetuation of tobacco companies, and thus the industry shows great creativity in getting the pro-smoking message across to teens (e.g., product placement in movies). Thus, there needs to be a commitment to strengthen the limitations on marketing to young people in particular; this is probably more important than the government’s stress on youth access to tobacco, for which the effectiveness evidence is more equivocal.

The government’s participation in and promotion of the World Health Organization’s *Tobacco Free Sports/Play it Clean* initiative is laudable, but it needs to focus on more than the importance of not smoking in terms of athletic performance. The government should also underline the dangers of tobacco companies sponsoring sporting events. This clearly was on the mind of Dr. Brundtland, Director-General of the World Health Organization, when he launched *Play it Clean* in 2001:

Tobacco companies pump hundreds of millions of dollars per year into sponsoring sports events worldwide. They claim they are sponsoring sports out of a sense of philanthropic duty. Their internal documents tell another story. They reveal that tobacco companies use sports sponsorship as an avenue for advertising their products. Such

*marketing tactics are remarkably effective in increasing tobacco sales and recruiting new smokers, especially among children and youth.*¹⁶⁶

3. Increased Counter-advertising and Other Media Advocacy.

Although noted in the *Targeting* report as a strategy used and advocated by others, it is significant and surprising that counter-advertising is not explicitly highlighted in the government's Priorities for Action (Appendix 1). A commitment to some kind of mass media education may be interpolated within the report (e.g., smokers having "access to a range of information" and "improve and promote website materials for youth"). However, giving full support to cutting-edge advertisements against the tobacco industry and smoking, and to sophisticated social marketing strategies to support healthy choices, needs to be more front and centre. Marketing works (see the previous point), and BC needs to make sure that its marketing is working for the cause of not smoking in the province. The messages need to be consistent, sustained and integrated with other prevention and cessation programs in schools, workplaces, and high-risk groups. What will be the government's actual commitment of resources to make sure anti-tobacco media advocacy is high-quality and uninterrupted?

4. Increased Efforts to Enforce or Encourage Smoke-free Places

The report calls for protection from second-hand smoke, in particular, that "no child or worker is exposed to second-hand smoke." Furthermore, BC's Tobacco Control Strategy seeks to "promote a smoke-free BC". No details are provided, however, of how this might be accomplished.

Current research indicates that there are no negative economic consequences associated with smoking bans in the hospitality industry. What are BC's plans in this area? How will the challenges be met of expanding smoking bans into traditional zones of private, voluntary activity such as homes and automobiles, especially when children are present?

5. Increased Involvement of Primary Care Providers in Health Promotion and Smoking Cessation

This is another large gap in the government's strategy. Although it is good that public health approaches to cessation are highlighted (e.g., self-help materials, quitlines, school curriculum), not all of them have proven track records of effectiveness (e.g., websites). Further, as a strongly effective and cost-effective ally in the cause, clinical cessation measures should have a higher profile in the report.

Several strategic matters need to be addressed, including how to capitalize on the present momentum towards primary healthcare reform, and how to not miss the opportunities for smoking intervention represented by those dealing with physical and mental illness. What are the best options for enhancing the commitment of physicians and other healthcare professionals to smoking cessation through

¹⁶⁶ The text of the speech available at http://www.who.int/director-general/speeches/2001/english/20011122_tobacco_freesportgeneva.html (accessed January 2005).

counselling, pharmacological aids, and other means? In particular, what is the government's position on reimbursing preventive services in primary care?

Denormalization

It is honest, at least, for the government to be upfront about not focusing their denormalization energies on debunking the tobacco industry, but it is a strange and disappointing position, one that at least should be supported by some explanation. Woven into the government's strategies are some elements which will help in a denormalization effort, e.g., eliminating smoking on school grounds and other public places. But some of these approaches are no longer "cutting-edge." They either are highly acceptable to the public or have largely already been achieved; thus, the currency of such efforts in strengthening denormalization is deflated. What will be the government's commitment to explore and enter new frontiers of denormalizing the image of tobacco and smoking, and to keep up with the ever-changing public relations target that tobacco companies represent?

The First Steps Towards a Comprehensive Strategy

The emphasis in the government's report on targeting efforts is a good one. The problems related to smoking are vast, and the resources are, as always, limited. Looking at high-risk populations such as pregnant women (and, by extension, their babies) and aboriginals is important and useful, though the challenges involved in cessation efforts among such groups need to be acknowledged.

Several age group targets are noted, teens (implicitly), young adults, adults up to middle-age; if one includes baby-boomers (which they will probably insist upon), then it seems odd to only leave out older adults and the elderly—which means we are quickly back to the whole population.

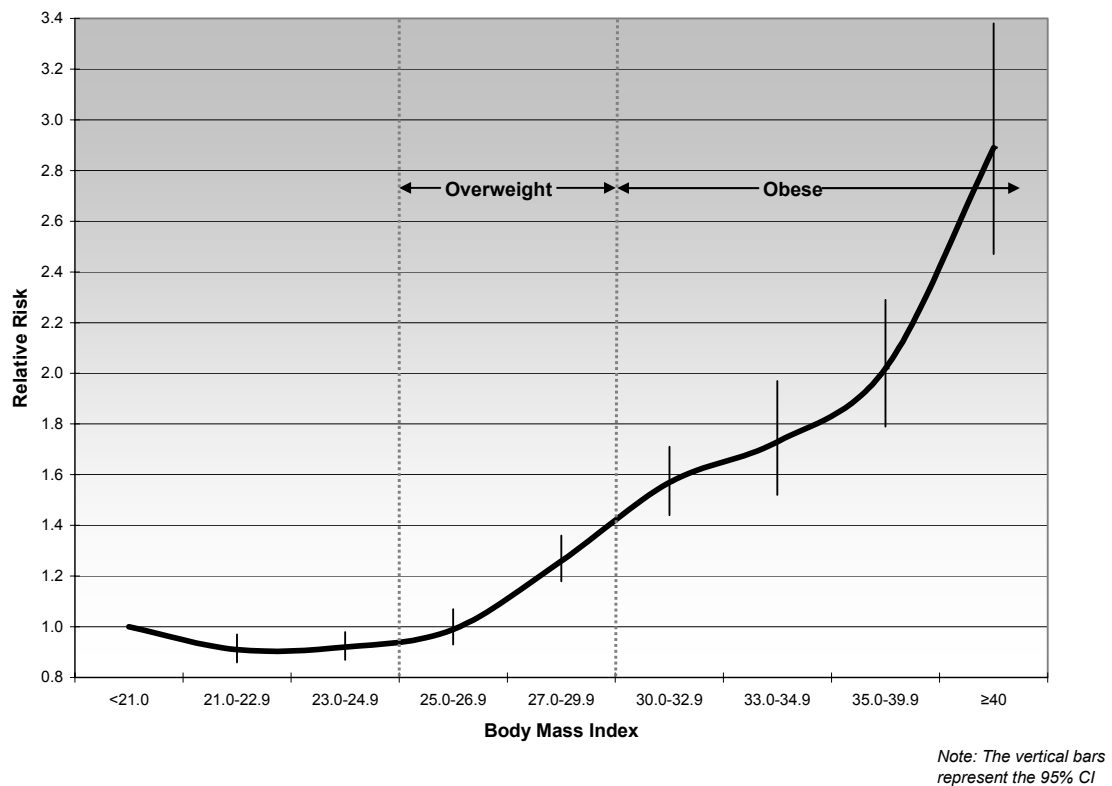
A more significant stratification, and one missing from the report, is reflected in the higher smoking rates among people with less economic means or education. This is the topic of social equity in health promotion, which is increasingly of concern in other jurisdictions in the developed and developing world. What is the government's commitment to make sure no one is left behind as we move towards a tobacco-free Olympics?

Improving Health through Obesity Control

Health Consequences of Obesity and Overweight

Recent research has shown a clear relationship between increased weight and an elevated risk of premature death. Hu and colleagues,¹⁶⁷ for example, report the results of a 24 year follow-up period for 116,564 women in the United States. When these women entered the study in 1976 they were between the ages of 30 and 55 and were free of known cancers or cardiovascular disease. After adjusting for age, smoking status, parental history with respect to coronary heart disease, menopausal status and hormone use, and alcohol consumption, they identified the relationship between BMI and the relative risk of premature death from all causes, as shown on the following chart.

**Body-Mass Index and Relative Risk of Death
From All Causes: Women**



One of the results from this study is that women with a BMI of between 25.0 and 26.9, often classified as part of the overweight group, do not have a statistically¹⁶⁸

¹⁶⁷ Hu F, Willett W, Tricia L et al. Adiposity as compared with physical activity in predicting mortality among women. *New England Journal of Medicine*. 2004; 351: 2694-703.

¹⁶⁸ As indicated by the overlap in the 95% confidence interval between this group and those of a 'healthy' weight.

elevated risk of premature mortality. Beyond a BMI of 27.0, the general pattern is clearly increased risk of premature death with increased BMI.

In addition, Hu and colleagues established that *both* increased weight and reduced physical activity are “strong and independent predictors of death.” That is, an individual who is overweight and physically *active* has a significantly higher risk of death from all causes compared with an individual of healthy weight who is physically *active*. This relationship holds for the risk of death specifically from cardiovascular diseases as well as cancers, in addition to deaths from all causes. The concept of fitness mitigating the effects of obesity has thus been seriously called into question.

The relationship between obesity and physical fitness as identified by Hu et al is noted on the following table created from their results.

Relative Risk of Death By BMI and Physical Activity			
All Causes			
	Physical Activity (hr/wk)		
	≥3.5	1.0 - 3.4	<1.0
BMI <25.0	1.00	1.18	1.55
BMI 25.0 - 29.9	1.28	1.33	1.64
BMI ≥30	1.91	2.05	2.42
Cardiovascular Diseases			
	Physical Activity (hr/wk)		
	≥3.5	1.0 - 3.4	<1.0
BMI <25.0	1.00	1.51	1.89
BMI 25.0 - 29.9	1.58	2.06	2.52
BMI ≥30	2.87	4.26	4.73
Cancers			
	Physical Activity (hr/wk)		
	≥3.5	1.0 - 3.4	<1.0
BMI <25.0	1.00	1.09*	1.32
BMI 25.0 - 29.9	1.22	1.20	1.39
BMI ≥30	1.57	1.44	1.68
* Not significant, confidence interval includes 1.0			

Based on their large prospective study, Hu et al found that women with a (healthy) BMI of <25.0 but who were inactive had a 55% increased all cause mortality compared to women with a BMI of <25.0 who engaged in moderate to vigorous physical activity at least 3.5 hours per week. For cardiovascular disease and cancers, premature mortality increased by 89% and 32% respectively.

While the study by Hu et al is based on results for females, similar relationships exist in men.^{169,170}

The large prospective study by Hu et al confirms the results found in numerous earlier smaller studies. Katzmarzyk and co-authors¹⁷¹ reviewed the approximately 170 articles published prior to February of 2003 and, based on their meta-analysis, determined that “both physical activity and adiposity¹⁷² are important determinants of mortality risk.” Furthermore, “physically active individuals have a lower risk of mortality by comparison to physically inactive peers, independent of level of adiposity.”

Peeters et al¹⁷³ quantified the impact of overweight and obesity on life expectancy in individuals at age 40. Female non-smokers lose 3.3 years of life expectancy if they are overweight (BMI 25.0 – 29.9) and 7.2 years if they are obese (BMI ≥ 30.0). Similar results are seen for male non-smokers, at 3.1 and 6.7 years respectively. In a follow-up study, Peeters and colleagues¹⁷⁴ calculated that obesity in non-smoking adults accounted for a reduction of five to six disability free years after age fifty.

The following table is based on work by Katzmarzyk and Janssen.¹⁷⁵ It summarizes the types of diseases most often associated with obesity (BMI ≥ 30.0), as well as the relative risk, 95% confidence interval and population attributable fraction (PAF) percent. The PAF is the proportion of the disease in the exposed group due to the exposure. For example, 15.4% of coronary heart disease in Canada is directly attributable to obesity.

¹⁶⁹ Baik I, Ascherio A, Rimm E et al. Adiposity and mortality in men. *American Journal of Epidemiology*. 2000; 152: 264-71.

¹⁷⁰ Ajani U, Lotufo P, Gaziano J et al. Body mass index and mortality among US male physicians. *Annals of Epidemiology*. 2004; 14: 731-39.

¹⁷¹ Katzmarzyk P, Janssen I, Ardern C. Physical inactivity, excess adiposity and premature mortality. *Obesity Reviews*. 2003; 4: 257-90.

¹⁷² Adiposity is a measure of body fat.

¹⁷³ Peeters A, Barendregt J, Willekens F et al. Obesity in adulthood and its consequences for life expectancy: A life-table analysis. *Annals of Internal Medicine*. 2003; 138: 24-32.

¹⁷⁴ Peeters A, Bonneux L, Nusselder W et al. Adult obesity and the burden of disability throughout life. *Obesity Research*. 2004; 12: 1145-51.

¹⁷⁵ Katzmarzyk P, Janssen I. The economic cost associated with physical inactivity and obesity in Canada: An update. *Canadian Journal of Applied Physiology*. 2004; 29: 90-115.

**Relative Risk Estimates
and Population Attributable Fraction For Obesity
Canada, 2001**

Disease	Summary RR	95% CI	PAF%
Coronary heart disease	2.24	2.04 - 2.45	15.4%
Stroke	1.50	1.28 - 1.77	6.8%
Hypertension	4.50	4.15 - 4.84	34.0%
Colon cancer	1.45	1.23 - 1.71	6.2%
Postmenopausal breast cancer	1.47	1.40 - 1.54	6.5%
Type 2 diabetes	3.73	3.45 - 4.06	28.6%
Gall bladder disease	3.33	2.86 - 3.85	25.5%
Osteoarthritis	1.99	1.76 - 2.24	12.7%

In determining the prevalence of obesity in Canada, the authors used the 2001 Canadian Community Health Survey (CCHS) results. Based on their analysis, Katzmarzyk and Janssen found that 34% of hypertension, 28.6% of diabetes, 25.5% of gallbladder disease, and so on, was directly attributable to obesity in 2001 in Canada.

Health Consequences of Physical Inactivity

The following table, based on work by Katzmarzyk and Janssen¹⁷⁶, summarizes the types of diseases most often associated with physical inactivity. Included in the table are the relative risk, 95% confidence interval and population attributable fraction (PAF). The PAF is the proportion of the disease in the exposed group due to the exposure. For example, 19.4% of coronary heart disease in Canada is directly attributable to physical inactivity.

**Relative Risk Estimates
and Population Attributable Risks For Physical Inactivity
Canada, 2001**

Disease	Summary RR	95% CI	PAF%
Coronary heart disease	1.45	1.38 - 1.54	19.4%
Stroke	1.60	1.42 - 1.80	24.3%
Hypertension	1.30	1.16 - 1.46	13.8%
Colon cancer	1.41	1.31 - 1.53	18.0%
Breast cancer	1.31	1.23 - 1.38	14.2%
Type 2 diabetes	1.50	1.37 - 1.63	21.1%
Osteoarthritis	1.59	1.40 - 1.80	24.0%

In determining the prevalence of physical inactivity in Canada, the authors used the 2001 Canadian Community Health Survey (CCHS) results. Based on their analysis, Katzmarzyk and Janssen found that 24.3% of strokes, 24.0% of osteoarthritis, 21.1% of type 2 diabetes, and so on, were directly attributable to physical inactivity in 2001 in Canada.

¹⁷⁶ Katzmarzyk P, Janssen I. The economic cost associated with physical inactivity and obesity in Canada: An update. *Canadian Journal of Applied Physiology*. 2004; 29: 90-115.

In developing their results, Katzmarzyk and Janssen surveyed the available literature. They note that since studies on physical inactivity usually include obesity as a covariate in the analysis, the “disease risk and health care costs (of physical inactivity) can be considered to be independent of the effects of obesity”.

Besides the reduced risk of the diseases noted in the table above, there are other benefits associated with increased physical activity. Higher rates of depression, for example, are associated with a sedentary lifestyle. Chen and Millar¹⁷⁷ found that sedentary Canadians had a 60% increased risk of a depressive episode, compared to Canadians who engaged in moderate physical activity. Furthermore, Spirduso and Cronin¹⁷⁸ found that long-term physical activity is related to postponed disability and independent living in elderly individuals.

Health Consequences of Unhealthy Diet

The health consequences associated with overweight/obesity and physical inactivity are well established. The relationship between the consumption of vegetables and fruit and health consequences, on the other hand, is less clear.

During the last decade, researchers have estimated that approximately 2.8% – 4.4% of the burden of disease in developed countries can be attributed to low vegetable and fruit intake, primarily through a protective function for cardiovascular diseases and cancers.¹⁷⁹ In developed countries, an estimated 28% of ischemic heart disease and 18% of ischemic stroke could be attributable to low vegetable and fruit intake.¹⁸⁰ In the early 1980s Doll and Peto estimated that approximately 35% of cancers were attributable to diet (excluding alcohol).¹⁸¹

More recently, the protective role of vegetable and fruit consumption has been called into question, particularly for cancers. Riboli and Norat¹⁸² provide a meta-analysis of the available literature on the protective effect of vegetables and fruits on cancer risk. They found an important difference in results depending on the type of study methodology used. Retrospective case-control studies indicated that vegetable consumption was protective against cancers of the oesophagus, breast, lung, stomach

¹⁷⁷ Chen J, Millar W. Health effects of physical activity. *Health Reports*. 1999; 11(1): 21-30.

¹⁷⁸ Spirduso W, Cronin D. Exercise dose-response effects on quality of life and independent living in older adults. *Medicine & Science in Sports & Exercise*. 2001; 33(6): S598-S608.

¹⁷⁹ See for example

World Health Organization. *The World Health Report 2002. Reducing Risks, Promoting Healthy Life*. Geneva: WHO, 2002.

National Institute of Public Health. *Determinants of the Burden of Disease in the EU*. Stockholm: NIPH, 1997.

Tobias M. *The Burden of Disease and Injury in New Zealand*. Public Health Intelligence Occasional Bulletin No. 1. Wellington: New Zealand Ministry of Health, 2001.

Mathers C, Vos T, Stevenson C. *The Burden of Disease and Injury in Australia*. AIHW Catalogue No. PHE 17. Canberra: Australian Institute of Health and Welfare (AIHW), 1999.

Vos T, Begg S. *The Victorian Burden of Disease Study: Mortality*. Melbourne: Public Health and Development Division, Victorian Government Department of Human Services, 1999.

¹⁸⁰ World Health Organization. *The World Health Report 2002. Reducing Risks, Promoting Healthy Life*. Geneva: WHO, 2002.

¹⁸¹ Doll R, Peto R. *The Causes of Cancer*. Oxford: University Press, 1981.

¹⁸² Riboli E, Norat T. Epidemiologic evidence of the protective effect of fruit and vegetables on cancer risk. *American Journal of Clinical Nutrition*. 2003; 78: 559S-569S.

and colorectum, while fruit consumption was protective against cancers of the mouth and pharynx, larynx, oesophagus, lung, stomach, and colorectum. The meta-analysis of prospective cohort studies, on the other hand, indicated that the only protective function was against lung and bladder cancers, and then only for fruit consumption.

Hung and colleagues¹⁸³ published the results of a major prospective cohort study assessing the protective role of vegetable and fruit consumption on cancers and cardiovascular diseases in November of 2004. This study was based on over 110,000 individuals followed for up to 22 years. After adjusting for total caloric intake, age, smoking status, alcohol use, personal history of hypertension, hypercholesterolemia, or diabetes, and (for women only) family history of breast cancer, menopausal status, and use of hormone replacement therapy, they found no protective effect associated with either vegetable or fruit consumption and risk of cancers. Another large prospective study in Europe has found that vegetable and fruit consumption is not associated with the risk of breast cancer.¹⁸⁴

Why this discrepancy between retrospective case-control and prospective cohort studies? Riboli and Norat¹⁸⁵ suggest that the differences may be due to recall bias or the difficulties associated with accurately measuring food intake. In case-control studies, individuals are asked to recall their dietary patterns in the past with this recall potentially biased by the diagnosis of cancer. A further source of bias may be the difficulty of finding volunteers for the control group in case-control studies. Individuals who do volunteer may be more health conscious and thus consume more fruits and vegetables than those who do not volunteer.¹⁸⁶

The issue of accurately measuring food intake is also raised by Schatzkin and Kipnis¹⁸⁷ in an editorial published in the same journal issue as the Hung et al study. They note that “the exposure assessment tool - food frequency questionnaire (FFQ) - that is used to measure diet, including fruit and vegetable intake, is subject to substantial error, both random and systematic. Is this error sufficient to obscure an existing fruit and vegetable-cancer association?”

While the Hung et al study found no association between increased consumption of vegetables and fruit and a reduced risk of cancers, they did find that vegetable and fruit intake was inversely associated with the risk of cardiovascular disease. Participants eating at least five or more servings of fruits and vegetables per day had a 28% lower risk of cardiovascular disease than those who consumed fewer than 1.5 servings daily. The authors also note that “the clear inverse relation between fruit and vegetable consumption and risk of cardiovascular disease indicates that exposure misclassification cannot account for the lack of an overall association with cancer incidence”.

¹⁸³ Hung H, Joshipura K, Jiang R et al. Fruit and vegetable intake and the risk of major chronic disease. *Journal of the National Cancer Institute*. 2004; 96(21): 1577-84.

¹⁸⁴ Van Gils C, Peeters P, Bueno-de-Mesquita H et al. Consumption of vegetables and fruits and risk of breast cancer. *Journal of the American Medical Association*. 2005; 293: 183-93.

¹⁸⁵ Riboli E, Norat T. Epidemiologic evidence of the protective effect of fruit and vegetables on cancer risk. *American Journal of Clinical Nutrition*. 2003; 78: 559S-569S.

¹⁸⁶ Willett W. Diet and cancer: An evolving picture. *Journal of the American Medical Association*. 2005; 293: 233-4.

¹⁸⁷ Schatzkin A, Kipnis V. Could exposure assessment problems give us wrong answers to nutrition and cancer questions? *Journal of the National Cancer Institute*. 2004; 96(21): 1564-5.

The Hung et al results for cardiovascular disease are similar to the prospective cohort study by Bazzano and colleagues.¹⁸⁸ Bazzano et al report on a study in which 9,608 adults were followed for an average of 19 years. Consuming vegetables and fruits three or more times per day was associated with a 42% lower stroke mortality, a 24% lower ischemic heart disease mortality and a 27% lower cardiovascular disease mortality.

Due to the emerging nature of research in this area, no attempts have been made to estimate the attributable risks associated with reduced consumption of vegetables and fruits, or the potential costs associated with these risks.

Benefits of Weight Loss

Assessing the benefits associated with weight loss is a controversial topic. A number of studies have indicated that fluctuations in weight may actually increase mortality compared to maintaining a steady weight.^{189,190,191} Furthermore, a focus on weight loss may increase the risk of eating disorders.¹⁹² Finally, a number of studies suggest that overweight may be protective in individuals with chronic conditions such as heart failure.¹⁹³

A key issue in the literature is whether the weight loss is intentional or unintentional. Astrup¹⁹⁴ notes that this is “an important methodological problem, because some of the subjects may have suffered from an underlying disease process both causing weight loss and leading to an increased mortality rate”. Results from early studies assessing intentional weight loss in the general population found equivocal associations between weight loss and mortality.¹⁹⁵ These equivocal results were based

¹⁸⁸ Bazzano L, He J, Ogden L et al. Fruit and vegetable intake and risk of cardiovascular disease in US adults: the first National Health and Nutrition Examination Survey epidemiologic follow-up study. *American Journal of Clinical Nutrition*. 2002; 76: 93-9.

¹⁸⁹ Mikkelsen K, Heitman B, Keiding N, Sorensen T. Independent effects of stable and changing body weight on total mortality. *Epidemiology*. 1999; 10: 671-8.

¹⁹⁰ Wannamethee S, Sharper A, Walker M. Weight change, weight fluctuation and mortality. *Archives of Internal Medicine*. 2002; 162: 2575-80.

¹⁹¹ Yaari S, Goldbourt U. Voluntary and involuntary weight loss: Associations with long term mortality in 9,228 middle-aged and elderly men. *American Journal of Epidemiology*. 1998; 148: 546-55.

¹⁹² Burns M, Gavey N. ‘Healthy weight’ at what cost? ‘Bulimia’ and a discourse of weight control. *Journal of Health Psychology*. 2004; 9(4): 549-65.

¹⁹³ Curtis J, Selter J, Wang Y et al. The Obesity Paradox: Body mass index and outcomes in patients with heart failure. *Archives of Internal Medicine*. 2005; 165: 55-61.

¹⁹⁴ Astrup A. Weight loss and increased mortality: epidemiologists blinded by observations? *Obesity Reviews*. 2003; 4: 1-2.

¹⁹⁵ See, for example,

Yaari S, Goldbourt U. Voluntary and involuntary weight loss: Associations with long term mortality in 9,228 middle-aged and elderly men. *American Journal of Epidemiology*. 1998; 148: 546-55.

Diehr P, Bild D, Harris T et al. Body mass index and mortality in non-smoking older adults: the Cardiovascular Health Study. *American Journal of Public Health*. 1998; 88: 623-9.

French S, Folsom A, Jeffrey R, Williamson D. Prospective study of intentional weight loss and mortality in older women: the Iowa Women’s Health Study. *American Journal of Epidemiology*. 1999; 149: 504-14.

largely on observational studies that were not specifically designed to test the hypothesis that intentional weight loss reduces mortality.^{196,197,198}

Two recent prospective studies have assessed the relationship between intentional versus unintentional weight loss and increased mortality in the general population¹⁹⁹ as well as in individuals with diabetes.²⁰⁰ In the general population, *intentional* weight loss is associated with a 24% *lower* mortality rate (compared to those who reported not trying to lose weight and with no weight loss). On the other hand, *unintentional* weight loss was associated with a 31% *higher* mortality rate. When intentionality was not taken into account, overall weight loss was associated with increased mortality, driven by the higher mortality associated with unintentional weight loss. This likely explains findings of the association between weight loss and higher mortality rates in previous research.

Individuals who lose a modest amount of weight, or none at all, experience a lower mortality rate than those not trying to lose weight. *Attempted* weight loss is a marker for healthy behaviours.

Perhaps surprisingly, individuals who tried but were unsuccessful in losing weight also experienced a lower mortality rate. The authors note that the “most plausible explanation for our finding that attempted weight loss was independently associated with reduced mortality is that weight loss attempts are a marker for healthy behaviours.” Further encouragement from this study was that the best result (a 30% reduction in mortality) was observed in those individuals with a modest intentional weight loss of 1-9 kgs.

¹⁹⁶ Astrup A. Weight loss and increased mortality: epidemiologists blinded by observations? *Obesity Reviews*. 2003; 4: 1-2.

¹⁹⁷ Yang D, Fontaine K, Wang C, Allison D. Weight loss causes increased mortality: cons. *Obesity Reviews* 2003; 4: 9-16.

¹⁹⁸ Sorensen T. Weight loss causes increased mortality: pros. *Obesity Reviews*. 2003; 4: 3-8.

¹⁹⁹ Gregg E, Gerzoff R, Thompson T, Williamson D. Intentional weight loss and death in overweight and obese U.S. adults 35 years of age and older. *Annals of Internal Medicine*. 2003; 138: 383-9.

²⁰⁰ Gregg E, Gerzoff R, Thompson T, Williamson D. Trying to loss weight, losing weight, and 9-year mortality in overweight U.S. adults with diabetes. *Diabetes Care*. 2004; 27: 657-62.

Summary of Effective Obesity Control Interventions

Reducing Energy Intake

Changing one's diet is more complex than the more discrete categories of whether one is a smoker or not. A major difference is that, unlike tobacco consumption, eating food is essential to staying alive. Further complicating the scenario is the fact that the most ubiquitous dietary interventions at individual levels (namely, dieting) and in whole populations (*5 A Day* fruit and vegetable campaigns) have produced at best equivocal results.

Nutrition education through mass media and other means can influence the diet of whole populations, though the precise formula for success remains elusive. A region of Finland, for example, has managed to reduce fat consumption and cardiovascular disease. This Finnish program lasted multiple decades, so that sustained, self-perpetuating changes in social norms eventually occurred, similar to the current stigmatization of tobacco in developed countries. In addition, the targeted communities were an integral part of the planning and implementation of the interventions.

Single-focus interventions, such as mass media campaigns to increase vegetable and fruit consumption, have been successful in raising awareness, but not necessarily in changing behaviours.

As with smoking, considerable attention has been placed on possible interventions in the school setting. The conclusion to date is that modest improvements in diet are possible in terms of both fat intake and vegetable and fruit consumption. The most effective interventions have been multi-faceted, incorporating both individual behaviour modification through class curricula and parental support, and environmental changes such as lower prices for healthy food choices in vending machines and the school cafeteria.

Involving families in diet change is vital in both the school and clinical settings.

There are many different modes employed in dietary counselling at the clinical level. Not surprisingly, the most effective counselling occurred over a longer time frame with more appointments and multiple, personalized components designed by specialized clinicians.

What is less clear is precisely which diet, especially which weight loss diet, ought to be recommended by healthcare providers. Dietary treatments to lose weight are both ubiquitous and notorious. A very extensive UK review found little evidence of long-term effectiveness for any diet, though there may be a slight edge for low-fat approaches. Some of the popular commercial weight loss programs use the dynamics of group support to good effect, though data demonstrating long-term results are not available.

Pharmacotherapy and surgery for morbid obesity are generally effective, although side effects can be a problem.

Environmental changes on a more macro level have been suggested, including the following:

- Taxes on foods with a low content of a range of nutrients, e.g. soft drinks.
- Restrictions on advertising, promotion, and sponsorship (especially when directed at young people)
- Nutrition labelling using a standard format for ingredients and quantities per recognized unit weight
- Nutrition signposting based on an agreed standard for fat, fibre, fruit and vegetable content which the consumer can recognize as appropriate in a healthy diet
- Nutrition claims that foster the understanding of the relationship between food and health
- Guaranteed provision of basic nutrient requirements for children in schools

The effectiveness of these interventions is not known. Many authorities are convinced, however, in light of the relative ineffectiveness of interventions geared to individuals, that tackling the obesogenic environment is the most important way forward.

Increasing Energy Expenditure

Interventions to increase physical activity are still at an early stage of assessment.

Early results show that informational approaches, used in isolation, produce at best modest changes in physical activity behaviour.

Approaches that involve sustained contact with a specialist or good telephone follow-up can be effective at increasing energy expenditure. Furthermore, interventions that include a social component, such as walking groups, can be quite effective. School-based physical education enhancements have produced strong results, whereas workplaces, in spite of many different theories and models, have not yet been convincing as an intervention platform.

The availability of places for recreational activity and safe communities are important contributors to increasing physical activity.

Transportation planning and other forms of urban development are just beginning to consider enhanced levels of energy expenditures as part of the larger built environment.

Preventing Overweight

Programs involving both unhealthy eating and exercise are generally more effective at reducing overweight than the individual risk elements targeted on their own. Comprehensive, multidisciplinary approaches to healthy diet and physical activity seem to be the most promising for communities, especially if they are sustained over the long-term.

Keeping weight off in the first place is an especially relevant goal with children, as obesity in younger years leads to more adverse health effects in adults. Also, not putting a pound on is easier than removing a pound later. The most promising form

of overweight prevention and weight reduction with children seems to be decreasing sedentary behaviour and increasing physical activity, with strong support in both the home and school environments.

While taking overweight seriously, caregivers and program leaders need to be on the alert for distorted body consciousness and disordered eating patterns among children and adolescents, especially females. Treatments for full-fledged eating disorders such as anorexia nervosa are not very effective, suggesting again that prevention is the best approach. The latter clearly will depend partly on environmental measures where societal messages concerning “perfect thinness” are counteracted. On the other hand, “fat acceptance” and similar movements must not be allowed to confuse the fact that interventions are truly advisable for unhealthy weight.

Cost-Effectiveness of Obesity Control Interventions

The inventory of health promotion cost effectiveness studies consulted above in the discussion of the economics of tobacco control also reported on the number of studies related to diet and physical activity. The number is not high. Only 8 studies were identified for both risk factor areas up to 2001.²⁰¹ The census provided by Avenell and colleagues in 2004 shows some improvement: of 16 economic studies of obesity treatments retrieved, 7 of them examined cost-effectiveness and another 6 provided a cost utility analysis.²⁰²

The gap in economic analysis reflects the fact that outcome evaluations in the obesity control area are at an early stage, especially compared with the 40-year track record in tobacco control and smoking cessation programs. Without a clear sense of effectiveness, pursuing a cost-effectiveness analysis becomes problematic. Fortunately, the situation is changing somewhat for physical activity, with an increase in economic analysis in recent years, even in the novel area of environmental interventions.

The situation with the cost-effectiveness of “energy intake” control is perhaps worse, with few published studies outside of the topic of bariatric surgery for morbid obesity. This fact simply underlines the need to move forward with interventions in the absence of complete data, with a full commitment to generate evaluations while in the process of implementing “innovative ideas that are ripe for testing.”²⁰³ Or, as a 2001 editorial on health promotion suggested in its title, “we need to know much more, but we know enough to act.”²⁰⁴

We need to know much more, but we know enough to act.

We will follow the format of our previous report on intervention effectiveness, looking at the cost-effectiveness of the two main strategies for intentionally managing obesity, i.e., reducing energy intake and increasing energy expenditure, as well as a combination of both of these in lifestyle interventions for overweight.

Although the outcome measures vary, the most common approach with respect to reduced energy intake is to examine a cost per unit of weight loss or BMI reduction. Increased energy expenditure shows a deviation from this pattern; instead of maintaining the spotlight on weight loss, the typical measurement shifts to a cost per additional unit of physical activity. For consistency, the parallel measurement with energy intake would have to identify the daily rate of calories being absorbed; the impracticality of this approach is what probably has prompted the focus on the “downstream” effect of changes in diet and / or absorption, i.e., weight (or BMI) changes.

²⁰¹ Rush B, Shiell A, Hawe P. A census of economic evaluations in health promotion. *Health Education Research*. 2004; 19(6): 707-19.

²⁰² Avenell A, Broom J, Brown T et al. *Systematic Review of the Long-term Effects and Economic Consequences of Treatments for Obesity and Implications for Health Improvement*. Health Technology Assessment, 2004; 8(21).

²⁰³ Pratt M, Macera C, Sallis J, O'Donnell M. Economic interventions to promote physical activity. *American Journal of Preventive Medicine*. 2004; 27(Suppl 3): 136-45.

²⁰⁴ Harris J, Holman P, Carande-Kulis V. Financial impact of health promotion: we need to know much more, but we know enough to act. *American Journal of Health Promotion*. 2001; 15(5): 378-82.

Another approach to enhancing evaluation consistency across interventions would be to track actual weight or BMI changes against different ways to promote physical activity. It is not clear why this approach generally has not been adopted. The result is increased difficulty comparing the effectiveness and cost-effectiveness of energy intake interventions with those related to energy expenditure.

Reducing Energy Intake

For the purpose of this economic review, it will be convenient to categorize the energy intake interventions as educational, medical (both counselling and pharmacological), and surgical approaches.

Nutrition Education

The Expanded Food and Nutrition Education Program (EFNEP) is a US program that currently operates in all 50 states. Through an experiential learning process, limited-resource audiences learn how to select and buy food that improves the nutrition quality of the meals they serve their families. In 2003, a cost-benefit analysis of the modest Oregon version of the program demonstrated a ratio of 1:3.6.²⁰⁵ Earlier studies have produced ratios up to 3 times higher.²⁰⁶

In addition to the wider community, nutrition education also takes place in specific settings. One study of group instruction in a low-fat diet in the workplace demonstrated a cost of \$14.70 per kg of weight lost.²⁰⁷

Counselling and Dietary Prescriptions

A systematic review of 13 cost-effectiveness studies of outpatient nutrition services published between 1966 and 2001 revealed that the cost per pound lost, in the 3 studies specifically measuring weight reduction, ranged from US\$2.40 to \$10.00.²⁰⁸

As one example, a randomized controlled trial of dietary counselling sessions provided by a dietician (with or without involvement by a physician) showed between 5 and 7 kg could be lost at a cost of \$AUS7.30 to \$9.76 per kg (the higher cost occurred when the physician issued the invitation to join the program and reviewed progress personally at 2 of the counselling sessions). The physician-involvement group showed a higher program completion rate and, on average, 1 kg more weight loss per person over 12 months.²⁰⁹

²⁰⁵ Schuster E, Zimmerman Z, Engle M et al. Investing in Oregon's expanded food and nutrition education program (EFNEP): documenting costs and benefits. *Journal of Nutrition Education & Behavior*. 2003; 35(4): 200-6.

²⁰⁶ Rajgopal R, Cox R, Lambur M, Lewis E. Cost-benefit analysis indicates the positive economic benefits of the Expanded Food and Nutrition Education Program related to chronic disease prevention. *Journal of Nutrition Education & Behavior*. 2002; 34(1): 26-37.

²⁰⁷ Siggard R, Raben A, Astrup A. Weight loss during 12 week's ad libitum carbohydrate-rich diet in overweight and normal-weight subjects at a Danish work site. *Obesity Research*. 1996; 4(4): 347-56.

²⁰⁸ Pavlovich W, Waters H, Weller W, Bass E. Systematic review of literature on the cost-effectiveness of nutrition services. *Journal of the American Dietetic Association*. 2004; 104(2): 226-32.

²⁰⁹ Pritchard D, Hyndman J, Taba F. Nutritional counselling in general practice: a cost effective analysis. *Journal of Epidemiology & Community Health*. 1999; 53: 311-6.

No other cost-effectiveness studies were retrieved related to preventive nutrition services in primary care; the research gap probably relates to the fact that such services are still relatively rare.

Pharmacological Approaches

There are currently two main drugs used as aids to create weight loss. An economic model for orlistat was summarized by Foxcroft and Milne.²¹⁰ Orlistat tends to produce, in combination with a low-calorie diet, a reasonable weight loss, but only over the short-term. Orlistat represented an estimated cost utility of £46,000 per QALY. This compares with modeling performed in 2004 on the other approved weight loss drug, sibutramine, which showed a cost utility of £4,780 per QALY.²¹¹ Another earlier study arrived at a somewhat higher figure, namely, £10,500 per QALY, but that clearly is still very competitive with orlistat.²¹²

Bariatric Surgery

Understanding the cost-effectiveness of surgery for morbid obesity is as important as ever, since there has been some controversy surrounding the procedure, culminating in recent decisions by some US insurance companies to discontinue their coverage of it.²¹³

Surgery for severe obesity comes in different forms. Craig and Tseng modeled the gastric bypass approach and calculated a cost-effectiveness of about \$5,000 to \$16,000 per QALY for women, and \$10,000 to \$36,000 for men.²¹⁴ This can be compared with a trial of vertical banded gastroplasty, which suggested that this surgery actually resulted in a saving of approximately \$4,000 per QALY when compared with no treatment.²¹⁵ An Australian review from 2003 seems to confirm the dominance of vertical banded gastroplasty in comparison with other surgical approaches, with adjustable gastric banding at the bottom of the list.²¹⁶

Modeling of surgical results over 20 years by Clegg and colleagues yielded contrary results, as shown in the following table of cost-effectiveness as measured against non-surgical management (with costs standardized to 2001 in a summary provided by Avenell et al).^{217,218}

²¹⁰ Foxcroft D, Milne R. Orlistat for the treatment of obesity: rapid review and cost-effectiveness model. *Obesity Reviews*. 2000; 1: 121-6.

²¹¹ Warren E, Brennan A, Akehurst R. Cost-effectiveness of sibutramine in the treatment of obesity. *Medical Decision-Making*. 2004; 24(1): 9-19.

²¹² Study summarized in O'Meara S, Riemsma R, Shirran L et al. The clinical effectiveness and cost-effectiveness of sibutramine in the management of obesity: a technology assessment. *Health Technology Assessment*. 2002; 6(6).

²¹³ Scheier L. Bariatric surgery: life-threatening risk of life-saving procedure? *Journal of the American Dietetic Association*. 2004; 104(9): 1338-40.

²¹⁴ Craig B, Tseng D. Cost-effectiveness of gastric bypass for severe obesity. *American Journal of Medicine*. 2002; 113: 491-8.

²¹⁵ Van Gemert W, Adang E, Kop M et al. A prospective cost-effectiveness analysis of vertical banded gastroplasty for the treatment of morbid obesity. *Obesity Surgery*. 1999; 9(5): 484-91.

²¹⁶ Available at <http://www7.health.gov.au/msac/pdfs/summary/summaryref14.pdf> (accessed January 2005).

²¹⁷ Clegg A, Colquitt J, Sidhu M et al. The clinical effectiveness and cost-effectiveness of surgery for people with morbid obesity: a systematic review and economic evaluation. *Health Technology Assessment*. 2002; 6(12).

<i>Surgery Type</i>	<i>Cost / QALY</i>
Vertical banded gastroplasty	£10,432
Adjustable gastric banding	£8,689
Gastric bypass	£6,408

Possible support for the cost-effectiveness estimate of gastric bypass surgery may be found in the modeling of diabetes prevention performed by Australian researchers. The cost per life-year saved through gastric bypass surgery was around £6,300 (conversion to 2001 UK currency again provided by Avenell et al); the cost-effectiveness was more impressive when the cohort was restricted to those with impaired glucose tolerance, a precursor of type 2 diabetes.²¹⁹

There is no clear explanation for the discrepancy between the various cost-effectiveness studies, but the perspective provided by Clegg and colleagues is helpful: “caution should be taken when comparing different surgical procedures as the economic evaluation is based on several unsophisticated assumptions, and evidence of clinical effectiveness varies between procedures.”²²⁰

There is a lot of interest in the reduced invasiveness of laparoscopic surgery. Although operations can be longer and thus more expensive, recovery time in the hospital is shorter.²²¹ A 2001 study confirmed that laparoscopic gastric bypass is a safe and cost-effective alternative to open surgery.²²²

Conclusion

It is useful to not only compare surgical techniques but to compare surgical care in general with medical approaches. Unfortunately, only one study sheds light on this topic. Martin and colleagues found that gastric bypass, though it cost 8 times more than instituting a very low calorie diet, was more cost-effective after 6 years.²²³ The main difference between the two approaches is that 89% of surgery patients maintained their weight loss after five years while only 21% of the diet group managed to do so.

Whatever the final conclusion for the morbidly obese, the interventions for those who are more moderately overweight still require further study so that the best medical and / or educational options can be identified and employed. The ultimate goal is to

²¹⁸ The price conversion is provided in Avenell A, Broom J, Brown T et al. *Systematic Review of the Long-term Effects and Economic Consequences of Treatments for Obesity and Implications for Health Improvement*. Health Technology Assessment, 2004; 8(21).

²¹⁹ Segal L, Dalton A, Richardson J. Cost-effectiveness of the primary prevention of non-insulin dependent diabetes mellitus. *Health Promotion International*. 1998; 13(3): 197-209.

²²⁰ Clegg A, Colquitt J, Sidhu M et al. The clinical effectiveness and cost-effectiveness of surgery for people with morbid obesity: a systematic review and economic evaluation. *Health Technology Assessment*. 2002; 6(12).

²²¹ Chua T, Mendiola R. Laparoscopic vertical banded gastroplasty: the Milwaukee experience. *Obesity Surgery*. 1995; 5(1): 77-80.

²²² Nguyen N, Goldman C, Rosenquist C et al. Laparoscopic versus open gastric bypass: a randomized study of outcomes, quality of life, and costs. *Annals of Surgery*. 2001; 234(3): 279-89.

²²³ Martin L, Tan T, Horn J et al. Comparison of the costs associated with medical and surgical treatment of obesity. *Surgery*. 1995; 118(4): 599-606.

identify cost-effective interventions which can prevent further weight gain, and reverse current rates of overweight, within a mixed population.

Increasing Energy Expenditure

In 2000, Sevick and colleagues found only 1 cost-effectiveness analysis attached to a randomized clinical trial of exercise promotion.²²⁴ The Task Force on Community Preventive Services confirmed the scarcity of research in 2002, where only 3 cost-effectiveness studies were identified relating to increasing physical activity.²²⁵ This assessment seems to hold for specific sub-populations. For older adults, a review by King et al noted that there is a lack of studies assessing "specific behavioural or program-based strategies aimed at promoting physical activity participation, as well as [a] dearth of studies aimed at replication, generalizability of interventions to important sub-groups, implementation, and cost-effectiveness evaluation".²²⁶ One comprehensive model of interventions to promote physical activity concluded that, as of 2004, "almost no data exist on efficacy, effectiveness, or cost-effectiveness" of the various strategies.²²⁷

Community Programs

Two different community-based approaches to promoting physical activity and energy expenditure have been evaluated economically.

The best-known project, led by Sevick and colleagues, compared the impact and cost-effectiveness of a "lifestyle" intervention, i.e., offering behavioural skills training in small groups that includes the integration of moderate intensity physical activity into daily life, with the provision of a structured, supervised exercise program.²²⁸ Both programs were effective at increasing physical activity and fitness but the lifestyle intervention approach was considerably less expensive per month, at both the 6 month and 24 month time periods.

The provision of free locally held exercise classes was further tested in 2004 within an older population. The incremental average QALY gain in the intervention group was 0.011, with a cost effectiveness of €17,174 per QALY.²²⁹ The intervention group suffered from a low level of adherence to the free exercise classes. Those who did participate regularly did see a more significant improvement in physical and mental health.

²²⁴ Sevick M, Dunn A, Morrow M et al. Cost-effectiveness of lifestyle and structured exercise interventions in sedentary adults: results of project *ACTIVE*. *American Journal of Preventive Medicine*. 2000; 19(1): 1-8.

²²⁵ Kahn E, Ramsey L, Brownson R et al. The effectiveness of interventions to increase physical activity: a systematic review. *American Journal of Preventive Medicine*. 2002; 22(Suppl 4): 73-107.

²²⁶ King A. Physical activity interventions targeting older adults: A critical review and recommendations. *American Journal of Preventive Medicine*. 1998; 15(4): 316-333.

²²⁷ Pratt M, Macera C, Sallis J, O'Donnell M. Economic interventions to promote physical activity. *American Journal of Preventive Medicine*. 2004; 27(Suppl 3): 136-45.

²²⁸ Sevick M, Dunn A, Morrow M et al. Cost-effectiveness of lifestyle and structured exercise interventions in sedentary adults: results of project *ACTIVE*. *American Journal of Preventive Medicine*. 2000; 19(1): 1-8.

²²⁹ Munro J, Nicholl J, Brazier J et al. Cost effectiveness of a community based exercise programme in over 65 year olds: cluster randomized trial. *Journal of Epidemiology & Community Health*. 2004; 58: 1004-10.

Provision of Workplace Physical Activity Opportunities

Bowne and co-authors²³⁰ report on a five year study in which sedentary white-collar workers were offered involvement in an industrial physical fitness program. The group who took advantage of this offer experienced a 46% reduction in major medical costs and a 20% reduction in disability days. Costs of the program were \$121 per participant with savings at \$353 per participant.

An analysis of a work site health promotion program by Golaszewski and colleagues noted that benefits were 3.4 times those of costs.²³¹

Counselling and Physical Activity Prescriptions

Elly et al²³² assessed the cost-effectiveness of the “Green Prescription” program in New Zealand. The intervention, which has also been employed in other jurisdictions,²³³ involved verbal advice, a written exercise prescription from a physician, and telephone follow-up by an exercise specialist. The cost of converting one additional sedentary adult to an active state was \$1,756 New Zealand dollars. The authors suggest that “verbal and written physical activity advice given in general practice with telephone follow-up is an inexpensive way of increasing activity for sedentary people”.

Another intervention started off in primary care, but essentially involved a referral to an exercise specialist who would direct a personalized program of exercise in both recreation centers and home settings.²³⁴ The cost of simply moving a person from sedentariness to activity was found to be £650, though the cost quadrupled if the outcome threshold was the actual level of activity recommended for health.

Built Environment

Although there is growing interest in community design approaches to engineering which encourage physical activity,²³⁵ the economic studies are only beginning to emerge in the face of significant methodological obstacles. One team of investigators suggested that controlled experimental research is unlikely to be feasible for strategies such as zoning, tax incentives, and changes in transportation policy.²³⁶ Nevertheless, members of this same team have been part of “paving the way” in the first cost-effectiveness study of the “built environment.” Four new trails were constructed in a town, and a census conducted of users. The average annual cost for persons becoming more physically active through the trails was US\$98, though the

²³⁰ Bowne D, Russell M, Morgan J et al. Reduced disability and health care costs in an industrial fitness program. *Journal of Occupational Medicine*. 1984; 26(11): 809-16.

²³¹ Golaszewski T, Snow D, Lynch et al. A benefit-to-cost analysis of a work-site health promotion program. *Journal of Occupational Medicine*. 1992; 34(12): 1164-72.

²³² Elly R, Kerse N, Arroll B et al. Cost-effectiveness of physical activity counselling in general practice. *New Zealand Medical Journal*. 2004; 117(1207): U1216.

²³³ Petrella R, Koval J, Cunningham D, Paterson D. Can primary care doctors prescribe exercise to improve fitness? The Step Test Exercise Prescription (STEP) project. *American Journal of Preventive Medicine*. 2003; 24(4): 316-22.

²³⁴ Stevens W, Hillsdon M, Thorogood M, McArdle. Cost-effectiveness of a primary care based physical activity intervention in 45-74 year old men and women: a randomised controlled trial. *British Journal of Sports Medicine*. 1998; 32: 236-41.

²³⁵ Sallis J, Bauman A, Pratt M. Environmental and policy interventions to promote physical activity. *American Journal of Preventive Medicine*. 1998; 15: 379-97.

²³⁶ Pratt M, Macera C, Sallis J, O'Donnell M. Economic interventions to promote physical activity. *American Journal of Preventive Medicine*. 2004; 27(Suppl 3): 136-45.

cost for persons attempting to lose weight was considerably higher.²³⁷ In another study of the same project, the authors note that the average annual cost per trail user was \$235 compared to the estimated per capita annual medical cost of inactivity of \$622.²³⁸

The preceding study represents in a sense the researchers following their own advice as found in the paper quoted earlier in this report: “Economic and policy research...will need to be carried out in parallel with implementation of policy changes in communities. Careful evaluation and high-quality case studies in a variety of settings and communities will be critical to advancing knowledge.”²³⁹ The fact is that there should be no lack of initiatives in community design upon which public health research can “piggy-back.” There are many economic motives at work today which are prompting both experiments and permanent changes in urban planning, e.g., the concept of a “walkable” community being investigated in BC itself.²⁴⁰ In Sacramento, California, the Local Government Commission Centre for Liveable Communities have identified the following benefits of walkable communities; increased property values, increased tourism, reduced negative impact on agriculture, improved retail sales, improved health.²⁴¹

²³⁷ Wang G, Macera C, Scudder-Soucie B et al. Cost effectiveness of a bicycle/pedestrian trail development in health promotion. *Preventive Medicine*. 2004; 38: 237-42

²³⁸ Wang G, Macera C, Scudder-Soucie et al. Cost analysis of the built environment: the case of bike and pedestrian trails in Lincoln, Neb. *American Journal of Public Health*. 2004; 94(4): 549-53.

²³⁹ Pratt M, Macera C, Sallis J, O'Donnell M. Economic interventions to promote physical activity. *American Journal of Preventive Medicine*. 2004; 27(Suppl 3): 136-45.

²⁴⁰ Littman T. *Economic Value of Walkability*. Victoria Transport Policy Institute, 2004. Available at <http://www.vtpi.org/walkability.pdf> (accessed January 2005).

²⁴¹ Local Government Commission Centre for Liveable Communities, *The Economic Benefits of Walkable Communities*. Available at http://www.lgc.org/freepub/PDF/Land_Use/focus/walk_to_money.pdf (accessed February 2005).

Combined Lifestyle Interventions for Obesity Control

Clinical Program

A US study²⁴² examined a cognitive behavioural skills training (of increasing intensity) program for lifestyle modification. The three levels of intensity include a workbook alone, the addition of computer-tailored information, and the addition of both computers and staff consultation. At the end of one year, the average weight loss, decrease in BMI and cost per participant, based on the varying levels of intensity, were as indicated on the following table.

<i>Intervention</i>	<i>Weight Loss (lbs)</i>	<i>Decrease in BMI</i>	<i>Cost per Participant</i>
Workbook	2.2	0.4	\$12.33
Computer-tailored information	4.7	0.9	\$41.99
Computer plus staff consultation	7.4	1.2	\$133.74

Family-based Program

A randomized clinical trial led by Goldfield and colleagues²⁴³ examined two ways to deliver training for families in the area of dietary and physical activity change aimed at reducing BMI. One method used group instruction alone, and the second augmented group work with individual therapeutic consultation. Group treatment involved 13 one hour sessions for both parents and children. When individual therapeutic consultation was involved, 20 minutes of the hour was dedicated to one-on-one therapy. Both interventions provided equivalent weight control results but the group intervention cost only \$491 per family while the mixed intervention cost \$1,390 per family. As a result, the group approach was considerably more cost-effective than the mixed approach.

School-based Program

Planet Health is an intervention aimed at middle-school students and designed to reduce obesity. The interdisciplinary curriculum focuses on decreasing television viewing, decreasing consumption of high-fat foods, increasing vegetable and fruit intake, and increasing moderate and vigorous physical activity. The researchers who investigated this program in 2003²⁴⁴ suggested that the program averted 5.8 cases of adulthood obesity resulting in 4.1 QALYs saved at a cost of \$33,677. When taking into account potential medical costs averted, the cost per QALY was \$4,305. If costs due to lost productivity were also included, then the intervention would actually result in savings of \$7,313. That is, the cost of the program (\$33,677) were more than offset by medical (\$15,887) and lost productivity (\$25,104) costs averted.

²⁴² Wylie-Rosett J, Swencionis C, Ginsberg M et al. Computerized weight loss intervention optimizes staff time: the clinical and cost results of a controlled clinical trial conducted in a managed care setting. *Journal of the American Dietetic Association*. 2001; 101(10): 1155-62.

²⁴³ Goldfield G, Epstein L, Kilanowski C et al. Cost-effectiveness of group and mixed family-based treatment for childhood obesity. *International Journal of Obesity*. 2001; 25(12): 1843-9.

²⁴⁴ Wang L, Yang Q, Lowry R, Wechsler H. Economic analysis of a school-based obesity prevention program. *Obesity Research*. 2003; 11(11): 1313-24.

Conclusion

The limited information on the cost-effectiveness of interventions in the obesity control area clearly follows from the limited information on the effectiveness of interventions. At present most interventions (with the exception of bariatric surgery for morbid obesity) are supported by a single cost-effectiveness study, at best. In addition to the lack of studies, one of the difficulties is that longer follow-up periods are often missing. This is important given the tendency, particularly of weight loss interventions, to lose their effectiveness over time. A further complication in the cost-effectiveness literature in this area is the lack of standardization. Outcomes are variously reported as a cost per unit of weight lost, cost per QALY gained, cost per physically active individual, cost per trial user, and so on, making comparisons across interventions difficult.

Given the above caveats, the following programs appear to be cost-effective:

- nutrition education targeted at low income families;
- lifestyle prescriptions provided in a primary care setting;
- offering behavioural skills training in small groups with the inclusion of moderate intensity physical activity into daily life;
- group intervention for families dealing with obesity; and
- interdisciplinary school curriculum with a focus on decreasing television viewing, decreasing consumption of high-fat foods, increasing vegetable and fruit intake, and increasing moderate and vigorous physical activity.

This does not mean that other programs are not cost-effective, just that the research evidence is currently very limited.

BC Risk Factor Intervention Plan

Based on all of the preceding reviews of intervention effectiveness and cost-effectiveness, the BC Risk Factor Intervention Plan has been devised to maximize the potential of hitting risk factor reduction targets with the most efficient use of resources. Whereas the analysis of cost-effectiveness was separated into two discussions, for tobacco control and then obesity control, the plan will integrate the two spheres as much as possible; this reflects the learning described in the previous reports concerning the synergies involved with tackling multiple risk factors simultaneously. Although several different typologies to organize the interventions are possible, we decided to use the following categories as introduced in the *Risk Factor Interventions: An Overview of Their Effectiveness*.

- Regulatory and economic interventions
- Community-based interventions
- School-based interventions
- Workplace-based interventions
- Clinical interventions and management

Effective and efficient efforts need to be directed towards achieving the 2010 risk factor targets, the same sort of energy that will go into meeting athletic expectations over the rest of the decade.

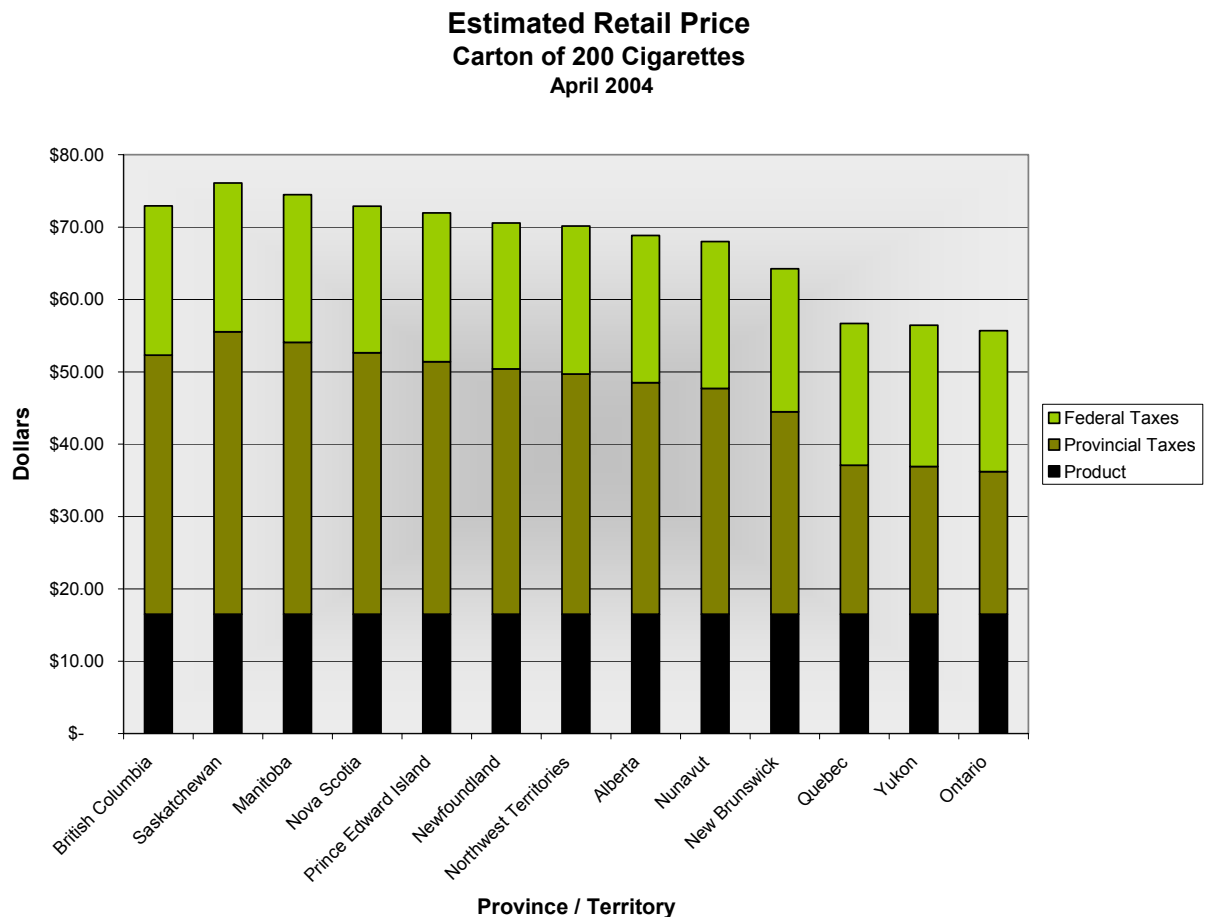
Effective and efficient efforts need to be directed towards achieving the 2010 risk factor targets, the same sort of energy that will go into meeting athletic expectations over the rest of the decade.

Regulatory and Economic Interventions

Increase Cigarette Prices

An increase in the cost of cigarettes is the single most effective intervention to reduce initiation rates and to encourage cessation.

The cost of a carton of 200 cigarettes ranges from \$55.69 in Ontario to \$76.10 in Saskatchewan. The cost in British Columbia, at \$72.92 is lower than the cost in Saskatchewan and Manitoba and equivalent to that in Nova Scotia. As indicated on the following chart, cigarette prices in Canada are largely due to federal and provincial taxation levels.²⁴⁵



Although British Columbia is well-positioned in terms of the level of provincial taxation on cigarette products, there is room for further improvement.

²⁴⁵ Data on retail price, level of taxation and government revenues are from the National Clearinghouse on Tobacco and Health. Available at www.ncth.ca (accessed February 2005).

We have modelled the effect of a \$2.00 per year provincial tax increase between 2005 and 2010, combined with achieving the BCHLA targets for smoking, on total provincial revenues from cigarette taxes during that time.

During the 1990s, provincial revenue from cigarette taxes averaged \$489 million per year in British Columbia. Based on the results of our model, average annual revenue from cigarette taxation between 2005 and 2010 would be \$497 million. The information used to derive these estimates is shown on the following table.

British Columbia							
Revenues from Tobacco Tax							
1995/96 Actual to 2010/11 Estimated							
Year	Revenue (in millions\$)		Prov. Taxes/ Carton	Cigs/ Day	Est. Cartons/ Year	# of Daily Smokers	# of Smokers
	Actual	Estimated					
1992/93	\$	483.21					
1993/94	\$	482.40					
1995/95	\$	516.37					
1995/96	\$	482.02					
1996/07	\$	487.66					
1997/98	\$	485.95					
1998/99	\$	505.11					
1999/00	\$	497.59		16.0			
2000/01	\$	459.91		14.8			701,636 CCHS Actual
2001/02				14.6			
2002/03				16.3			
2003/04				15.8		492,926	674,292 CCHS Actual
2004/05	\$	489.09	\$	35.80	13,661,639	499,055	682,676 BCHLA Target
2005/06	\$	496.46	\$	37.80	13,133,841	479,775	656,302 BCHLA Target
2006/07	\$	501.24	\$	39.80	12,594,080	460,058	629,330 BCHLA Target
2007/08	\$	503.29	\$	41.80	12,040,403	439,832	601,663 BCHLA Target
2008/09	\$	502.12	\$	43.80	11,463,964	418,775	572,858 BCHLA Target
2009/10	\$	497.74	\$	45.80	10,867,600	396,990	543,057 BCHLA Target
2010/11	\$	490.04	\$	47.80	10,251,853	374,497	512,288 BCHLA Target

Annual Increase of \$2.00

Sources:

1) Actual revenue from tobacco taxes 1992/93 to 2000/01 is from the National Clearinghouse on Tobacco and Health Program

2) Cigarettes per day is from CTUMS (based on daily smokers aged 15+)

3) Number of smokers in 2000 and 2003 is from CCHS and includes daily and occasional smokers age 12+.

4) The number of daily smokers for 2004/05 and future years is based on a 73.1% daily to total smokers in 2003.

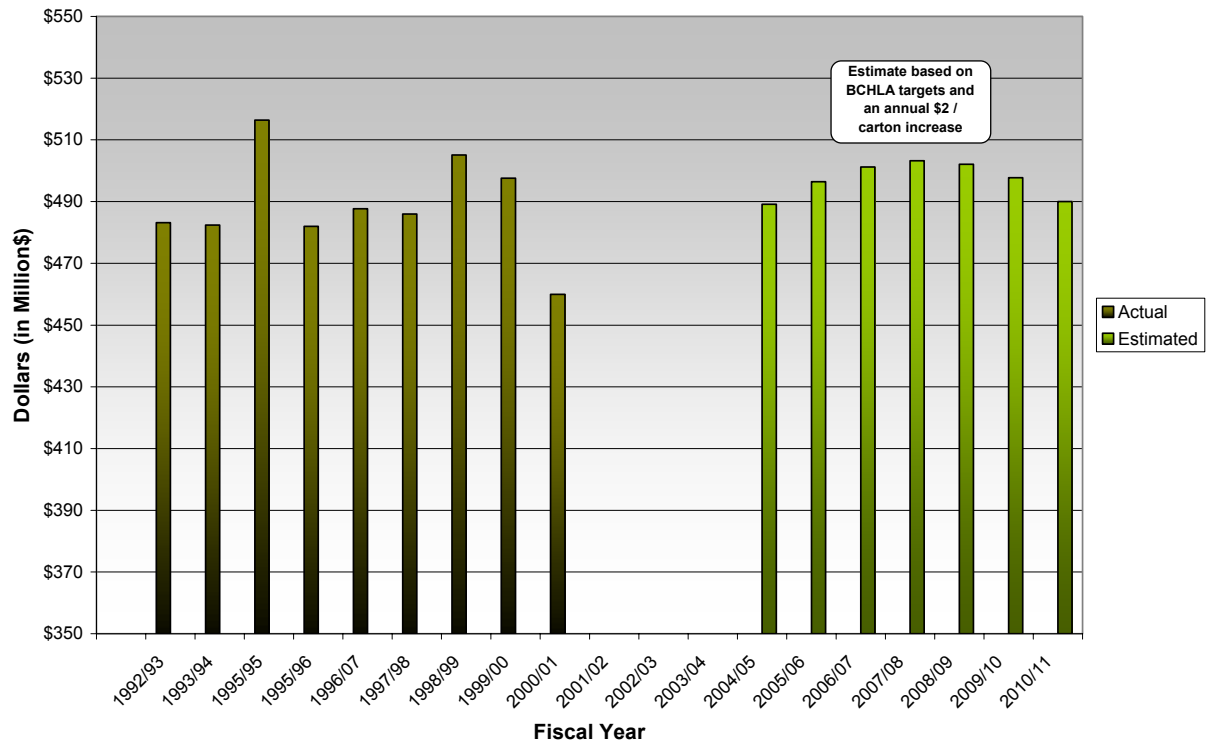
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- 4) The number of daily smokers for 2004/05 and future years is based on a 73.1% daily to total smokers in 2003.

Not only would the increase in taxation encourage cessation and reduce initiation, it would result in stable provincial revenue from this source even as the number of individuals who smoke decreases substantially.

Information on the actual and projected provincial revenue associated with cigarette taxation is also shown on the following graph

British Columbia Revenues from Tobacco Tax Actual and Estimated



Control of Activities Promoting Tobacco Consumption

Direct Advertising

Control of advertising by the tobacco industry is seen as one of the cornerstones of tobacco control policy in many jurisdictions in the world. This reality is reflected in the World Health Organisation's *Framework Convention on Tobacco Control* (FCTC), which enjoins treaty countries to "undertake a comprehensive ban of all tobacco advertising, promotion and sponsorship."²⁴⁶ The FCTC is expected to come into force in the spring of 2005.

Marketing of tobacco products comes in at least two modes: direct advertising and indirect approaches. The following table specifies the main media and marketing means available to the tobacco industry and potentially relevant to appropriate legislation.

Direct Tobacco Marketing	Indirect Tobacco Marketing
National TV	Product placement
Cable TV	Sponsored event with brand name
National radio	Other products with brand name
National press	Tobacco product with other brand name
International press	Direct mail give-aways
Billboards	Promotional discounts
Point-of-sale	
Before movies	

Constitutionally, legislation related to advertising controls in Canada is under the purview of the federal government. Canada has in many ways been at the forefront of tobacco advertising control in the world. In the history of tobacco control, Canada instituted a total ban on direct tobacco advertising relatively early; it was only 1 of 6 OECD countries to have done so before 1990. By comparison, a review of the World Health Organization database for the European region showed that only 4 out of 52 countries have either a complete or partial ban on all areas of direct tobacco advertising; the countries are France, Ireland, Norway, and the UK.²⁴⁷ There has been serious resistance, led by Germany, against implementing the FCTC advertising regulations within the entire European Union.

²⁴⁶ Framework available at http://www.who.int/tobacco/framework/en/fctc_booklet_english.pdf (accessed February 2005).

²⁴⁷ Database available at <http://data.euro.who.int/tobacco/> (accessed February 2005).

It is not clear what British Columbia might lobby for in terms of improving current advertising legislation in Canada, specifically the Tobacco Act of 1997. There *are* loopholes in the Act, e.g., allowing for limited advertisements in settings not normally accessed by young people; nevertheless, according to Health Canada, the reported spending on direct advertising by tobacco companies was almost nil in 2003.²⁴⁸ Moreover, Canada is even moving to comply with FCTC requirements by having health warnings on all remaining forms of tobacco advertising in the country.

Most advertising activity seems to be restricted to retailers, especially cigar stores, and targeted to tourists or mediated through websites. The one *major* exception to the current low level of advertising spending is point-of-sale displays, including “power walls” (see below).

Apart from action on power walls, it is possible that BC tobacco control advocates could formulate some new proposals for effective and well-resourced enforcement mechanisms around advertising controls; enforcement measures and compliance rates are always mediators of effectiveness with any sort of legislation.

Power wall displays

In contrast to very limited use of traditional forms of media advertising, tobacco manufacturers paid \$77 million to retailers for retail display space in Canada in 2002. As one backgrounder described, “in-store retail cigarette displays, commonly called ‘power walls,’ target individuals, and stimulate impulse purchases. Add to this the fact that the height and placement of these displays have been carefully calculated to have maximum impact on the purchaser, and it is clear that the impact of displays upon potential consumers is extremely important to the tobacco industry.”²⁴⁹ There are several concerns related to power walls, including:

- the fact that they weaken the resolve of ex-smokers to remain smoke-free; reportedly, just one purchase can turn an ex-smoker back into a daily smoker.
- the suggestion that they create an aura of social acceptability, creating the impression that cigarettes are more popular than is actually the case.
- the notion that children should not be exposed to such direct cigarette advertisement promotions every time they go into a corner store, including stores next to schools.

Enhanced legislation on point-of-sale displays and advertising would be a new tobacco control measure that likely would be beneficial in terms of reduced smoking prevalence. Ontario’s newly proposed tobacco control law in fact includes just such restrictions on retail tobacco displays.

²⁴⁸ Summary available at <http://www.hc-sc.gc.ca/hecs-sesc/tobacco/legislation/warnings/advert/index.html> (accessed February 2005).

²⁴⁹ Backgrounder available at <http://www.newswire.ca/en/releases/archive/January2005/14/c2914.html> (accessed February 2005).

Sponsorships

Many tobacco companies shifted their advertising dollar in total-ban jurisdictions to sponsorships of sporting and other high-profile events, subsidies of public facilities, etc. This has been effective for them, and British Columbia has certainly not been immune from this approach. However, the good news is that the Canadian government has already extended marketing controls to indirect, sponsorship-based advertising in a 1998 amendment to the Tobacco Act (which came into force in 2003). This compares with Europe, for example, where less than 10% of the countries have such comprehensive legislation in place.²⁵⁰

Glamorisation of Smoking in Movies / Television Shows

Another arena receiving increasing attention as part of a tobacco control policy is the portrayal of smoking in films. Increasingly, movie stars are receiving payment for endorsing or using cigarettes on screen, in so-called product placements.

Based on the evidence that adolescents are more likely to try smoking if their favourite movie stars smoked on screen, Dr. Glantz of the Center For Tobacco Control Research in San Francisco met with the Ontario Film Review Board in October, 2004, to propose that movies portraying smoking should be given an 18A rating, i.e., any young person seeing the subliminal pro-smoking message would at least have to have an adult accompanying them. More recently, the American Lung Association has begun to rate movies using icons of lungs, black for movies depicting heavy smoking and pink for when none of the characters smoke.²⁵¹

This is an area of tobacco control and social denormalization that could very well be high-profile in British Columbia, which is the “Hollywood North” of Canada.

²⁵⁰ Database available at <http://data.euro.who.int/tobacco/> (accessed February 2005).

²⁵¹ Cobb C. Anti-smoking campaign targets films. *The Vancouver Sun*, December 20, 2004, pg A8.

Tobacco Sales to Minors

Age restrictions on the purchase of tobacco products vary around the world. The other main policy difference among jurisdictions relates to the party on whom the sanction for non-compliance falls. The focus has been placed either on the retailer not selling to minors, or on the young person not buying or using tobacco products. As noted in our previous report on risk factor interventions, there have been mixed results related to youth access laws. Only one older study was found which analyzed the economics of such policies; following a substantial new federal initiative in the US in 1996, the Food and Drug Administration calculated that the cost per QALY for restriction of cigarette sales to minors was \$950.²⁵² A key determinant of effectiveness seems to be the intensity of enforcement, but such measures are expensive and may reduce the cost-effectiveness of any youth sales policy. In the end, if the effectiveness of a policy and its implementation cannot be assured, then cost-effectiveness becomes moot; up-to-date verification of cost-effectiveness under different enforcement regimes would certainly add to the discussion.

Canada already has strong legislation against youth tobacco sales in effect. The Tobacco Act of 1997 superseded the Tobacco Sales to Young Persons Act; it limits the documents that may be used to verify a person's age, and requires legible signs to be posted in stores with the following message in English and French: "It is prohibited by federal law to provide tobacco products to persons under 18 years of age."

As with the advertising control legislation, increasing compliance with the law related to youth tobacco sales may be a goal for British Columbia. Health Canada reported that BC showed a retailer compliance rate of about 84%, better than the national average but trailing provinces such as Manitoba and Nova Scotia.²⁵³ If BC wants to be the national leader in risk factor reduction, especially related to vulnerable population groups such as teens, then it definitely has room for improvement.

²⁵² Cited in Graham J, Corso P, Morris J et al. Evaluating the cost-effectiveness of clinical and public health measures. *Annual Review of Public Health*. 1998; 19: 125-52.

²⁵³ Data available at <http://www.hc-sc.gc.ca/hecs-sesc/tobacco/research/access03/tables/c.html> (accessed February 2005).

Smoke-free Legislation and Policy

Unlike the preceding areas of tobacco control, which require the participation of senior levels of government, smoke-free legislation is possible at municipal levels, creating a variety of policies within the communities of BC. This “patchwork” of regulations apparently concerns restaurateurs, at least according to the Canadian Restaurant and Food Services Association.²⁵⁴

This may be one area where tobacco control advocates and business are in complete agreement: there needs to be one smoke-free policy for the whole province. To make the policy as comprehensive as possible, each of the settings identified by the World Health Organization ought to at least be considered: healthcare facilities, education facilities, government facilities, restaurants, pubs and bars, indoor workplaces and offices, and theatres and cinemas.²⁵⁵

Ontario recently tabled the kind of legislation that could work in BC, making all workplaces and public places 100% smoke-free; the included areas have been extended to schools (public and private), common areas of condominiums and apartment buildings, college and university residences, day nurseries and home daycares, reserved outdoor seating areas in sports arenas and entertainment venues. There was a suggestion that the proposal would include smoke-free zones around public buildings (perhaps similar to the ban on smoking near hospital entrances which is found in some jurisdictions), but that does not seem to be the case.²⁵⁶

However, San Francisco has not backed away from protecting outdoor spaces; the most far-reaching bans in the US were enacted in January 2005, including all city-owned parks, public plazas and sports facilities (except golf courses).²⁵⁷ Calgary, will have a ban on smoking on outdoor restaurant patios, at least by 2008, while Brandon, Manitoba, recently reversed a similar policy. Smokers in Victoria (Australia) were just given a “reprieve” from a proposed smoking ban on beaches. Clearly, this is a fluid policy area.

The main “sticking point” in BC seems to be designated smoking rooms (DSRs). Although many municipalities (e.g., Greater Victoria, Richmond) do not permit separate smoking rooms in entertainment establishments (from bars to bowling alleys), there is still no province-wide ban on this remaining “loophole” in workplace protection; this despite concerns expressed by the Workers’ Compensation Board and other advocates for the health of staff who may feel compelled to enter the DSRs and be exposed to environmental tobacco smoke.²⁵⁸ Many health promoters would simply like to see the government move towards legislation (rather than regulations) for 100% smoke-free workplaces across the province; it could be seen, within the big

²⁵⁴ See the website at <http://www.crfa.ca/issues/bytopic/smokingregulations.asp> (accessed February 2005).

²⁵⁵ See the database available at <http://data.euro.who.int/tobacco/> (accessed February 2005).

²⁵⁶ See the draft legislation at http://www.ontla.on.ca/documents/Bills/38_Parliament/Session1/b164.pdf (accessed February 2005).

²⁵⁷ See the news report at <http://www.freerepublic.com/focus/f-news/1329492/posts> (accessed February 2005).

²⁵⁸ The whole story can be tracked on the Clean Air Coalition of BC website, <http://www.cleanaircoalitionbc.com/caccontentwcbregdesc.htm> (accessed February 2005).

picture of health, justice and economic concerns, that this is a rather modest accommodation.

A perennial objection to such restrictions is the concern that revenue will be lost in the hospitality or tourism industry, but as was noted in our previous report, none of the many better-designed studies by independent researchers found a negative impact on revenue or jobs due to any kind of smoking ban.

Restrictions on Food Advertising

The call for restrictions on advertising unhealthy food is intensifying in many jurisdictions, especially with respect to captive and impressionable audiences consisting of children. There is a concern about a “David and Goliath” imbalance in the fight to protect against marketing unhealthy foods. For example, the recent House of Commons’ Health Select Committee Report on Obesity in the UK cited the following comment:²⁵⁹

Too much reliance has been placed on health education and handing out the odd leaflet in doctors' surgeries over the last 20 or 30 years as the Department of Health's strategy. It is not adequate. The main reason it is not adequate, of course, is that for every pound the Health Education Authority used to spend on promoting healthy diets there is about £800 being spent by the food industry encouraging us to eat their products. Of those products, about 95% are ones that would have encouraged weight gain rather than a healthy diet.

However, the UK report stopped short of asking for legislative changes, but instead looked to enhanced voluntary cooperation from the food and advertising industries (a position which the government and the Advertising Association were quick to support). The policy response may be intensified in the future. The UK government’s conclusion in December, 2004, was that “there is a strong case for action to restrict further the advertising and promotion to children of those foods and drinks that are high in fat, salt and sugar.”²⁶⁰

The Health Select Committee report does note several jurisdictions in Europe, especially in Scandinavia, where *all* televised advertising directed at children is banned or restricted. As for the Canadian context, Quebec also has banned marketing aimed at children under age 13.²⁶¹ On the other hand, other jurisdictions, such as Australia, are citing uncertainty in linking food advertising with childhood obesity in order to justify no legislative action to control the marketing of unhealthy food to children.²⁶²

It is not clear exactly where the province of BC should land on the topic of responsible food marketing when, once again, the main legislative levers are in the hands of the federal government. At the least, some lobbying efforts directed at relevant food and advertising councils could be initiated.

The main concern about relative inaction in this area is any misconception about the power of marketing, coinciding with the glaring irrationality of various advertising associations²⁶³ when they plead that marketing in fact does not affect food choices

²⁵⁹ House of Commons’ Health Select Committee *Report on Obesity*. May 2004. www.publications.parliament.uk/pa/cm200304/cmselect/cmhealth/23/2302.htm (accessed February 2005).

²⁶⁰ Report at <http://www.dh.gov.uk/assetRoot/04/09/87/21/04098721.pdf> (accessed February 2005).

²⁶¹ See the commentary at http://eartheasy.com/article_kidfluence.htm (accessed February 2005).

²⁶² See the position articulated by the Minister of Health and Ageing at http://216.239.57.104/search?q=cache:arbU1EeQ3x8J:www.phaa.net.au/Advocacy_Issues/tonyabbottvfood.htm+Restrictions+on+Food+Advertising&hl=en (accessed February 2005).

²⁶³ For example, the commentary in the Australian setting at http://www.health.nsw.gov.au/obesity/adult/summit/pres/Speech_IanAlwill.pdf (accessed February 2005).

very much; the question which immediately follows: why then would the food industry spend billions of dollars annually on such advertising?

Taxation of Specific Foods

Fast food, soft drinks, and foods high in sugar and fat are the most likely targets for taxes. A helpful 2004 review of the “pros and cons” of different obesity control strategies is not optimistic about the use of large-scale food taxes aimed at reducing the consumption of particular foods.²⁶⁴ The reasons cited for a negative evaluation of such strategies are:

- States in the US that currently have small taxes on carbonated beverages and other foods of low nutrition value do so mainly for revenue-generation; even if such funds were intended to support healthcare, there are arguably more sensible taxation mechanisms to achieve the same goal.
- The array of (unhealthy) food choices would make it easy for consumers to switch to other tasty, yet untaxed foods that may increase the risk of obesity. For example, some fruit juice products have more calories than a serving of pop. Or, if a “fat tax” were imposed, high-sugar foods might become more popular.
- It is problematic to determine the size of the food tax that would actually be an effective deterrent for unhealthy choices without, for instance, increasing food insecurity for low-income families as they transfer part of their budget to now more expensive junk food.
- Some surveys show a low tolerance among consumers for the idea of special food taxation.
- The strong food industry lobby, which points to the fact that there is little evidence that such taxation leads to a positive health effect, and, in particular, a reduction in obesity rates.

As suggested in our previous report, a focused trial of taxation measures for relatively obvious health-offenders such as soft drinks and potato chips may be in order, thus generating some effectiveness data which may in turn be more convincing for both industry and the general public.

Another related approach that could be explored is subsidies to reduce the price of healthy foods; but, again, neither the evidence of effectiveness nor policy mechanisms is very clear.

²⁶⁴ Finkelstein E, French S, Variyam J, Haines P. Pros and cons of proposed interventions to promote healthy eating. *American Journal of Preventive Medicine*. 2004; 27(Suppl 3): 163-71.

Food Regulation

There are a variety of means proposed to influence the mix and volume of food choices available in the marketplace, including agricultural adjustments to change the basic food supply, and measures to improve the nutrition characteristics of popular foods. A recent report in the UK encouraged using government purchasing power to expand the market for fresh healthy foods while counteracting the current subsidies supporting the ingredients in high fat/sugar/salt products.²⁶⁵

An example of an unhealthy component of processed foods, and a topic of current concern in the developed world, is *trans* fats; these substances have the following effects on the human body:

- lowering of HDL (good) cholesterol;
- increasing of LDL (bad) cholesterol;
- making the arteries more rigid and clogging arteries;
- causing insulin resistance and contributing to type 2 diabetes onset.

According to the Harvard School of Public Health, approximately 30,000 premature coronary heart disease deaths annually in the US alone could be attributable to consumption of *trans* fatty acids.²⁶⁶

So far, Denmark is the only jurisdiction in the world that regulates the amount of *trans* fat in processed foods. However, the new US dietary guidelines (January 2005) have focused new attention on this food component, with a recommendation to

*Consume 10 percent of calories from saturated fatty acids and less than 300 mg/day of cholesterol, and keep trans fatty acid consumption as low as possible.*²⁶⁷

BC could commit to fully participate in the ongoing federal discussion of appropriate responses to the health risks of *trans* fat.

²⁶⁵ See the summary at <http://www.iotf.org/media/iotfjan29.htm> (accessed February 2005).

²⁶⁶ See the summary at <http://www.hsph.harvard.edu/reviews/transfats.html> (accessed February 2005).

²⁶⁷ See the summary at <http://www.health.gov/dietaryguidelines/dga2005/recommendations.htm> (accessed February 2005).

Nutrition Labelling / Signposting in Retail and Restaurant Settings

As noted in our previous report, the existing regulations for nutrition labels on package foods are already very clear and comprehensive. Companies need to comply by using a standard format for ingredients and quantities per recognized unit weight by 2007. British Columbia could take a position and enter the national debate around whether labelling needs to be extended to other kinds of foods and / or restaurants. It is not clear whether the province can take unilateral action in such areas.

Likewise, the discussion about how best to provide point-of-sale information to consumers through signs and kiosks is likely to be intense for some time. One question concerns the voluntary educational programs by food companies, retailers and restaurants: are they sufficient, or is the patchwork of formats and symbols for nutrition information only serving to confuse the situation more for consumers? BC will have a role to play in clarifying answers to these and other related concerns.

A related initiative would be to institute a provincial program of certification of menu items. Restaurants with an overall positive health rating could identify their approved status by means of an official plaque. One of the stipulations could be health-friendly labelling right on menus. Managing this program could be part of the role of existing food inspectors once guidelines were established. The trials of such interventions have been limited, but BC once again could take a leadership role.

Tax Incentives for Sports and Recreation Activities

On February 3, 2005, the press reported that BC MLA Christy Clark would introduce a private member's motion in the legislature to provide tax incentives to parents so that they will be encouraged to enrol their children in extracurricular physical activities.²⁶⁸ This could be an obesity-fighting measure, overcoming for some families a prohibitive price barrier to participating in otherwise attractive programs. The plan, still light on details, is apparently the first of its kind in Canada, though it was suggested in a 1998 report on Sport in Canada; the recommendation at that time (which even provided some of the financial details) noted that:²⁶⁹

One initiative that would encourage families to purchase sporting equipment and to register their children in a local sport organization is the child sport tax credit. This credit would apply to family expenditures related to equipment expenses and the registration of children in public and private clubs recognized by Revenue Canada and amateur sport programs affiliated with national sport organizations.

We have estimated the financial impact of such a tax incentive using a maximum credit of \$200 per child per year and assuming that the credit would be used for half of British Columbia children between the ages of 3 and 17.

The following table suggests a possible budget to resource such a strategy in BC

Tax Incentives for Sports and Recreation Activities						
Estimated Cost						
	Fiscal Year					
	2005/06	2006/07	2007/08	2008/09	2009/2010	2010/11
Children Aged 3-17						
Target Population	730,798	724,088	717,564	710,804	705,163	700,744
Estimated Utilization (50%)	365,399	362,044	358,782	355,402	352,582	350,372
Maximum per Child per Year	\$200	\$200	\$200	\$200	\$200	\$200
Average Expenditures per Year	\$ 73,079,800	\$ 72,408,800	\$ 71,756,400	\$ 71,080,400	\$ 70,516,300	\$ 70,074,400
Tax Rate - Provincial	6.05%	6.05%	6.05%	6.05%	6.05%	6.05%
Tax Rate - Federal	16.00%	16.00%	16.00%	16.00%	16.00%	16.00%
Estimated Provincial Cost	\$ 4,421,328	\$ 4,380,732	\$ 4,341,262	\$ 4,300,364	\$ 4,266,236	\$ 4,239,501
Estimated Federal Cost	\$ 11,692,768	\$ 11,585,408	\$ 11,481,024	\$ 11,372,864	\$ 11,282,608	\$ 11,211,904

Questions have been raised about such a strategy. In an editorial, the Vancouver Sun²⁷⁰ lauded the idea but noted that there are many other ways to keep children active. The article points to programs such as *Action Schools! BC* (see below), Sport BC's *Kidsport* and *Arts Umbrella* that are currently working in this area. Furthermore, a tax incentive is likely to provide relief for middle income parents but

²⁶⁸ *The Vancouver Sun*. February 3, 2005, pg A1.

²⁶⁹ Report available at <http://www.parl.gc.ca/InfoComDoc/36/1/CHER/Studies/Reports/sinsrp05-e.htm#toc> (accessed February 2005).

²⁷⁰ Tax breaks not only way to keep kids active *The Vancouver Sun*. February 4, 2005, pg A14.

do little to assist low income parents. Rather than a tax incentive, the editorial suggests supporting current organizations in this area and expanding bursary programs for parents who cannot afford these fees.

Community-based Interventions

Media Advocacy

The goal of media advocacy is to provide consistent messages over an extended time period (at least until 2010) on specific aspects of healthy living; particularly the importance of not smoking, the value of physical activity and appropriate consumption of healthy foods. It is important to provide enough coverage so that people in the target populations will find it easier to take advantage of the other grassroots interventions that will be proposed to encourage healthy behaviours. While significant advances have been made in 'denormalizing' tobacco consumption (though there is still much that needs to be done), we now want to push for the 'normalization' of being physically active and making healthy food choices.

The mass media campaign should thus target tobacco use and obesity in the populations noted below. Included in the obesity message is the value of being physically active and making healthy food choices.

We want to target the entire BC population (male and female), with particular reference to:

- Children under the age of 9
- Tweens aged 9-12
- Youth aged 13-17
- College students
- Adults to age 55

It is recognized that messages will need to be tailored to each of these groups. In targeting these age groups, we also want to make sure to include appropriate advertising for:

- First Nations
- New Canadians (e.g., Chinese, Taiwanese, Vietnamese, Hong Kong natives and people from India and Pakistan)

Additional suggestions on the media campaign can be found in Appendix D.

The following cost estimates are based on achieving an 80% saturation of the target audiences. These cost estimates are very rough and would need to be revised after additional planning to determine the exact messages that would be conveyed, as well as how these messages would be translated into media formats. Additional work with marketing and creative planners will be required regarding the strategic placement, purchase and role of each of the media. It may be desirable to focus the media campaign on selected audiences and selected messages at any given time, rather than dilute the overall campaign with too many messages targeted at too many groups.

It is also important to purchase high-end advertising that has a better probability of getting the desired message across to target audiences. That is, appropriate funds need to be included to produce advertising in the various recommended media formats that can compete with or be as good as any advertising produced by large companies (e.g. MacDonald's or commercials aimed at children to get them to consume sugary cereals).

A rough estimate of costs for a risk factor media campaign is shown on the following table. Again, it must be stressed that additional planning will be required before a more precise estimate would be available.

	Media Campaign Estimated Cost					
	Fiscal Year					
	2005/06	2006/07	2007/08	2008/09	2009/2010	2010/11
Advertisement Production	\$ 7,660,000	\$ 7,889,800	\$ 8,126,494	\$ 8,370,289	\$ 8,621,397	\$ 8,880,039
Medium						
Television	\$ 7,000,000	\$ 7,210,000	\$ 7,426,300	\$ 7,649,089	\$ 7,878,562	\$ 8,114,919
Movie Theatre	\$ 150,000	\$ 154,500	\$ 159,135	\$ 163,909	\$ 168,826	\$ 173,891
Outdoor - Posters	\$ 1,700,000	\$ 1,751,000	\$ 1,803,530	\$ 1,857,636	\$ 1,913,365	\$ 1,970,766
Outdoor - Transit Shelters	\$ 1,200,000	\$ 1,236,000	\$ 1,273,080	\$ 1,311,272	\$ 1,350,611	\$ 1,391,129
Transit (Interior and Exterior)	\$ 700,000	\$ 721,000	\$ 742,630	\$ 764,909	\$ 787,856	\$ 811,492
Print - Newspapers, Magazines, Publications	\$ 6,000,000	\$ 6,180,000	\$ 6,365,400	\$ 6,556,362	\$ 6,753,053	\$ 6,955,644
Ethnic	\$ 1,200,000	\$ 1,236,000	\$ 1,273,080	\$ 1,311,272	\$ 1,350,611	\$ 1,391,129
Internet	\$ 500,000	\$ 515,000	\$ 530,450	\$ 546,364	\$ 562,754	\$ 579,637
Event / Community Promotion	\$ 700,000	\$ 721,000	\$ 742,630	\$ 764,909	\$ 787,856	\$ 811,492
Total Media Buying	\$ 19,150,000	\$ 19,724,500	\$ 20,316,235	\$ 20,925,722	\$ 21,553,494	\$ 22,200,099
Total Media Campaign	\$ 26,810,000	\$ 27,614,300	\$ 28,442,729	\$ 29,296,011	\$ 30,174,891	\$ 31,080,138

By way of comparison, the Florida "Truth" campaign directed at smoking and youth used \$25 million of their \$200 million budget to run a mass media campaign that involved 33 television commercials, seven billboards, eight print ads and four posters.

The \$7.0 million allocated to television commercials would purchase approximately 1,400 thirty second spots at \$5,000 each (a 30 second spot on the OC currently costs \$5,190). Prices vary, of course, with the possibility of lower unit costs due to the public service nature of the advertisements and bulk purchasing.

The funds allocated to movie theatres would allow for 15 second spots in over 100 movie theatres throughout the year.

Annual future year costs have been increased by 3%.

Community Action Coordinators

One model for community-based implementation and energizing of risk factor programs can be found in community action coordinators. The Community Action Coordinator could be accountable for effectively coordinating, implementing and mobilizing strategies for action in risk factor reduction. Particular emphasis could be in creating supportive environments in communities and supporting advocacy initiatives aimed at governments and institutions. These accountabilities are achieved through a combination of community action, advocacy, and public education.

See Appendix E for a full job description of the equivalent coordinator role proposed for cancer control by the Cancer Society. Naturally the position would need to be adapted to the more general mandate of the BCHLA, and to risk factor reduction that goes beyond cancer control. As another comparison, it is noteworthy that Nova Scotia, in devising its Tobacco Strategy,²⁷¹ came up with a similar community-based position, namely, the district tobacco strategy coordinator. A recent "report card" on the progress in Nova Scotia noted that funding had been received for these positions.²⁷²

The Community Action Coordinator could play a key role in implementing the additional community-based interventions suggested below.

In estimating the cost of implementing this program, we have assumed that two full-time staff would be allocated to each electoral district, beginning with one staff person in the first year and increasing to two in the second year. In addition, there would be five regional managers, one per health authority. The estimated costs of the program are summarized on the following table.

Community Action Coordinators Estimated Cost						
	Fiscal Year					
	2005/06	2006/07	2007/08	2008/09	2009/2010	2010/11
Community Action Coordinators						
FTEs	75	150	150	150	150	150
Average Annual Salary	\$ 50,000	\$ 51,500	\$ 53,045	\$ 54,636	\$ 56,275	\$ 57,964
Benefits (@20%)	\$ 10,000	\$ 10,300	\$ 10,609	\$ 10,927	\$ 11,255	\$ 11,593
Total Salary & Benefits	\$ 4,500,000	\$ 9,270,000	\$ 9,548,100	\$ 9,834,543	\$ 10,129,579	\$ 10,433,467
Regional Coordinators						
FTEs	5	5	5	5	5	5
Average Annual Salary	\$ 75,000	\$ 77,250	\$ 79,568	\$ 81,955	\$ 84,413	\$ 86,946
Benefits (@20%)	\$ 15,000	\$ 15,450	\$ 15,914	\$ 16,391	\$ 16,883	\$ 17,389
Total Salary & Benefits	\$ 450,000	\$ 463,500	\$ 477,405	\$ 491,727	\$ 506,479	\$ 521,673
Overhead (@40%)	\$ 1,980,000	\$ 3,893,400	\$ 4,010,202	\$ 4,130,508	\$ 4,254,423	\$ 4,382,056
Total Costs	\$ 6,930,000	\$ 13,626,900	\$ 14,035,707	\$ 14,456,778	\$ 14,890,482	\$ 15,337,196

²⁷¹ Available at <http://www.gov.ns.ca/health/downloads/tobacco.pdf> (accessed January 2005).

²⁷² Available at <http://www.smokefreens.ca/documents/newsfnsreport.pdf> (accessed January 2005).

Point-of-Decision Prompts

As one policy-planning resource summarized, “point of decision prompts are interventions designed to change the physical environment to influence an individual to make active rather than sedentary behavioral choices.”²⁷³ For instance, signs can be placed by elevators and escalators that encourage people to use nearby stairs, with messages stressing either health benefits or weight loss. This relatively simple, effective, and inexpensive mechanism would require some research to identify potential locations and the best design and content, and some coordination with building designers and managers to make stairways as safe and attractive as possible. One possibility: an annual “most improved stairway” award in each Health Authority. A US study has demonstrated that beautifying a stairway can by itself significantly increase usage rates.²⁷⁴ Many more practical suggestions and case studies involving individuals and workplace groups are available through the Health Canada *Stairway to Health* program (there is an equivalent set of resources on the Centres for Disease Control website).

A range of budgets is possible, depending upon how elaborate the physical changes to the stairways might be. In its most sophisticated and long-term form, a stairway initiative requires partnership with urban planners and architects to see new buildings designed to make the “healthy choice the easy choice.”

The impact that the point-of-decision prompts have on people’s choices to be active may decrease over time. Studies suggest that the initial impact of the prompts is most effective and that some individuals will go back to using the sedentary alternatives. It is important to find ways to keep the prompts exciting and fresh by varying design and wording, creating themes and contests, connecting with wider community campaigns, etc.

While directing people to stairways is the most common form of point-of-decision prompts, other applications have been tried, e.g.,

- inserting mile markers in public walking spaces (parks, trails, skywalks, etc.);
- introducing a sidewalk hopscotch or other activity in public walking spaces;
- using a walking radar so people can see their walking speed and increase their pace; and
- providing signs in parking lots requesting people to park farther away.

Community Action Coordinators could partner with many different stakeholders and brainstorm new ways to prompt physical activity.

²⁷³ See the website at <http://www.dhss.mo.gov/NewWeb2004/InterventionMICA/PointofDecisionPrompts/> (accessed February 2005). The list of prompts tried in different settings is also from this source.

²⁷⁴ See the report at <http://stairway.hc-sc.gc.ca/viewsuccessstories.aro?Cid=2> (accessed February 2005).

Community Social Supports for Physical Activity

Aside from the whole range of potential incentives for regular, organized sports in a community,²⁷⁵ there is also great potential for social support and events allowing more informal participation by a wider audience.

Walking groups have the advantage of being self-managing once set up and launched. Walking is increasingly being recognized as the almost “perfect” exercise and very conducive to weight maintenance, as well as other health benefits. Being part of a walking group is a great means to enhance the experience, for a variety of reasons:

- increased safety;
- peer encouragement and support;
- a chance to meet people and make friends;
- almost anyone can do it;
- possible to make it work with only a few members;
- minimal leadership or administration; and
- no special expense or equipment.

The main components of a new group with which a community action coordinator would need to be concerned are: advertising, a setting in which to convene (which could be a natural recruiting pool such as a religious congregation or social club), some orientation for the leaders, and perhaps a modest newsletter. Specialized fees, training, liability, and the like, would only come into play if the excursions were more elaborate or the terrain more challenging. As an added incentive, the serious “walking group leader awards” of organizations like Outward Bound could be adapted for use in a network of informal walking groups. Various inter-group contests and social events are all very possible.

Community physical activity events can take on virtually unlimited configurations, from softball tournaments to skateboard park rallies to children’s track competitions at municipal fairs. Bigger events with advertising, complementary entertainment, and catering have the advantage of drawing a crowd, but are more expensive and intermittent. Block parties with suggested children’s games, neighbourhood tennis leagues, condominium-based programs, and backyard summer sport clubs can operate more frequently, and again could become self-managing in certain cases. As much as possible, each event or setting would provide an opportunity for healthy living education through printed materials, kiosks with video screens, dramatic presentations, informal mentoring, and other means.

Finally, the goal would be to make sure all local physical activity efforts coordinate well with, and build off of, province-wide and national campaigns.

²⁷⁵ See, for example, *Sport in Canada: Everybody’s Business*. 1998. Available at <http://www.parl.gc.ca/InfoComDoc/36/1/CHER/Studies/Reports/sinsrp05-e.htm#toc> (accessed February 2005).

Pedometers

A recent Alberta health publication noted that “a major limiting factor in studying and monitoring physical activity behaviours and the associated health benefits has been the lack of a reliable, valid, and standardized assessment tool.”²⁷⁶

Ideally, the goal is to find a technology or method that is sensitive to changes in activity patterns, applicable to diverse groups, convenient and economically viable.²⁷⁷

Although there is no “gold standard” for measuring physical activity, pedometers are becoming increasingly popular. Pedometers typically measure the number of steps that a person takes over a specific period of time. In more sophisticated units, if a person’s stride length is entered, then distance travelled can also be estimated; as well, providing weight and age can allow energy expenditure to be calculated. These additional measures typically are less accurate than the basic step count.²⁷⁸

The BC Standing Committee on Health recommended the use of pedometers in its report *The Path to Health and Wellness: Making British Columbians Healthier by 2010*. More specifically, the recommendation was to “explore methods to enable interested British Columbians to obtain accurate and reliable pedometers. Options could include rebates, bulk purchase, or other incentives to make pedometer use more widely available and to promote British Columbians to ‘take steps’ to become more active”.

There are a number of advantages associated with the use of pedometers, including the following characteristics:

- relatively small and lightweight, socially acceptable, and easy to operate;
- all segments of the population can benefit from them, though results for obese people can be less accurate;²⁷⁹
- can be placed on different parts of the body (though for standardization purposes, a person’s dominant foot is the recommended location);
- offer objective results, avoiding self-report bias; and
- provide immediate personal feedback, allowing self-coaching, behaviour modification, etc.

There are certain measures that are not captured by pedometers, including the intensity, duration, and frequency of physical activity.²⁸⁰ For example, walking and running are not distinguished. It is also challenging to relate the number of steps taken with recommended levels of physical activity, though there have been attempts to do so (e.g. 10,000 steps per day).^{281, 282}

²⁷⁶ Alberta Centre for Active Living. *WellSpring*. 2003; 14: 2.

²⁷⁷ Washburn R, Schoeller D. Measurement of physical activity. *Quest*. 2001; 53(3): 295-309.

²⁷⁸ Alberta Centre for Active Living. *WellSpring*. 2003; 14: 2.

²⁷⁹ Swartz A, Bassett D, Moore J et al. Effects of body mass index on the accuracy of an electronic pedometer. *International Journal of Sports Medicine*. 2003; 24(8): 588-92.

²⁸⁰ Beighle A, Pangrazi R, Vincent S. Pedometers, physical activity, and accountability. *Journal of Physical Education, Recreation & Dance*. 2001; 72(9): 16-19.

²⁸¹ Tudor-Locke C, Bassett D. How many steps/day are enough? Preliminary pedometer indices for public health. *Sports Medicine*. 2004; 34(1): 1-8.

The main drawback of pedometers is accuracy problems. Different brands record different results, and the recorded number for all models can be different than the true count, especially during slow walking or when excessive bending is part of the person's daily routine. As well, the number of steps is usually underestimated when the activity level is more intense.

Types of Pedometers

As already noted, all pedometers are not created equal. Pedometers measure the physics of body motion. As a person steps, their body accelerates and decelerates vertically; the foot contact with the ground creates sharp changes in motion. So-called seismic or mechanical pedometer engineering involves a lever arm attached like a pendulum to a spring; with each step, the pendulum moves, a circuit is closed, and one electrical event is recorded on the digital read-out (see Appendix H for more details).

Cost of Pedometers

There is an on-line distributor in Canada of both the DigiWalker SW-200 and the NL-2000, providing a convenient price comparison. A price for the Sportline 330 was also found at a suburban store catering to runners. The lowest price for a pedometer was located at Canadian Tire on-line, though no data is available allowing a quality comparison for the LifeGear model. The basic models often have sister models with more features, and at a higher cost. The LifeGear Deluxe Pedometer retails at 3-4 times the price of the basic version; it features the ability to calculate distance, speed and calorie expenditure, as well as count steps. No Canadian price was located for the piezoelectric model known as the Kenz Lifecorder, but the US cost seems to be around \$200.

<i>Pedometer Model</i>	<i>Type</i>	<i>Retail Price</i>
LifeGear	Seismic	\$11.99
Sportline 330	Seismic	\$32.99
DigiWalker SW-200	Seismic; coil spring	\$38.99
NL-2000	Piezoelectric	\$75.99

A public health campaign would naturally be accessing bulk prices. An idea of what may be available is provided by other Canadian projects. For example, Moncton (surprised at its recent rating as the 11th most obese city in Canada) launched a campaign which included securing 2,000 DigiWalkers at \$23 from New Lifestyles.²⁸³ Moncton adapted the *Stepping Out* program of PEI; the province distributes subsidized pedometers (offering \$10 per unit), with 1,500 given out in 2003, and already a further 2,700 by June, 2004.²⁸⁴

As there was a private sponsor (Kellogg's) involved with the 2004 pedometer distribution in Canada, it is not clear what the bulk price for the 800,000 units

²⁸² Le Masurier G, Sidman C, Corbin C. Accumulating 10,000 steps: does this meet current physical activity guidelines? *Research Quarterly for Exercise & Sport*. 2003; 74(4): 389-94.

²⁸³ See the website at http://www.diabeaters.com/new_lifestyles/HTML_FILES/catalog.html (accessed January 2005).

²⁸⁴ *Summit: Canada's Magazine on Public Sector Purchasing*.

actually was (though the suggested retail value for the pedometer was \$15).²⁸⁵ Getting this item in a \$6 box of cereal seems like a good deal, until one factors in the news of product failure as reported in an on-line article.²⁸⁶

One can imagine that the unit price for low-end devices, and especially ones involved with promotional give-aways like those sponsored by Kellogg's and McDonald's (in the US and elsewhere in 2003), is probably pretty low. The cost may somewhat reflect the quality. As one independent website concluded: "the engineers spend more effort making the product inexpensive rather than going the extra mile to make the device accurate, reliable, and a pleasure to use."²⁸⁷ This can have an unfortunate effect if the give-away represents the first exposure of a person to using a pedometer; a bad impression may persist and spread, and curtail the overall public health benefit.

In estimating the cost of providing pedometers to inactive individuals in British Columbia, we have assumed that the DigiWalker SW-200 which retail at \$38.99 could be purchased in bulk (50,000+ units per year) for \$20.00 per unit. Furthermore, we have assumed that each individual who would need to move from being inactive to active to achieve the BCHLA targets in this area would receive a pedometer, and that this pedometer would be subsidized at 75%. That is, the individual would be able to 'purchase' a DigiWalker SW-200 for a modest fee of \$5.00.

The results of this analysis are shown on the following table.

	Pedometers Estimated Cost					
	Fiscal Year					
	2005/06	2006/07	2007/08	2008/09	2009/2010	2010/11
Inactive to Active Individuals	54,331	56,336	57,880	59,317	60,765	62,219
Average Cost of Pedometer	\$ 20.00	\$ 20.60	\$ 21.22	\$ 21.85	\$ 22.51	\$ 23.19
Total Cost	\$ 1,086,617	\$ 1,160,518	\$ 1,228,106	\$ 1,296,338	\$ 1,367,826	\$ 1,442,583
Subsidy (75%)	\$ 814,962	\$ 870,388	\$ 921,079	\$ 972,254	\$ 1,025,869	\$ 1,081,937

A pedometer subsidy program would cost \$0.8 million in the first year, increasing to \$1.1 million by 2010/11.

²⁸⁵ As a comparison, a program involving 2,500 patients in Alabama sponsored by a Kellogg-related foundation provided pedometers, advertising and some administration for US\$40,000. Extrapolating to the Canadian context, the program in 2004 may have cost Kellogg's over a million dollars.

²⁸⁶ Available at <http://www.speakwell.com/well/2004spring/pedCopy.html> (accessed January 2005).

²⁸⁷ Available at <http://pedometers.com/engineering.asp> (accessed January 2005).

Enhanced Access to Places of Physical Activity

Increasing the use of community facilities for physical activity can focus on demand or supply. Apart from various types of advertising, stimulating the demand of individuals for physical activity facilities may be more realistic in other settings (e.g., risk screening clinics, primary care “green” prescriptions). Groups of people, on the other hand, could be encouraged to access such resources through the expansion of community groups and events (see the section above) and the distribution of adequate information, such as an inventory of facilities. Another vital issue is safety: the demand to use parks, trails, and even indoor facilities will increase if steps are taken to make them as secure as possible, e.g., lighting, enforced dog policies, emergency phones, staff monitoring the changing rooms. Safe access to the very basic “facilities” of a community should not be neglected: sometimes the most commonly used places for physical activity are streets and sidewalks.²⁸⁸

One incentive at a population level involves a fiscal lever, i.e., reducing or eliminating access fees for select cohorts. The targets can be very specific, e.g., free exercise classes for pregnant women, perhaps linked to a smoking cessation program for affected women. A strategy of broader appeal involves cancelling recreation fees for school-aged children, which is actually one of the recommendations in a recent UK report on obesity.²⁸⁹ As one example in BC, the Municipality of Delta has recently made their leisure centres free for grade 5 students. The degree that such programs could be expanded will depend on the subsidy budget available.

Increasing supply of facilities can mean literally constructing more, but directly influencing such large-scale policy would usually lie outside the scope of a community action coordinator. More pragmatically, working to make existing facility options truly available is a worthy goal. For instance, access policies and even rental rates may be very reasonable at the level of school boards, but the reality is that principals often act as the true gatekeepers, controlling how their property is used by outside groups. In recreation facilities, the hours of opening can make a big difference in usage rates. A broad-based community partnership around the use of physical activity facilities will involve bringing administrators on board, not only in the public sphere but in private settings such as churches, athletic clubs with their own space, and other social organizations.

²⁸⁸ Huston S, Evenson K, Bors P, Gizlice Z. Neighborhood environment, access to places for activity, and leisure-time physical activity in a diverse North Carolina population. *American Journal of Health Promotion*. 2003; 18(1): 58-69.

Sun Safety in Recreational Settings

Prevention of exposure to UV radiation is an important public health concern. It is possible that, with enhanced focus on physical activity, people will be spending more time outdoors, thus potentially increasing their need for sun safety.

According to the Community Guide of the US Task Force on Community Preventive Services, interventions used for sun safety in recreational or tourism settings have been designed to increase sun-protective knowledge, attitudes, intentions, and behaviors among adults and children.²⁹⁰

The role of a community action coordinator could be to stimulate policy-makers and frontline staff to be proactive in the most common settings for sun exposure, e.g., beaches, pools, day camps, school playgrounds.

Interventions related to sun safety can include one or more of the following:

- educational brochures, including culturally-relevant materials and photographs of skin cancer lesions;
- sun-safety training of and role-modeling by lifeguards, aquatic instructors, and outdoor recreation staff;
- sun-safety lessons, interactive activities, and incentives for parents and children;
- direct provision of sunscreen (samples or regular supply);
- point-of-purchase prompts; and
- increasing availability of shaded areas.

To serve the latter objective, shade and shelter assessments of key outdoor locations can be conducted. There are consultancies which specialize in this sort of work, generating reports that can be used to advocate improvements.²⁹¹

Additional comments on sun safety in school settings can be found below.

²⁸⁹ See the summary at <http://www.iotf.org/media/iotfjan29.htm> (accessed February 2005).

²⁹⁰ See summary at <http://www.thecommunityguide.org/cancer/skin/default.htm> (accessed February 2005).

²⁹¹ See for example <http://www.shelterstrategies.com.au/Consultancies.html> (accessed February 2005).

Funding for Community Groups

Community-based initiatives that have seen success, e.g., the North Karelia project in Finland, attribute a considerable portion of their success to broad-based community involvement and support.

One way to encourage community involvement is to provide grant funding for community based initiatives seeking to address one or more of the risk factors in a specific community. This funding should be broadly available to community groups. In estimating costs for such a program, we have assumed that the grants would be a maximum of \$10,000 to allow for such a broad distribution of funds. In the first year, eight grants would be available for community groups in each electoral district, increasing to 16 grants in the following years. The average size of grants would be \$7,500 in 2005/06, increasing by 3% per year.

Based on these assumptions, this program would allocate \$4.5 million in grants in 2005/06, increasing to \$10.4 million by 2010/11 (see following table)

Funding for Community Groups						
Estimated Cost						
	Fiscal Year					
	2005/06	2006/07	2007/08	2008/09	2009/2010	2010/11
Community-Based Interventions						
Grants per Electoral District	8	16	16	16	16	16
Average Number of Grants	600	1,200	1,200	1,200	1,200	1,200
Average Value per Grant	\$ 7,500	\$ 7,725	\$ 7,957	\$ 8,195	\$ 8,441	\$ 8,695
Total Cost	\$ 4,500,000	\$ 9,270,000	\$ 9,548,100	\$ 9,834,543	\$ 10,129,579	\$ 10,433,467

School-based Interventions

The school environment, particularly elementary and secondary schools, are a convenient location to provide a prevention message and example to children and young people.

Prior to suggesting interventions in this setting, it is important to understand the volume of schools and students in the province. There are currently (in 2004) 2,033 elementary and secondary schools in British Columbia, with 684,000 students, or an average of 337 students per school (see following table, further details are available in Appendix F).

BC Elementary and Secondary Schools				
By Health Services Delivery Area				
HA	HSDA	# of Schools	# of Students	Mean # Students / School
Fraser Health Authority				
	Fraser North	210	90,080	429
	Fraser South	253	115,619	457
	Fraser East	135	49,034	363
	Fraser HA Overall	598	254,733	426
Vancouver Coastal Health Authority				
	Richmond	65	25,729	396
	Vancouver	172	74,760	435
	North Shore / Coast Garibaldi	118	38,835	329
	Vancouver Coastal HA Overall	355	139,324	392
Vancouver Island Health Authority				
	South Vancouver Island	218	69,216	318
	Central Vancouver Island	135	38,177	283
	North Vancouver Island	21	2,294	109
	Vancouver Island HA Overall	374	109,687	293
Interior Health Authority				
	East Kootenay	82	17,440	213
	Thompson Cariboo Shuswap	113	29,984	265
	Okanagan	179	57,545	321
	Kootenay Boundary	34	7,731	227
	Interior HA Overall	408	112,700	276
Northern Health Authority				
	Northeast	58	12,648	218
	Northern Interior	131	34,020	260
	Northwest	64	12,698	198
	Northern HA Overall	253	59,366	235
	Other	45	8,437	187
	British Columbia Overall	2,033	684,247	337

The challenge is to work towards enhanced population health among the almost 700,000 students in the “next generation” of our province, building on the structural and social advantages available in school settings. Schools with a broad commitment to health are sometimes called “health-promoting schools” (especially in Europe), guided by a 10-year old World Health Organization definition:²⁹²

A health promoting school is one in which all members of the school community work together to provide pupils with integrated and positive experiences and structures, which promote and protect their health. This includes both the formal and the informal curriculum in health, the creation of a safe and healthy school environment, the provision of appropriate health services and the involvement of the family and wider community in efforts to promote health.

A health promotion perspective is being supported in different spheres in BC, including the office of provincial health officer. One of the existing school-based initiatives, called *Healthy Schools*, can be traced back as far as 1990.²⁹³ There needs to be a recommitment to that broad-based strategy, as well new emphases. Recently, the province made a strong new start in tackling two important risk factors, obesity and inactivity, with a trial implementation of the program called *Action Schools! BC*.

Action Schools! BC

In May of 2003, the BC Government launched *Action Schools! BC*, a physical activity model tailored to individual elementary schools to promote healthy living.²⁹⁴

Action Schools! BC focuses on six action zones:

- School Environment – Making healthy choices the easy choices, by creating safe and inclusive environments and supporting active-living policy.
- Scheduled Physical Education – Supporting the curriculum goal to deliver 150 minutes of scheduled physical education per week.
- Classroom Action – Providing creative, alternative classroom physical activity ideas that complement scheduled physical education.
- Family and Community – Fostering the development of partnerships with families and community practitioners to promote active living.
- Extracurricular – Balancing classroom action and physical education with a variety of opportunities for students, school staff, and families to be physically active before and after school and during lunch and recess.
- School Spirit – Cultivating schools spirit by encouraging physical activity and celebrating the benefits of active living for the whole school.

Initial funding for the program was \$1.2 million.

²⁹² See the report from Scottish context at <http://www.healthpromotingschools.co.uk/files/beingwelldoingwell.pdf> (accessed February 2005).

²⁹³ See the revised guidelines at http://www.mcf.gov.bc.ca/publications/ecd/healthy_schools_website.pdf (accessed February 2005).

²⁹⁴ See http://www2.news.gov.bc.ca/nrm_news_releases/2003HLTH0014-000489-Attachment1.htm (accessed February 2005).

In November of 2004, the Province announced the continuation and expansion of *Action Schools! BC*,²⁹⁵ including the following components:

- More than \$14.5 million over five years for *Action Schools! BC*, which includes expanding the program to grades K-9 province-wide by 2010 and developing a secondary school model. An additional \$500,000 will be invested to train teachers and help districts and planning councils implement *Action Schools! BC*.
- An action plan to promote healthy food and to discontinue sales of junk food in BC schools within 4 1/2 years.
- An awards recognition program for BC schools that will be designed to echo and support the spirit of the 2010 Olympic and Paralympic Winter Games and help build positive attitudes toward lifelong physical activity.
- \$220,000 over three years to develop a framework to promote health in schools. This fulfils a recommendation in the provincial health officer's 2003 report *An Ounce of Prevention – a Public Rationale for the School as the Setting for Health Promotion*.
- A healthy schools forum on Jan. 14, 2005 that would launch formal work on the framework, with participants from government and key health and education health partners.
- \$300,000 over three years to support the Pan Canadian Joint Consortium on School Health. Together with Prince Edward Island, BC is leading a national consortium focused on school health.

While setting a good stage with *Action Schools! BC*, the province needs to go further, especially examining its commitment to other risk factors, and ensuring that a multi-component approach does not delay addressing *environmental* factors.

Combined Risk Factor Programs

Multi-component approaches to risk factor reduction in schools and other settings have been highlighted as effective by researchers. Already a *multi-component* approach (physical education, alternative classroom activities, involvement of parents, etc.), the expansion of the *Action Schools! BC* program into nutrition areas (see preceding section) begins also to move the province towards a *multi-factorial* approach to student health. Combining risk factors makes a lot of sense and can produce synergistic improvements in health.

Based on the “health-promoting schools” perspective, the recent report of the provincial health officer, *An Ounce of Prevention – a Public Rationale for the School as the Setting for Health Promotion*, includes 13 categories of concern, from body image to bullying. Alcohol and one other abused drug (cannabis) are naturally included, though not UV exposure.²⁹⁶ The effectiveness research on school-based risk factor interventions was reviewed in our previous report; the results in terms of actual *behaviour* changes have been mixed. Most research on school health promotion has,

²⁹⁵ See <http://www.healthservices.gov.bc.ca/cpa/mediasite/pdf/2004BCED0077-000987.pdf> (accessed February 2005).

²⁹⁶ Report available at http://www.healthservices.gov.bc.ca/pho/pdf/o_prevention.pdf (accessed February 2005).

not surprisingly, focused on substance abuse; there is little data measuring the impact of a more generalized “health promoting schools” approach.²⁹⁷

As suggested above, most research has focused on single risk factors. For instance, one area which is perhaps most relevant to elementary schools is protecting against UV exposure and associated skin cancer. This becomes especially important in the light of encouraging more physical activity, a proportion of which will occur outdoors. In a comprehensive prevention program, UV exposure thus is a sort of “side effect” that needs to be ameliorated, rather like weight gain upon smoking cessation.

The interventions for sun safety focus on some combination of increasing use of sunscreen, scheduling activities to avoid peak sun hours, increasing shade, encouraging children to play in shady areas or wear sun-protective clothing, and provision of information and modeling to children, parents, and teachers.²⁹⁸ Additional resources for recreational settings are suggested above under Community-Based Interventions.

With comprehensive health promotion, one of the main issues facing schools is whether programs can attempt to tackle too many health matters at the same time, diluting the focus on what might be considered the prime targets. Of course, any prioritization requires a set of criteria. If the emphasis is on major chronic disease prevention, then the risk factors that are of concern in this report will likely be centre stage: tobacco use, unhealthy diet, physical activity and obesity. However, the definition of health will undoubtedly continue to range much further than disease prevention per se.

Environmental Interventions in Schools

The *Ounce of Prevention* report helpfully identifies four core elements in a multi-component health program in schools:

- health instruction;
- on-site preventive health services plus assessment / referral to outside resources;
- social support, including staff, students and community resources (one might add parents); and
- a safe and secure physical environment.

The last category is the focus of this section. Following the pattern in many other parts of the BCHLA project, *environmental* improvements in schools are vital to long-term effectiveness in supporting behaviour changes and disease risk reduction. In this light, it is disconcerting that the phase-in time is so generous for the two explicit environmental interventions, promoting healthy food and not selling unhealthy food; if it really takes 4 to 5 years to accomplish these goals, then it will be too late to make a difference to the present plan.

²⁹⁷ See the review at

<http://www.city.hamilton.on.ca/PHCS/EPHPP/Research/Summary/HealthPromotingSchools.pdf> (accessed February 2005).

²⁹⁸ See summary at <http://www.thecommunityguide.org/cancer/skin/default.htm> (February 2005).

The Directorate of Agencies for School Health (DASH) maintains a website with resources applicable to developing school food and nutrition policies.²⁹⁹ In particular, there is a checklist of 50 possible environmental and program initiatives adaptable to BC, including:³⁰⁰

Options for Promoting Healthy Foods

Making nutritious and appealing foods such as vegetables, fruit, low fat dairy, and low fat grain products available wherever and whenever food is sold or offered.

Posting the nutrition content of food sold or offered.

Pricing healthy food items to ensure they are the most affordable option (this may involve subsidies from senior levels of government).

Increasing resources for BC's *community LINK* effort to make sure that programs such as "breakfast for learning" are made comprehensively available to students most in need.

Options for Curtailing Unhealthy Food

Avoid using food as a performance incentive, especially unhealthy food.

Eliminating "junk food" from vending machines, or at least subsidize the healthy selections.

Not using fast food or other "branded" items in a school meal program.

Exploring alternatives to fund-raising based on sale of unhealthy food items.

Resources for Interventions

Interventions cost money. This is often a stumbling block to trying a new intervention. Perhaps the intervention (e.g. banning sales of junk food) may lead to reduced revenue for school programs. Or, other interventions require the production of educational materials or additional staff support.

To begin to address these resource issues, we have allocated \$50 per student per year to school-based interventions. The assumption is that this money would be made available to individual schools to support specific initiatives seen as leading to a healthier school environment and thus healthier students.

²⁹⁹ See model policies at <http://www.dashbc.org/aboutnp/sfnp/policies.html> (accessed February 2005).

³⁰⁰ See the list at <http://www.departments.oxy.edu/uepi/schoolfoodschecklist.htm> (accessed February 2005).

School-based Interventions Estimated Cost							
	Fiscal Year						
	2004/05	2005/06	2006/07	2007/08	2008/09	2009/2010	2010/11
Actual							
# of Students	684,247						
# of Schools	2,033						
Average # of Students per School	337						
Projected							
Projected Increase in 5-17 yr old		-1.02%	-1.00%	-1.07%	-1.16%	-0.98%	-0.84%
# of Students		677,294	670,501	663,301	655,620	649,196	643,732
Average # of Students per School		333	330	326	322	319	317
Dollars Allocated per Student		\$ 50.00	\$ 51.50	\$ 53.05	\$ 54.64	\$ 56.28	\$ 57.96
Average Allocation per School		\$ 16,657	\$ 16,985	\$ 17,307	\$ 17,620	\$ 17,970	\$ 18,354
Total Allocation		\$ 33,864,683	\$ 34,530,817	\$ 35,184,816	\$ 35,820,707	\$ 36,533,791	\$ 37,313,104

The estimated cost of this component of the program would be approximately \$34 million, should all elementary and secondary schools in British Columbia choose to take advantage of the program.

Workplace-based Interventions

Implementing programs and policies in workplaces depends on a key philosophical decision: will private companies be subsidized to enhance employee health? If so, then one option that has been widely recommended is tax incentives related to providing exercise facilities and / or healthy food options in cafeterias. However, there is certainly an argument that companies should be independently motivated to provide a comprehensive prevention program, given the well-established cost-benefit ratios of such efforts. Research has consistently demonstrated that comprehensive worksite health promotion programs can lower healthcare and insurance costs, decrease absenteeism, and improve performance and productivity. Of 24 studies published in peer-reviewed journals from 1991-1993, “all but one evidenced positive health outcomes. Of the studies which analyzed cost-effectiveness or cost benefits, every one indicated a positive return.”³⁰¹

Help could still be offered to companies “doing it on their own.” For example, the Public Health Agency of Canada provides a template to enable employers to create a business case for employee health services.³⁰² Although the time that community action coordinators could spend in such a vast arena may be limited, there certainly is a role for encouraging business and industry to increase their commitment to employee health.

Similar attention needs to be paid to evaluating the employee health programs in public institutions. As suggested in the *The Path to Health and Wellness* report, programs for employees in the public sector should provide the “gold standard” for the rest of the province, beginning with the government’s own direct workforce.³⁰³

Whatever the health options provided, the main challenge in most workplaces will be finding ways to increase employee participation rates in proven preventive programs such as individual or group-based smoking cessation.

In the end, the *minimal* commitment of the government to workplace-based prevention should be to enhance enforcement of smoking bans, as these have an impact on both environmental tobacco smoke exposure and cessation rates.

³⁰¹ Pelletier K. A review and analysis of the health and cost-effective outcome studies of comprehensive health promotion and disease prevention programs at the worksite: 1991-1993 update. *American Journal of Health Promotion*. 1993; 8(1): 50-62.

³⁰² See http://www.phac-aspc.gc.ca/pau-uap/fitness/work/case_template_e.html (accessed February 2005).

³⁰³ Select Standing Committee on Health. *The Path To Health And Wellness: Making British Columbians Healthier by 2010*. 2004. See recommendations #11 and 12.

Clinical Interventions and Management

Brief tobacco dependence treatment is now the recommended minimum strategy in approaching all cases of smoking in primary care. Such a brief intervention is sometimes referred to as physician advice; it can comprise as little as three minutes of contact. A 2004 Cochrane review of 34 trials³⁰⁴ suggested that simple advice has a small positive effect on cessation rates. Compared to offering no advice, brief advice produced an absolute increase in cessation rates of 2.5%.

While brief advice is just marginally effective, there is evidence that more intensive advice or counselling is considerably more effective than minimal interventions. Intensified person-to-person contact (individual, group, or proactive telephone counselling) can include practical tools such as problem-solving, various supportive techniques, and follow-up after cessation (to prevent relapse). A Cochrane review of 15 trials (which specifically focused on cessation specialists rather than regular clinicians) found that counselling was 62% (odds ratio³⁰⁵ of 1.62) more likely to achieve successful smoking cessation than minimal intervention.³⁰⁶

In the report *Treating Tobacco Use and Dependence* the authors summarized the results of 43 studies of various intensity levels of person-to-person contact. Their results suggest a clear relationship between increased intensity of cessation counselling and abstinence rates, as indicated on the following table.

<i>Level of Contact</i>	<i>Estimated Odds Ratio (95% C.I.)³⁰⁷</i>	<i>Estimated Abstinence Rate (95% C.I.)</i>
No Contact	1.0	10.9%
Minimal Counselling (<3 minutes)	1.3 (1.01, 1.60)	13.4% (10.9, 16.1)
Low Intensity Counselling (3-10 minutes)	1.6 (1.2, 2.0)	16.0% (12.8, 19.2)
Higher Intensity Counselling (>10 minutes)	2.3 (2.0, 2.7)	22.1% (19.4, 24.7)

³⁰⁴ Silagy C, Stead L. Physician advice for smoking cessation Cochrane Tobacco Addiction Group *Cochrane Database of Systematic Reviews*. 3, 2004.

³⁰⁵ The odds ratio is used to compare the probability of a certain event occurring in two groups. An odds ratio greater than one implies that the event is more likely in that group.

³⁰⁶ Lancaster T, Stead L. Individual behavioural counselling for smoking cessation Cochrane Tobacco Addiction Group *Cochrane Database of Systematic Reviews*. 3, 2004.

³⁰⁷ C.I. = Confidence Interval, the 95% confidence interval range given means that the 'true' number will fall within the given range 95 out of a 100 times. For there to be a true (statistically significant) difference between the control group and the test group, the 95% CI range for the test group should fall outside of 1.0.

This same report, based on a meta-analysis of 45 studies, also noted a strong relationship between the number of treatment sessions and abstinence rates, as indicated on the following table.

<i>Number of Sessions</i>	<i>Estimated Odds Ratio (95% C.I.)</i>	<i>Estimated Abstinence Rate (95% C.I.)</i>
0-1 Session	1.0	12.4%
2-3 Sessions	1.4 (1.1, 1.7)	16.3% (13.7, 19.0)
4-8 Sessions	1.9 (1.6, 2.2)	20.9% (18.1, 23.6)
>8 Sessions	2.3 (2.1, 3.0)	22.1% (21.0, 28.4)

Finally, counselling administered by both physician clinicians and non-physician clinicians (e.g. nurses, health educators, psychologists, etc.) effectively increases abstinence rates (based on a meta-analysis of 37 studies), as indicated on the following table.

<i>Type of Clinician</i>	<i>Estimated Odds Ratio (95% C.I.)</i>	<i>Estimated Abstinence Rate (95% C.I.)</i>
No Clinician	1.0	10.2%
Self-help	1.1 (0.9, 1.3)	10.9% (9.1, 12.7)
Non-physician Clinician	1.7 (1.3, 2.1)	15.8% (12.8, 18.8)
Physician Clinician	2.2 (1.5, 3.2)	19.9% (13.7, 26.2)

The authors of *Treating Tobacco Use and Dependence* conclude that “there is a strong dose-response relationship between the intensity of tobacco dependence counselling and its effectiveness. Treatments involving person-to-person contact (via individual, group, or proactive telephone counselling) are consistently effective, and their effectiveness increases with treatment intensity (e.g., minutes of contact).”³⁰⁸ They suggest a minimum of four face-to-face contacts of at least 10 minutes duration.

Despite the effectiveness of primary care based interventions in smoking cessation, this is an underutilized service. There are a number of reasons for this, including the lack of appropriate training and financial support. Primary care providers who receive training in, for example, smoking cessation interventions, are more likely to apply these interventions in their clinic.^{309,310} This has led to the following recommendation; “To encourage provider interventions, all clinicians and clinicians-

³⁰⁸ Fiore M, Bailey W, Cohen S et al. *Treating Tobacco Use and Dependence. Quick Reference Guide for Clinicians*. Rockville, MD: U.S. Department of Health and Human Services. Public Health Service. October 2000.

³⁰⁹ Jennett P, Laxdal O, Hayton R et al. The effects of continuing medical education on family doctor performance in office practice: A randomized control study. *Medical Educator*. 1988; 22: 139-45.

³¹⁰ Richmond R, Mendelsohn C, Kehoe L. Family practitioners’ utilization of a brief smoking cessation program following reinforcement contact after training: A randomized trial. *Preventative Medicine*. 1998; 27: 77-83.

in-training should be trained in effective strategies to promote the motivation to quit tobacco use and to increase patients' success in quitting."³¹¹

With respect to an analysis of clinical interventions and management for either smoking cessation, increasing energy expenditure, or decreasing energy intake, an important piece of background information is the number of primary care providers in the province.

³¹¹ US Department of Health and Human Services, Treating Tobacco Use and Dependence: A Systems Approach, November 2000 available at <http://www.surgeongeneral.gov/tobacco/systems.pdf> (accessed December 2004).

Number of General Practices in British Columbia

The Centre for Health Services and Policy Research (CHSPR) at the University of British Columbia released the *Primary Health Care Atlas* on January 31, 2005.³¹² Based on this report, there were 3,852 general practitioners in British Columbia in 2000/01. We used this base information to estimate the number of primary care practices in the province. The number of locations is based on an average of 2.14 physicians per location in the Fraser Health Authority. This average was applied to the other HSDAs as group practice information is still being developed by CHSPR (current estimates are approximately 1.90), resulting in an estimated 1,797 locations (see following table).

Number of General Practitioners In British Columbia			
Based on the MSP Billing Address of the Physician Fiscal 2000 / 01			
HA	HSDA	# of GPs	Est # of Locations
Fraser Health Authority			
	Fraser North	383	179
	Fraser South	387	181
	Fraser East	177	83
	Fraser HA Overall	947	442
Vancouver Coastal Health Authority			
	Vancouver	774	362
	Richmond	130	61
	North Shore / Coast Garibaldi	289	135
	Vancouver Coastal HA Overall	1,193	557
Vancouver Island Health Authority			
	South Vancouver Island	485	227
	Central Vancouver Island	227	106
	North Vancouver Island	57	27
	Vancouver Island HA Overall	769	360
Interior Health Authority			
	East Kootenay	91	43
	Kootenay-Boundary	91	43
	Okanagan	291	136
	Thompson / Cariboo	186	87
	Interior HA Overall	660	308
Northern Health Authority			
	Northwest HSDA	106	49
	Northern Interior HSDA	127	59
	Northeast HSDA	44	21
	Northern HA Overall	277	129
	LHA Unknown	7	
	British Columbia Overall	3,852	1,797

One component of the current primary care reform in Canada is the enhancement of group practices, i.e. encouraging and increasing group practice size so as to allow 24-7 service and the inclusion of non physician staff to be able to expand the range of

³¹² Watson D, Krueger H, Mooney D, Black C. *Planning for Renewal: Mapping Primary Health Care in BC*. Available at <http://www.chspr.ubc.ca/Research/primaryhc/mappingphc.htm> (accessed February 2005).

services provided in the primary care setting. The current primary care reform presents an ideal opportunity to examine how services, particularly preventative services, are provided to patients.

With the focus on larger group practices, we have assumed that in the future, an increase in GPs in the province is likely to be offset by a larger number practicing in group settings.

Prevention Detailing

Visits in clinician's offices of "detailers" from pharmaceutical companies who explain (and promote) new drug products are commonplace. In 2003, the pharmaceutical industry had approximately 100,000 detailers in Canada and the US, or one for every five prescribing physicians. Some physicians have implemented restrictions, e.g. a maximum of two visits per year, in order not to be overwhelmed by detailers.³¹³

This much-debated practice has served as a model for other, more objective on-site, face-to-face encounters with primary care providers by knowledgeable healthcare educators. The practice, most commonly called "academic detailing,"³¹⁴ has become a growing fixture over the last 15 years in the arsenal of options to influence knowledge and practice in the primary care setting.^{315,316,317,318,319}

As the application of academic detailing in primary prevention is relatively new, its potential usefulness in modifying knowledge, attitudes, and activities of primary care providers and, ultimately, patient behaviours and health outcomes, has not been assessed. Some understanding of that usefulness can be inferred from the evidence of academic detailing in other arenas over the last couple of decades.

What is known, however, is that primary care physicians who receive training in, for example, smoking cessation interventions, are more likely to apply these interventions in their clinic.^{320,321}

The method and format of academic detailing can vary. It can involve as little as 15 to 30 minute personal sessions 2 to 3 times per year, with topics selected in accordance with enquiries received from the primary care providers. A variation on the theme of personalized visits is a trained educator interacting with a group of primary care providers.^{322,323}

³¹³ Clarke P. Detailing changes. *Medical Post*. October 28, 2003; 39(39).

³¹⁴ Soumerai S, Avorn J. Principles of educational outreach ('academic detailing') to improve clinical decision making. *Journal of the American Medical Association*. 1990; 263(4): 549-56.

³¹⁵ Siegel D, Lopez J, Meier J et al. Academic detailing to improve antihypertensive prescribing patterns. *American Journal of Hypertension*. 2003; 16(6): 508-11.

³¹⁶ Hall L, Eccles M, Barton R et al. Is untargeted outreach visiting in primary care effective? A pragmatic randomized controlled trial. *Journal of Public Health Medicine*. 2001; 23(2): 109-13.

³¹⁷ Solomon D, van Houten L, Glynn RJ. Academic detailing to improve use of broad-spectrum antibiotics at an academic medical center. *Archives of Internal Medicine*. 2001; 161(15): 1897-902.

³¹⁸ Markey P, Schattner P. Promoting evidence-based medicine in general practice—the impact of academic detailing. *Family Practice*. 2001; 18(4): 364-6.

³¹⁹ Hill C, Bunn D, Hawkins J. Stretching the managed care dollar in the new millennium: the practice of detailing primary care physicians. *Managed Care Quarterly*. 2002; 10(2): 18-23.

³²⁰ Jennett P, Laxdal O, Hayton R et al. The effects of continuing medical education on family doctor performance in office practice: A randomized control study. *Medical Educator*. 1988; 22: 139-45.

³²¹ Richmond R, Mendelsohn C, Kehoe L. Family practitioners' utilization of a brief smoking cessation program following reinforcement contact after training: A randomized trial. *Preventative Medicine*. 1998; 27: 77-83.

³²² Diwan V, Wahlstrom R, Tomson G et al. Effects of "group detailing" on the prescribing of lipid-lowering drugs: a randomized controlled trial in Swedish primary care *Journal of Clinical Epidemiology* 1995; 48(5): 705-11.

Prevention Detailers

The background of the detailer depends on the task. Clinical pharmacists,^{324,325,326,327} physicians, and nurses are the professionals most commonly trained as detailers.^{328,329,330} For the purposes of prevention detailing, it would be appropriate to use masters prepared community health nurses or equivalently qualified staff with at least five years of experience. The individuals hired for these positions should have the following skill-set:

- Experts on the importance of health promotion / prevention
- Adept at building trust quickly in frequent "cold calls"
- Able educators and focused communicators
- Good at managing diverse information, assimilating research, and using guidelines
- Willingness to travel to appointments
- Ability to multi-task and use their time efficiently
- Augment 1-to-1 encounters with telephone follow-up & group presentations
- Familiar with managing cross-professional relationships
- Ability to work in a process over the long-term.

The work of prevention detailers would focus on the following principles:

- interviewing to determine baseline knowledge held by primary care providers
- defining clear objectives
- establishing credibility in a variety of ways, e.g., by being unbiased
- stimulating active participation in the educational interaction
- using concise graphic materials
- highlighting and repeating the essential message
- providing positive feedback about improvements on follow-up visits.³³¹

³²³ Siegel D, Lopez J, Meier J et al. Academic detailing to improve antihypertensive prescribing patterns. *American Journal of Hypertension*. 2003; 16(6): 508-11.

³²⁴ Siegel D, Lopez J, Meier J et al. Academic detailing to improve antihypertensive prescribing patterns. *American Journal of Hypertension*. 2003; 16: 508-11.

³²⁵ Silversides A. "Academic detailing" improving prescribing practices in North Vancouver, conference told. *Canadian Medical Association Journal*. 1997; 156: 876-8.

³²⁶ The RxFiles Newsletter February, 2003. Available at www.RxFiles.ca (accessed December 2004).

³²⁷ Diwan VK, Wahlstrom R, Tomson G et al. Effects of 'group detailing' on the prescribing of lipid-lowering drugs: A randomized controlled trial in Swedish primary care. *Journal of Clinical Epidemiology*. 1995; 48(5): 705-11.

³²⁸ Feder G, Griffiths G, Highton C et al. Do clinical guidelines introduced with practice based education improve care of asthmatic and diabetic patients? A randomized controlled trial in general practices in east London. *British Medical Journal*. 1995; 311(7018): 1473-8.

³²⁹ Goldstein M, Niaura R, Willey C et al. An academic detailing intervention to disseminate physician-delivered smoking cessation counselling: smoking cessation outcomes of the Physicians Counselling Smokers Project. *Preventative Medicine*. 2003; 36: 185-96.

³³⁰ Drug Evaluation Alliance of Nova Scotia Newsletter April 2001. Available at <http://www.gov.ns.ca/health/pharmacare/pubs/Annual%20Summary%20April%202001.pdf> (accessed December 2004).

³³¹ Soumerai S, Avorn J. Principles of educational outreach ('academic detailing') to improve clinical decision making. *Journal of the American Medical Association*. 1990; 263(4): 549-56.

Number of Visits to Each Location per Year

Based on current practice in academic detailing, prevention detailing would involve about two to three individual or group visits per year,^{332,333,334,335,336} with time for telephone and other correspondence before and after each visit.³³⁷

In determining the estimated cost of implementing a prevention detailing program in British Columbia, we have assumed three 30 minute visits by the prevention detailer to each GP location per year. This would apply to areas with higher physician densities (e.g. most of VCHA, all of FHA, the south of Vancouver Island and larger centres in the IHA and NHA). Geographically dispersed areas would receive two face-to-face visit per year with more intense follow-up (e.g. telephone, email, fax).

In estimating the cost of a prevention detailing program in British Columbia, we made the following assumptions / calculations (for details see Appendix G):

- Each full time prevention detailer would provide approximately 1,500 worked hours per year, with 70% of this time in client contact (including the actual visit, pre and post visit correspondence, and travel time) and 30% in education, research, and preparation for client contacts. The average detailer would thus provide approximately 1,000 hours of client contact time per year.
- The number of detailers is based on the estimated number of general practitioner office locations (see above), the number of client contacts per year, and the time required to travel to and from the GP office location.
- Starting salary on April 1, 2005 would be \$71,178. Salary costs would increase by 4% per year with additional experience increments based on the BCNU pay scale. Benefits are calculated at 20%.
- Overhead costs, including office space, supplies, etc. are estimated at 40% of salary (before benefits).
- A provincial coordinator would be paid the starting salary plus \$10,000 per year.

³³² Goldstein M, Niaura R, Willey C et al. An academic detailing intervention to disseminate physician-delivered smoking cessation counselling: smoking cessation outcomes of the Physicians Counselling Smokers Project. *Preventative Medicine*. 2003; 36: 185-196.

³³³ Silversides A. "Academic detailing" improving prescribing practices in North Vancouver, conference told. *Canadian Medical Association Journal*. 1997; 156: 876-8.

³³⁴ The RxFiles Newsletter February, 2003. Available at www.RxFiles.ca (accessed December 2004)

³³⁵ Drug Evaluation Alliance of Nova Scotia Newsletter April 2001. Available at <http://www.gov.ns.ca/health/pharmacare/pubs/Annual%20Summary%20April%202001.pdf> (accessed December 2004).

³³⁶ Diwan V, Wahlstrom R, Tomson G et al. Effects of 'group detailing' on the prescribing of lipid-lowering drugs: A randomized controlled trial in Swedish primary care. *Journal of Clinical Epidemiology*. 1995; 48(5): 705-11.

³³⁷ Feder G, Griffiths G, Highton C et al. Do clinical guidelines introduced with practice based education improve care of asthmatic and diabetic patients? A randomized controlled trial in general practices in east London. *British Medical Journal*. 1995; 311(7018): 1473-8.

- Travel time and costs are estimated based on the office location of the detailer and the average distance to physician's offices. Travel costs are estimated at \$0.44 per kilometer.

Based on these assumptions, annual costs of a prevention detailing program that would provide access to all GPs in the province would cost approximately \$2.5 million, as indicated on the following table. This cost would increase to \$3.1 million by 2010/11.

Prevention Detailing Estimated Cost						
	Fiscal Year					
	2005/06	2006/07	2007/08	2008/09	2009/2010	2010/11
British Columbia Overall						
FTEs	18.0	18.0	18.0	18.0	18.0	18.0
Salary	\$ 1,291,203	\$ 1,373,794	\$ 1,467,513	\$ 1,563,919	\$ 1,675,271	\$ 1,741,882
Benefits (@20%)	\$ 258,241	\$ 274,759	\$ 293,503	\$ 312,784	\$ 335,054	\$ 348,376
Overhead (@40%)	\$ 516,481	\$ 549,518	\$ 587,005	\$ 625,568	\$ 670,108	\$ 696,753
Travel	\$ 288,346	\$ 299,880	\$ 311,875	\$ 324,350	\$ 337,324	\$ 350,817
Total \$	\$ 2,354,271	\$ 2,497,951	\$ 2,659,896	\$ 2,826,620	\$ 3,017,758	\$ 3,137,828

Reimbursement of Primary Care Based Smoking Cessation

In estimating the cost of expanding primary care based smoking cessation programs in British Columbia, we have made the following assumptions:

- Initially, 25% of the targeted reduction in smokers would seek primary care based support for cessation. This would increase to 50% by 2008/09.
- Five quit attempts would be required for every successful cessation.
- An initial longer consultation meeting would be followed up with five follow-up visits. These visits could take place on a one-to-one basis or in small groups. The initial costs are based on one-to-one visits.
- The cost of the initial visit would be \$48.57 with follow-up visits at \$27.90. The cost of these visits would increase by 3% per year.

Based on these assumptions, the cost of this program would be \$8.2 million in 2005/06 increasing to \$21.8 million in 2010/11, as indicated on the following table.

Primary Care Interventions Estimated Cost - Individual Sessions						
	Fiscal Year					
	2005/06	2006/07	2007/08	2008/09	2009/2010	2010/11
Smokers						
Target Reduction	34,698	36,237	37,201	38,128	39,057	40,056
% Accessing Primary Care	25%	35%	45%	50%	50%	50%
Ratio of Attempts / Success	5:1	5:1	5:1	5:1	5:1	5:1
Total Quit Attempts	43,373	63,415	83,703	95,319	97,642	100,141
Visits per Quit Attempt						
Initial Visit	1	1	1	1	1	1
Follow-up Visits	5	5	5	5	5	5
Cost per Visit (Individual Sessions)						
Initial Visit	\$ 48.57	\$ 50.03	\$ 51.53	\$ 53.07	\$ 54.67	\$ 56.31
Follow-up Visits	\$ 27.90	\$ 28.74	\$ 29.60	\$ 30.49	\$ 31.40	\$ 32.34
Annual Costs	\$ 8,157,110	\$ 12,284,322	\$ 16,700,695	\$ 19,588,897	\$ 20,668,417	\$ 21,833,230

Group Therapy for Smoking Cessation

The above cost estimates are based on individual sessions between the primary care provider and the smoker.

Group therapy offers individual members the opportunity to learn skills and techniques to change behaviour and stop smoking, as well as to provide each other with psychosocial support. There are over 100 different group therapy programs described in the literature.³³⁸ The groups can be led by professional facilitators, clinical psychologists, health educators, nurses, or physicians. The rationale for including group therapy in the arsenal of cessation strategies is that it lies between intensive counselling and self-help approaches, and perhaps is less expensive than the former and more effective than the latter. A range of components are used in group therapy; there is evidence that aids for cognitive and behavioural skills and avoiding relapse are especially useful.

There is some evidence that group therapy may be less expensive than individual therapy, with costs depending to some degree on the background of the facilitator and the size of the group.

In the following analysis we have maintained all of the assumptions of the individual sessions but assumed a 4:1 patient to instructor ratio. With this relatively small group approach, the costs decreased from \$8.2 million to \$6.4 million in the first year and from \$21.8 million to \$17.2 million in 2010/11 (see following table). A larger group size would decrease costs even further.

Primary Care Interventions Estimated Cost - Group Sessions						
	Fiscal Year					
	2005/06	2006/07	2007/08	2008/09	2009/2010	2010/11
Smokers						
Target Reduction	34,698	36,237	37,201	38,128	39,057	40,056
% Accessing Primary Care	25%	35%	45%	50%	50%	50%
Ratio of Attempts / Success	5:1	5:1	5:1	5:1	5:1	5:1
Total Quit Attempts	43,373	63,415	83,703	95,319	97,642	100,141
Visits per Quit Attempt						
Initial Visit	1	1	1	1	1	1
Follow-up Visits	5	5	5	5	5	5
Cost per Visit (Individual Sessions)						
Initial Visit	\$ 48.57	\$ 50.03	\$ 51.53	\$ 53.07	\$ 54.67	\$ 56.31
Follow-up Visits	\$ 19.85	\$ 20.45	\$ 21.06	\$ 21.69	\$ 22.34	\$ 23.01
Annual Costs	\$ 6,411,357	\$ 9,655,280	\$ 13,126,478	\$ 15,396,558	\$ 16,245,044	\$ 17,160,568

³³⁸ Hajek P. Current issues in behavioral and pharmacological approaches to smoking cessation. *Addictive Behaviors*. 1996; 21(6): 699-707.

In conclusion, the funding of smoking cessation services is critical to their establishment and use. The conclusion in the United States is that

*when smoking cessation services are provided as a fully covered benefit by a health plan in contrast to a health plan that required a significant co-pay, evidence suggests that the overall use of cessation treatment will increase and smoking prevalence within the health plan will decrease. The national health promotion and disease prevention objectives for the year 2010 as set forth in Healthy People 2010 propose to increase to 100 percent the proportion of health plans that offer treatment of nicotine addiction, such as tobacco use cessation counselling by health care providers, pharmacotherapies, and other cessation services. The presence of prepaid or discounted prescription drug benefits increases patients' receipt of nicotine gum, the duration of gum use, and smoking cessation rates.*³³⁹

³³⁹ US Department of Health and Human Services, *Treating Tobacco Use and Dependence: A Systems Approach*, November 2000. Available at <http://www.surgeongeneral.gov/tobacco/systems.pdf> (accessed December 2004).

Nicotine Replacement Therapy

The last review of nicotine replacement therapy (NRT) in BC by the Therapeutics Initiative of UBC was conducted in 1997.³⁴⁰ At that time, all forms of NRT were deemed effective; with patches, there was not sufficient evidence to recommend one type over another, nor was a comparison of gum and patches possible. There was some evidence that combining gum and patches may be useful with heavily-addicted smokers. Only gum and patches were available in Canada in 1997, with patches requiring a prescription. All NRT products are now sold over-the-counter in BC³⁴¹

The figures in the table below are the regular retail prices from January, 2005, in three major pharmacies in BC. The patches come in a 7 day supply (or 14 days for the highest dose, used with heavier smokers starting out on their quit campaign).

<i>Drug</i>	<i>Quantity</i>	<i>Pharmasave</i>	<i>London Drugs</i>	<i>Save-On</i>
Nicoderm patch (21 mg)	14 patches		\$49.99	\$54.99
Nicoderm patch (21-14-7 mg)	7 patches	\$28.99	\$28.99	\$28.79
Habitrol patch (21-14-7 mg)	7 patches	\$26.99		\$23.39
“House” brand	14 patches		\$39.99	
	7 patches	\$22.99	\$22.99	
Nicorette gum (2 mg)	30 pieces	\$11.99	\$13.49	\$12.69
	105 pieces	\$29.99	\$29.99	\$28.99
Nicorette gum (4 mg)	30 pieces	\$14.99	\$14.99	\$13.95
	105 pieces	\$35.99	\$37.99	\$35.55
Inhaler	42 cartridges			\$39.99
	30 cartridges			\$29.99

The nicotine patch dosages noted in the above table refers to three different intensities, depending upon the type and timing of therapy needed. A typical course of treatment is suggested in the Nicoderm instructional literature, namely a total of 10 weeks of daily patches, stepping down in dose from 21 mg to 7 mg as one proceeds through the program. A second approach begins with the medium dosage level (14 mg) for 6 weeks, and then moves to the lowest dose, 7 mg, for 2 to 4 weeks, as needed; this less intense program is used for those who smoke less than 10 cigarettes a day, who weigh less than 45 kg, or who have heart disease.

The Nicorette gum instructions for patients suggest that the usual rate of usage is 10 pieces of gum per day. The patient is directed to not use more than 20 pieces per day

³⁴⁰ Therapeutics Initiative. Effective clinical tobacco intervention. *Therapeutics Letter*. September/October, 1997.

³⁴¹ For example, the Federal Health Protection Branch changed the status of nicotine patch products in June, 1998.

(one British website put the upper limit at 15 pieces³⁴²). The 4 mg dosage is meant for people who smoke more than 20 cigarettes a day. As for the course of treatment, the US FDA guidelines specify that the product should not be used for more than 12 weeks.

Reimbursement of Costs

The “special authority criteria” of the BC PharmaCare plan does not extend to smoking cessation aids such as gum and patches, and as of June, 2004, bupropion (Zyban) used as a cessation aid was also explicitly confirmed as excluded from the normal plan and “special authority” provisions.

A complete survey of private insurance plans operating in BC has not been completed to see if any includes cessation aids under extended coverage provisions. As one notable example, though, the employee benefits of the BC Public Service Agency explicitly excludes nicotine gum and patches.³⁴³

The situation in BC can be compared with the province of Quebec, which added both NRT and bupropion to its drug plan in 1998, and also required private insurers to comply with at least the minimum standards of the public plan. Although several Canadian jurisdictions subsidize NRTs for limited population groups, Quebec remains the only province which fully reimburses such products, at a cost of \$15 million in 2003-04.³⁴⁴ It is not clear how much of the almost 10% drop in Quebec smoking rates since 1994³⁴⁵ could be attributed to covering the out-of-pocket expenses of many people trying to quit, or even whether any specific studies have been done. There is no subsidization of NRT or bupropion in Ontario, though this approach was recommended by the Ontario Medical Association in a report in December, 2003.³⁴⁶

The Clean Air Coalition of BC rated the progress on this area of tobacco control in the province as *unacceptable* in its 2001 Report Card.³⁴⁷

The literature strongly supports the use of NRT in conjunction with a primary care based cessation program. Yet the costs of NRT can be prohibitive, especially to those of lower financial means. In addition, without access to smoking cessation programs, most individuals will need to make at least 10 quit attempts on average before they are successful, increasing the costs of the NRT dramatically. NRT costs approximately \$250 per quit attempt. With access to smoking cessation programs, the

³⁴² Available at http://www.myparmacy.co.uk/medicines/medicines/n/nicorette/nicorette_2mg_gum.htm (accessed January 2005).

³⁴³ Description available at http://www.bcpublicservice.ca/benefits/plan_details/health.htm (accessed January 2005).

³⁴⁴ Ontario Tobacco Research Unit. *The Tobacco Control Environment: Ontario and Beyond*. November, 2004.

³⁴⁵ Statistics from the Canadian Community Health Survey. Available at <http://www.statcan.ca/Daily/English/040615/d040615b.htm> (accessed January 2005).

³⁴⁶ Ontario Medical Association. *Investing in Tobacco Control: Good Health Policy, Good Fiscal Policy*. December, 2003.

³⁴⁷ Clean Air Coalition of BC. *1st British Columbia Tobacco Control Report Card*. June, 2001.

average number of quit attempts per successful cessation is reduced from at least 10 to 4 or 5.

To encourage successful cessation attempts, it is important to provide easy access to both a smoking cessation program as well as NRT. To encourage this combination of services, we have estimated the cost of providing free NRT, but only to those individuals who enter a smoking cessation program.

One important advantage of a publicly funded approach is the ability to provide NRT at a lower unit cost than if the product is purchased by individuals at retail prices. In the analysis above, we have assumed a 40% reduction in unit costs associated with the bulk purchasing of NRT patches.

To fund the NRT of all individuals who entered a smoking cessation therapy program would cost \$6.5 million in the first year, increasing to \$15.0 million in 2010/11 (see following table).

Nicotine Replacement Therapy Estimated Cost						
	Fiscal Year					
	2005/06	2006/07	2007/08	2008/09	2009/2010	2010/11
Nicotine Replacement Therapy						
Target Reduction - Smokers	34,698	36,237	37,201	38,128	39,057	40,056
% Accessing Primary Care	25%	35%	45%	50%	50%	50%
Ratio of Attempts / Success	5:1	5:1	5:1	5:1	5:1	5:1
Total Quit Attempts	43,373	63,415	83,703	95,319	97,642	100,141
Nicotine Replacement Therapy						
Retail Cost of 70 Patches	\$ 250.00	\$ 250.00	\$ 250.00	\$ 250.00	\$ 250.00	\$ 250.00
Est Wholesale Cost	\$ 150.00	\$ 150.00	\$ 150.00	\$ 150.00	\$ 150.00	\$ 150.00
Annual Costs	\$ 6,505,910	\$ 9,512,304	\$ 12,555,437	\$ 14,297,827	\$ 14,646,372	\$ 15,021,164

Lifestyle Counselling

While primary care based smoking cessation programs are very cost-effective, there is also some evidence that similar approaches may succeed in the other targeted lifestyle areas; namely, physical activity, healthy eating, and weight loss / maintenance.

One such approach, called the “green prescription” intervention, has been piloted in New Zealand.³⁴⁸ The New Zealand “green prescription” intervention includes the following steps:

- Primary care clinicians are offered four hours of training in how to use motivational interviewing techniques to give advice on physical activity and the green prescription
- Patients who have been identified as "less active" through screening at the reception desk and who agree to participate receive a prompt card, stating their stage of change, from the researcher, to give to the general practitioner during consultation
- In the consultation, the primary care professional discusses increasing physical activity and decides on appropriate goals with the patient. These goals, usually home based physical activity or walking, are written on a standard green prescription and given to the patient
- A copy of the green prescription is faxed to the local sports foundation with the patient's consent. Relevant details such as age, weight, and particular health conditions are often included
- Exercise specialists from the sports foundation make at least three telephone calls (lasting 10-20 minutes) to the patients over the next three months to encourage and support them. Motivational interviewing techniques are used. Specific advice about exercise or community groups is provided if appropriate
- Quarterly newsletters from the sports foundations about physical activity initiatives in the community and motivational material are sent to participants. Other mailed materials, such as specific exercise programmes, are sent to interested participants
- The staff of the general practice is encouraged to provide feedback to the participant on subsequent visits to the practice

In reviewing this program, Elly et al³⁴⁹ found that the average cost per “green prescription” was \$170NZ and that one out of ten prescriptions resulted in sustained physical activity and an improvement in quality of life over the 12 month follow-up

³⁴⁸ Elley R, Kerse N, Arroll B, Robinson E. Effectiveness of counselling patients on physical activity in general practice: Cluster randomised controlled trial. *British Medical Journal*. 2003; 326: 793-9.

³⁴⁹ Elley R, Kerse N, Arroll B et al. Cost-effectiveness of physical activity counselling in general practice. *New Zealand Medical Journal*. 2004; 117(1207): U1216.

period. The cost of moving one sedentary individual into an active lifestyle was \$1,756NZ or \$1,547CA.³⁵⁰

In estimating the cost of a “green prescription” program in British Columbia we have assumed that 10% of the targeted reduction of physically inactive individuals would access such a program, with this percent increasing to 25% over time. The estimated cost of the program would be \$8.4 million in the first year, increasing to \$28.0 million in 2010/11, as indicated on the following table.

Primary Care Interventions Lifestyle Counselling - Estimated Cost						
	Fiscal Year					
	2005/06	2006/07	2007/08	2008/09	2009/2010	2010/11
Physically Inactive						
Target Reduction	54,331	56,336	57,880	59,317	60,765	62,219
% Accessing Primary Care	10%	15%	20%	25%	25%	25%
Ratio of Attempts / Success	10:1	10:1	10:1	10:1	10:1	10:1
Total Attempts	54,331	84,504	115,761	148,292	151,912	155,548
Cost per Attempt	\$ 155	\$ 160	\$ 164	\$ 169	\$ 174	\$ 180
Annual Costs	\$ 8,421,279	\$ 13,491,018	\$ 19,035,638	\$ 25,116,551	\$ 26,501,625	\$ 27,950,045

³⁵⁰ Based on \$1,756NZ converted to Canadian dollars using an exchange rate of 0.88.

Special Populations

Special populations represent those who are at high risk for chronic disease or are otherwise strategic in terms of potential health improvements and cost avoidance. As well, attempts to address socioeconomic disparities play a role in the following emphasis. Four population categories are briefly reviewed below, with some high-level suggestions for risk factor strategies. Much more work needs to be done on detailed planning. A key guideline for any program improvement or development is to fully involve individuals from the target group in taking leadership in and developing the necessary programs.

Pregnant Women and New Mothers

Smoking Cessation

In the economic analysis provided earlier in this report, the cost-benefit ratio for reducing smoking during pregnancy was seen to be very favourable. This is largely due to avoided costs related to low-birthweight newborns.

Broader policies already discussed, such as taxation, are perhaps even more effective for motivated and / or low income pregnant women than for those in the general population.

Enhancements to the clinical services available in the healthcare system as a whole will also “catch” pregnant women, but more targeted assessment, providing reminders, counselling, and social support in obstetrical care could increase smoking cessation in pregnant women.

To multiply the benefits even further, clinical and community programs need to be developed to prevent relapse after birth. The goal is to encourage and support permanent cessation in new mothers, who are still a relatively “motivated” cohort. Initiatives related to “smoke-free homes and cars” will provide a major educational and environmental boost to any other efforts geared to protecting mothers and their young children.

Comprehensive Preventive Care in Pregnancy and New Families

Preventive care for pregnant women, new mothers and babies extends beyond smoking cessation. Especially for high risk and / or low income situations, such care needs to embrace a range of services, from nutrition counselling to helping with substance abuse. There is an established service in BC that addresses this area, the Pregnancy Outreach Program (POP), which is partly funded by the Canada Prenatal Nutrition Program. The government’s description of POP is as follows:³⁵¹

The Pregnancy Outreach Program in BC provides services and supports to pregnant women and new families at risk of poor maternal or infant health due to poverty, substance use and/or isolation. There are 40 sites throughout the province providing nutrition counselling, supplemental food, social support, health education, and referral to other community services.

³⁵¹ See the websites at <http://www.healthservices.gov.bc.ca/prevent/pregnancy.html> and <http://www.healthservices.gov.bc.ca/library/statsmaster/in0042.html> (accessed February 2005).

The Pregnancy Outreach Program provides health counselling and peer support to high risk pregnant women who do not typically access prenatal health services. The specific objectives are to improve nutrition, decrease smoking, decrease alcohol and drug use, ensure social support, and encourage breastfeeding.

Any enhancement of prenatal and maternal care would need to take into account what this programs offers to low-income families. Clear points of potential expansion in the area as a whole are mothers and families who lie outside of the strict POP criteria.

Breastfeeding for Obesity Control

As noted in our previous report, breastfeeding represents one of those low-cost interventions with no adverse effects that, among other health benefits for child and mother, could be a cornerstone in the fight against childhood obesity and its possible consequences (including increased risk for adult obesity).

There are already longstanding and well-established breastfeeding advocacy, education, and support services available in BC. The main way to create more progress might be to intensify the media, community health, and clinical (e.g., paediatrician) messages that link breastfeeding to the obesity issue.

Mental Illness

Similar to the situation with pregnant women and any other specific subpopulation, responding to the tragically high smoking rates among the mentally ill requires targeted efforts. The main difference is that the degree to which community-based health messages and controls can be received and acted upon is limited, though they may influence any caregivers (though such secondary influence is limited, as many mentally ill people live on their own). This means that a strategy will not depend so much on media advocacy or policy initiatives such as taxation, but rather very focused clinical and group programs. Increased funding for specialized cessation counsellors (for depression), group facilitators (for schizophrenia), and pharmacotherapy (for both) could have dramatic health and economic benefits.

First Nations

In addition to the media advocacy suggestions (see above), the main concerns with approaching preventive care in First Nations is cultural sensitivity and respect for historical and political contexts. This involves more than distinguishing traditional tobacco use from unhealthy versions and producing culture-based materials and programs, e.g., *Don't Misuse Tobacco: Keep it Sacred*.³⁵² Although important, well-recognized distinctions such as traditional smoking is only the beginning. The true power comes in looking to First Nations leadership to shape their own effective programs. We want to cooperate on initiatives that will embrace the platform available for health promotion within First Nations, including:

- reinforcing preventive messages and recruiting for programs through strong family and community linkages (in this regard, First Nations could actually serve as a model for the rest of BC);

³⁵² Available at <http://www.afn.ca/Programs/Health/BookletENG.pdf> (accessed February 2005).

- identifying and training the best community action coordinators from within those social structures;
- depending on the influential voice of elders;
- targeting the large youth cohort, who may in turn end up inspiring the elders;
- connecting any health efforts to broader aspects of spiritual and political meaning.

Tobacco control, as with every other subpopulation, is further developed than interventions for obesity within First Nations. Increased funding for health promotion should start with the orientation and options detailed in BC's aboriginal tobacco strategy, *Honouring our Health*.³⁵³ One simple improvement that could happen right away is renewing the many out-of-date links on the Aboriginal Tobacco Resource List at BC Tobacco Control.

The federal government's 5-year commitment to new spending in this area is about to expire, so discussion about next steps and fresh partnerships needs to be initiated.

Although nutrition and physical activity programs are in their infancy, the Aboriginal Diabetes Initiative³⁵⁴ provides a foundation on which to build. The Aboriginal Diabetes Initiative receives \$58 million, or half of the funding under the Canadian Diabetes Strategy. Virtually unknown before 1945, the problem among First Nations communities today is severe; type 2 diabetes rates are 3 to 5 times higher than the national average. The Strategy provides funding for community-based, culturally appropriate programs for diabetes prevention, though it is not clear what balance exists between primordial and primary approaches. Clearly, tackling risk factors such as physical inactivity more aggressively would be a good strategy.

New Canadians

The story with landed immigrants / refugees and disease prevention begins with the same consideration given to First Nations: culturally-sensitive messages and programs. Of course, there are unique barriers common to all services provided in these settings, such as the need for language translation. A particular challenge is knowing how to position health promotion in the midst of the many goals that new Canadians are pursuing in order to become settled in the country.

In major centres at least there are well-established community health services that "catch" people at entry, but they are normally dealing with acute problems such as infectious diseases, malnutrition, and sometimes psychological effects related to trauma and oppression, as well as traditional preventive measures such as vaccinations. Funding and facilitation could be developed to increase messages and referral capacity to enhance primordial prevention at this earliest point of contact.

³⁵³ Available at <http://www.afn.ca/Programs/Health/BookletENG.pdf> (accessed February 2005).

³⁵⁴ Summary at <http://www.afn.ca/Programs/Health/Factsheets/FS-Diabetes-e.pdf> (accessed February 2005).

Specific campaigns targeted at groups at particular risk using culturally sensitive messages can be more effective than general population campaigns. Stevens and co-authors³⁵⁵ found that the smoking prevalence in the Turkish population living in London UK was much higher than the general population. The health promotion agency in the area implemented a successful campaign, in Turkish, which involved a play, a poster and media campaign, and purpose-driven leaflets. After one year there was a substantial increase in knowledge regarding the health impacts of smoking and a 6.4% reduction in the number of smokers.

We have included \$20.0 million annually in the budget for work in the area of special populations.

³⁵⁵ Stevens W, Thorogood M, Kayikki S. Cost-effectiveness of a community anti-smoking campaign targeted at a high risk group in London. *Health Promotion International*. 2002; 17(1): 43-50.

Surveillance, Evaluation and Other Administrative Costs

Interventions designed to enhance healthy behaviours will need to be carefully developed and implemented over the long term. As noted above, there are a number of possible interventions for which the accumulation of evidence is still in its infancy. Furthermore, few successful population-wide strategies exist in the areas of unhealthy diet, physical inactivity, and overweight. As noted in *The Path to Health and Wellness: Making British Columbians Healthier by 2010*³⁵⁶, “(w)hile proof of successful strategies to reduce obesity and to promote healthy eating and active lives on a population-wide level does not yet exist, many countries are embarking on ambitious programs in a struggle to make a difference”.

Many authorities are convinced, in light of the relative ineffectiveness of interventions geared to individuals that tackling the “obesogenic” environment is definitely the most beneficial way to move forward. The effectiveness of many of these interventions is not yet known.

Given this situation, there will be an ongoing need for evaluation of the effectiveness of interventions taken in the British Columbia environment. ***Taking a leadership role will require risks in implementing interventions before others have shown them to be effective.*** Ongoing evaluation of these interventions will allow for the continual reassessment of interventions with appropriate changes based on new evidence.

A grid to evaluate population health initiatives has been devised by Glasgow, Estabrooks, and colleagues³⁵⁷. Known by the acronym RE-AIM, the intention of their approach is to evaluate health behaviour interventions with a large public health impact.

The five criteria in their planning system are:

<i>Reach:</i>	How do we reach those who need the intervention?
<i>Effectiveness:</i>	How do we know our intervention is effective?
<i>Adoption:</i>	How do we develop organizational support to deliver the intervention?
<i>Implementation:</i>	How do we ensure it is delivered in a high-quality way?
<i>Maintenance:</i>	How do we get the intervention to be delivered over the long term?

To support evaluation initiatives, there is the need to collect high-quality data at the community level on an ongoing basis. This is essential to assure that baseline measures are established at the community level and for tracking changes in these measures over time, as various interventions are implemented.

While the Canadian Community Health Survey, utilized extensively in the other components of this project, provides ongoing surveillance at the Health Services

³⁵⁶ Available at <http://www.leg.bc.ca/cmt/37thparl/session-5/health/reports/Rpt-Hlth-37-5-FirstReport-04Nov25.pdf> (accessed February 2005).

³⁵⁷ Glasgow R, Vogt T, Boles S. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *American Journal of Public Health*. 1999; 89(9): 1322-7.

Delivery Area, many individuals working in the health authorities have noted the need for both more detailed and timelier data available for natural communities.

Ongoing research into the mechanisms that influence behaviour change would be critical in appropriately designing, implementing, evaluating, and ultimately redesigning interventions.

An important aspect of implementing a comprehensive risk factor reduction program in British Columbia is the establishment of and ongoing fostering of networks of individuals and groups working to achieve the goals of healthier individuals living in healthier communities. Part of this networking could include an annual conference for feedback; which interventions have/have not worked, regional successes, aspects of success, evaluation results, and summary of behaviour change research. This would not be an academic conference; rather, individuals and organizations would need to depart from the conferences with a wealth of ideas to implement in their jurisdictions with a renewed energy.

Finally, a strong centralized administration would be required with a permanent location to oversee the entire project. Without strong central administration the program runs the risk of being implemented piecemeal. This group would need to enthusiastically put in place policies and hiring procedures, assure that common messaging is developed early on, work with advertising agencies, consultants and researchers, develop a newsletter and website, and so on.

We have allocated 10% of the total annual the budget to surveillance, evaluation, and administration.

Summary of Recommended Interventions

Regulatory and Economic Interventions

- Consider incentives and taxation to encourage greater involvement of children in physical activities
- Advocate for the federal implementation of a standardized system of nutrition information for products that includes all foods (not just packaged), including at point-of-purchase. This could include a provincial program of certification of restaurant menu items and portion control.
- Implement consistent, comprehensive smoke-free legislation in the province, including 100% workplace bans in the hospitality industry. Lobby pharmacies to stop selling cigarettes.
- Increase the price of cigarettes by \$2.00 per carton per year
- Consider restrictions on food advertising aimed at children
- Consider a focused trial of taxation measures for specific unhealthy foods
- Continue to protect against creative attempts by the tobacco industry to market their product, e.g., retail “power walls,” product placements, smoking in movies & magazines
- Improve compliance with restrictions on tobacco sales to minors

Community-Based Interventions

- Establish Community Action Coordinators (2 per electoral riding) to mobilize strategies for risk factor reduction
- Provide modest funding for up to 1,200 community groups throughout the province with ideas on how to address risk factors
- Develop a strategic media plan with clear, common messages for different at-risk populations with well-conceived short and long term advocacy goals
- Consider subsidizing pedometers as a source of instant feedback to individuals who are attempting to become more physically active
- Implement “point-of-decision” prompts to encourage healthy behaviours
- Encourage and support walking groups and physical activity events
- Enhance access to places of physical activity; both indoor and outdoor

School-Based Interventions

- Expand *Action Schools! BC* program and encourage a more rapid implementation of some of its recommendations, plus coordination with anti-smoking resources, to move towards significant levels of primordial prevention among young people
- Focus on environmental approaches to risk factor interventions, including options for promoting healthy foods, curtailing access to unhealthy foods, creating opportunities for physical activity and tobacco free sites.

Workplace-Based Interventions

- In partnership with WCB, unions, business and others, offer funding to assist employers and employees to create a healthier work environment, from stairway walking campaigns to exercise facilities and healthy food choices

Clinical Interventions and Management

- Implement a program of 'prevention detailing' to provide education and feedback to enable primary health care providers to more fully address risk factors
- Cover out-of-pocket expenses for nicotine replacement therapy initiated within a recognized clinical program
- Provide reimbursement for lifestyle counselling around physical activity, healthy eating and living smoke free
- Provide compensation to primary health care providers for lifestyle counselling around physical activity, healthy eating and living smoke free

Special Populations

- Support health promotion programs for special populations, including low income populations, pregnant/breastfeeding women, the mentally ill, First Nations People, new Canadians.

Surveillance, Evaluation and Other Administrative Costs

- Provide adequate resources for appropriate surveillance and timely community-level feedback
- Provide adequate resources for the evaluation of new interventions and the dissemination of findings, particularly in those areas where the effectiveness information is promising, but limited
- Provide adequate resources to administer the overall plan to ensure a coordinated, comprehensive approach
- Encourage behaviour change research that focuses on the application of what we already know and considers the individual in the context of a population health approach

The estimated costs of these interventions are summarized on the following table.

Summary Estimated Cost (in Million\$)							
	Fiscal Year						6 Year Total
	2005/06	2006/07	2007/08	2008/09	2009/2010	2010/11	
Regulatory and Economic Interventions							
Net Taxation of Cigarettes	\$ (7.37)	\$ (12.16)	\$ (14.20)	\$ (13.03)	\$ (8.65)	\$ (0.95)	\$ (56.37)
Tax Incentives - Physical Activity	\$ 4.42	\$ 4.38	\$ 4.34	\$ 4.30	\$ 4.27	\$ 4.24	\$ 25.95
Community-based Interventions							
Mass Media Campaign	\$ 26.81	\$ 27.61	\$ 28.44	\$ 29.30	\$ 30.17	\$ 31.08	\$ 173.42
Community Action Coordinators	\$ 6.93	\$ 13.63	\$ 14.04	\$ 14.46	\$ 14.89	\$ 15.34	\$ 79.28
Community-Based Funding	\$ 4.50	\$ 9.27	\$ 9.55	\$ 9.83	\$ 10.13	\$ 10.43	\$ 53.72
Pedometers	\$ 0.81	\$ 0.87	\$ 0.92	\$ 0.97	\$ 1.03	\$ 1.08	\$ 5.69
School-based Interventions							
Allocation to Schools	\$ 33.86	\$ 34.53	\$ 35.18	\$ 35.82	\$ 36.53	\$ 37.31	\$ 213.25
Clinical Intervention & Management							
Prevention Detailing	\$ 2.35	\$ 2.50	\$ 2.66	\$ 2.83	\$ 3.02	\$ 3.14	\$ 16.49
Primary Care Based Smoking	\$ 6.41	\$ 9.66	\$ 13.13	\$ 15.40	\$ 16.25	\$ 17.16	\$ 78.00
Cost of NRT	\$ 6.51	\$ 9.51	\$ 12.56	\$ 14.30	\$ 14.65	\$ 15.02	\$ 72.54
Lifestyle Counselling	\$ 8.42	\$ 13.49	\$ 19.04	\$ 25.12	\$ 26.50	\$ 27.95	\$ 120.52
Special Populations	\$ 20.00	\$ 20.60	\$ 21.22	\$ 21.85	\$ 22.51	\$ 23.19	\$ 129.37
Miscellaneous Costs	\$ 10.00	\$ 10.30	\$ 10.61	\$ 10.93	\$ 11.26	\$ 11.59	\$ 64.68
Administration, Surveillance, Evaluation	\$ 12.37	\$ 14.42	\$ 15.75	\$ 17.21	\$ 18.25	\$ 19.66	\$ 97.65
Total Cost	\$ 136.03	\$ 158.61	\$ 173.22	\$ 189.27	\$ 200.80	\$ 216.24	\$ 1,074.18

The interventions are estimated to cost \$136 million in the first year, increasing to \$216 million in 2010/11 for a total of \$1.1 billion over the course of the campaign. This expenditure equates to \$41 per British Columbian per year.

Summary Estimated Cost (in Million\$)		
	6 Year Total	% of Total
Regulatory and Economic Interventions	\$ (30.42)	-3%
Community-based Interventions	\$ 312.10	29%
School-based Interventions	\$ 213.25	20%
Clinical Intervention & Management	\$ 287.54	27%
Special Populations	\$ 129.37	12%
Miscellaneous Costs	\$ 64.68	6%
Administration, Surveillance, Evaluation	\$ 97.65	9%
Total Cost	\$ 1,074.18	100%

Summary and Conclusion

The Winning Legacy

Why tackle risk factors and chronic disease so vigorously in BC between now and the 2010 Olympic and Paralympic Games? The intermediate outcomes of the plan eventually lead to the ultimate reason to pursue it: *a winning legacy* of health improvement and cost avoidance in the province.

Focusing on risk factors improves health.

- Smoking cessation has major and immediate health impacts; former smokers have less risk of chronic disease onset, and thus they live longer on average than continuing smokers.
- It is even better to never start smoking in the first place (and certainly easier than quitting). This form of so-called *primordial* prevention is where the stress needs to be placed. If young people do not take up smoking before age 19, *they are unlikely ever to become regular users of tobacco*.
- Intentional weight loss to control overweight or obesity leads to lower mortality. The best health results are seen with modest weight loss (which happens to be the sort of weight loss most people achieve).
- Again, it is better to work towards healthy weight maintenance in children through good nutrition and a less sedentary lifestyle, avoiding obesity problems altogether.
- Independent of weight control, there are other significant health benefits from increasing physical activity or eating healthier food in moderate quantities.

The paramount benefit of achieving the BCHLA targets is a substantially healthier population.

The benefits of achieving the BCHLA targets also include significant cost avoidance in both direct healthcare and indirect costs.

During the six years leading up to the 2010 Winter Olympics, as much as \$2.4 billion in direct and indirect costs could be avoided if the BCHLA targets are achieved, as indicated on the following table.

BCHLA Risk Factor Targets Estimated Cost Avoidance									

The cumulative \$2.4 billion in costs avoided is in addition to the almost \$1.0 billion that would remain in former smokers' pockets due to not buying cigarettes.

A Unique Moment

There is the potential for greatness almost without parallel in BC history. We could set the pace for preventive healthcare in the country, and become a model for the whole world. This "unique moment" is not only a reflection of home-grown advantages such as:

- a strong foundation of population health on which to build further;
- a physical setting in the province which inspires recreation and exercise;
- unprecedented multi-sectoral cooperation, of which the present BCHLA project is a powerful example; and
- symbolic and public relations momentum leading towards the 2010 Games.

The "moment" also coincides with the profound global reinforcement of health promotion in recent years. Most notably, the World Health Organization's Framework Convention for Tobacco Control is about to be ratified. That same body has also intensified its focus on unhealthy eating, physical inactivity, and obesity, with almost every developed nation in the world following up with major assessment reports and comprehensive plans to tackle the epidemic of overweight. We are seeing that there is power in both localized modeling of programs and cooperation between jurisdictions. As one review suggested:

Indicators for success which focus only upon benefits for individuals cannot capture adequately the extent of the impact of the many and varied collective, collaborative health promotion

*initiatives, alliances or partnerships currently underway around the world.*³⁵⁸

The global concern and action is producing a profusion of case studies on pilot projects and effective programs which can help to shape our planning (for instance, see the summary on British and Australian initiatives in the recent BC government report *The Path to Health and Wellness*). The research effort is huge, with cutting-edge work being done from combining risk factors to environmental interventions. What case studies and research will British Columbia add to the cause?

The Finish Line

We sometimes talk about the *bottom line*, and this is not bad: it *will* take financial investment to make this plan work and achieve the results desired by B.C.

However, it will take more than money to get to the *finish line* of better health for the whole population. What is needed? The following 4 attitudes and commitments:

A “long obedience in the same direction”: the war on tobacco has made substantial gains, but it has taken a concerted effort over 40 years. The famous North Karelia project in Finland saw dietary changes and reduced cardiovascular disease after a 30 year program. Nova Scotia is pursuing a 20-year health strategy.³⁵⁹

And attitude shifts often need to precede behaviour change. “Diffusion of innovations” in society takes time. The “holy grail” of an entrenched social norm in favour of healthy behaviours, and against unhealthy influences, needs to be solidified by a high-quality social marketing campaign over many decades. The public agreement required to move towards eliminating avoidable chronic disease goes beyond the short-term political cycle to a multi-generational perspective; we must still be at it when we finally host the *summer* Olympic Games.

An evidence-based strategy: while being willing to try things before we have a complete idea of their effectiveness, we also need to be at the forefront of developing new types of evidence—especially in the little-understood area of environmental changes. We must evaluate trial programs rigorously, be flexible in abandoning unhelpful approaches, communicate results widely, and help the rest of the world to adapt successful interventions from the BC setting.

A comprehensive approach: the most impressive results in tobacco control have been seen with programs involving many simultaneous, coordinated interventions over different settings (school, workplace, clinic, etc.). The interventions have comprised policy initiatives, media advocacy, community-wide programs, individual behaviour change, and environmental supports. Almost certainly a similar inventory will be required to tackle obesity.

The long history with tobacco control has allowed new methods to be developed to test the interaction and synergy between different policy components, including

³⁵⁸ Gillies P. Effectiveness of alliances and partnerships for health promotion. *Health Promotion International*. 1998; 13(2): 99-120.

³⁵⁹ See the news report at http://www.gpiatlantic.org/clippings/mc_20yr-health_herald1-22-03.shtml (accessed February 2005).

overall funding.³⁶⁰ One recent European paradigm weighted the key interventions in terms of their impact on smoking rates:³⁶¹

<i>Intervention</i>	<i>Weighting (out of 100)</i>
Price	30
Smoking bans	22
Tobacco control budget	15
Advertising ban	13
Labelling/health warning	10
Cessation treatment	10

Using this scale, 28 countries in Europe were assessed. Of the 10 countries which scored over 50 (out of 100) in tobacco control efforts, 8 showed a decrease in smoking prevalence of more than 20% between 1985 and 2003. Of the 10 countries scoring less than 40, only 1 achieved such a strong result.

This analysis shows that we simply cannot afford to “pick and choose” interventions and dilute their overall combined impact. In fact, the reason some interventions for nutrition and / or physical activity have shown such equivocal results may simply be because they have been implemented in isolation.

In addition, we are only beginning to understand the synergies involved with addressing *multiple* risk factors at the same time. Entire public research agencies are studying this topic, with the eventual data undoubtedly destined to dramatically shape how we approach risk factors and disease prevention in the future.

Sufficient and sustained resources: the fact that the resources and leadership commitment need to be sustained over the long haul has already been suggested above. One of the greatest examples of success in public health in the US, for instance, has been seen in tobacco control; the greatest tragedy has been in the same arena, when gains were lost as funding waned.

This leads back to the “bottom line” which in the end becomes vital for the finish line. It is practically useless to devise a multi-faceted plan, announce it to great fanfare, and then not fund it adequately.

This lesson about sufficient public investment in health promotion and disease prevention, learned the hard way through the ups and downs of the history of tobacco control, must be equally applied to unhealthy eating, inactivity, and obesity. Otherwise, British Columbia will never achieve *the winning legacy* it desires to see in the years leading up to the 2010 Olympics and beyond.

³⁶⁰ Levy D, Chaloupka F, Gitchell J. The effects of tobacco control policies on smoking rates: a tobacco control scorecard. *Journal of Public Health Management & Practice*. 2004; 10(4): 338-5.

³⁶¹ Joossens L. *Effective Tobacco Control Policies in 28 European Countries*. October, 2004.

Abbreviations and Acronyms

AHCPR – Agency for Health Care Policy and Research (US agency). Reorganized as the Agency for Healthcare Research and Quality (AHRQ) in 1999.

BCHLA – B.C. Healthy Living Alliance

BCNU – British Columbia Nurses Union

BMI – body mass index

CCHS – Canadian Community Health Survey

CCS – Canadian Cancer Society

CHD – coronary heart disease

CHSPR – Centre for Health Services and Policy Research (at the University of British Columbia)

CTUMS – Canadian Tobacco Use Monitoring Survey

COPD – chronic obstructive pulmonary disease

DALY – disability adjusted life year (see Glossary)

DASH – Directorate of Agencies for School Health

DSR – designated smoking rooms

EFNEP – Expanded Food and Nutrition Education Program (US program)

FCTC – Framework Convention on Tobacco Control (WHO treaty)

FDA – Food and Drug Administration (US agency)

FTE – full time equivalent

LHA – Local Health Authority

HDL Cholesterol - high-density lipoprotein cholesterol (or “good” cholesterol)

HSDR – Health Service Delivery Area

GP – general practitioner

LDL Cholesterol – low-density lipoprotein cholesterol (or “bad” cholesterol)

LT – less than

NGO – non-governmental organization

NRT – nicotine replacement therapy

OECD - Organization for Economic Cooperation and Development

PAF – population attributable fraction (see Glossary)

POP – Pregnancy Outreach Program (B.C. program)

QALY – quality adjusted life year (see Glossary)

YPLL – years of potential life lost

WHO – World Health Organization

Glossary

Adiposity - having the property of containing fat. In terms of human health, adiposity usually refers to an excessive number or size of adipose or fat cells. Sometimes qualified as central, abdominal or visceral adiposity, as measured by waist-hip ratio or waist circumference.

Bariatric Surgery - Surgery on the stomach and / or intestines to help a patient with extreme obesity lose weight.

Carcinogen – A substance or agent that can cause cancer.

Chronic Disease - A medical problem that is in some sense permanent or at least prolonged, i.e., caused by a non-reversible pathological condition, involving residual disability which requires special rehabilitation, and / or otherwise requiring a indefinite period of care. Major chronic diseases include cancers, cardiovascular disease, diabetes, etc.

Disability Adjusted Life Year (DALY) – The Disability Adjusted Life Year or DALY is a health gap measure that extends the concept of potential years of life lost due to premature death (PYLL) to include equivalent years of ‘healthy’ life lost by virtue of being in states of poor health or disability. The DALY combines in one measure the time lived with disability and the time lost due to premature mortality. One DALY can be thought of as one lost year of ‘healthy’ life and the burden of disease as a measurement of the gap between current health status and an ideal situation where everyone lives into old age free of disease and disability.

Ischemic Heart Disease - Coronary artery disease or coronary heart disease caused by narrowing of the coronary arteries and decreased blood flow to the heart.

Meta-analysis - The statistical analysis of the results of a collection of individual research studies for the purpose of integrating their findings.

Obesogenic - Conditions that lead people to become excessively fat. The term ‘obesogenic environment’ was first proposed by Swinburn, Egger and Raza in an article entitled “Dissecting obesogenic environments: the development and application of a framework for identifying and prioritizing environmental interventions for obesity.” *Preventative Medicine*. 1999; 29: 563-570. They note that “people struggle against environments which increasingly promote a high energy intake and sedentary behaviors.”

Pedometers – Personal measuring instrument for recording the number of steps taken during walking or related movement.

Perinatal - Concerning the period just before, during and just after birth. Various cut-off are points proposed, including a beginning when the fetus attains a weight of 500 g and an end from 1 to 4 weeks after birth. The WHO suggests the period begins after the 28th week of pregnancy. and ends after 28 days of neonatal life

Population Attributable Fraction (PAF) - Also called attributable risk, population attributable risk proportion, or etiologic fraction, it is defined as the proportion of the disease cases in a population that would be prevented if a risk factor exposure were eliminated.

Primordial Prevention – Prevention aimed at avoiding the emergence of the social, economic and cultural patterns of living that are known to contribute to an elevated risk of disease. In other words, preventing disease risk factors from occurring in the first place.

Quality Adjusted Life Year (QALY) – A quality-adjusted life year takes into account both quantity and the quality of life generated by healthcare interventions. It is the arithmetic product of life expectancy and a measure of the quality of the remaining life years. A QALY places a weight on time in different health states. A year of perfect health is worth 1; however, a year of less than perfect health life expectancy is worth less than 1. Death is considered to be equivalent to 0.

Transdermal Patch - A medicated adhesive pad that is placed on the skin to deliver a time-release dose of medication through the skin into the bloodstream. A common means employed in nicotine replacement therapy (NRT).

trans fat(s) or *trans* fatty acids – Created when hydrogen is forced through an ordinary vegetable oil (hydrogenation), converting some polyunsaturates to monounsaturates, and some monounsaturates to saturates. A particular product from this process, *trans* fat, like saturated fat, tends to raise “bad” LDL cholesterol levels; unlike saturated fat, *trans* fat appears to lower “good” HDL cholesterol levels at the same time, though the research on this relationship is not yet complete.

Appendix A: BCHLA Risk Factor Targets

British Columbia BCHLA Risk Factor Targets								
	2003	2004	2005	2006	2007	2008	2008	2010
Proportion of the Population with the Risk Factor								
Smokers	18.7%	18.7%	17.8%	16.8%	15.9%	14.9%	13.9%	13.0%
LT 5 F&V / Day	54.0%	54.1%	50.0%	46.0%	42.0%	38.0%	34.0%	30.0%
Inactive	38.9%	38.9%	37.5%	36.0%	34.5%	33.0%	31.5%	30.0%
Overweight	30.8%	30.9%	29.3%	27.8%	26.3%	24.8%	23.3%	21.8%
Obese	11.6%	11.6%	11.0%	10.5%	9.9%	9.3%	8.8%	8.2%
Number of Individuals With The Risk Factor (if targets are achieved)								
Smokers	674,292	682,676	656,302	629,330	601,663	572,858	543,057	512,288
LT 5 F&V / Day	1,945,702	1,970,965	1,848,934	1,723,736	1,595,181	1,462,091	1,324,891	1,183,770
Inactive	1,401,909	1,420,152	1,383,998	1,346,948	1,308,913	1,269,002	1,227,505	1,184,617
Overweight	788,993	801,565	773,935	744,875	714,447	682,261	649,332	615,863
Obese	296,424	301,307	291,000	280,156	268,785	256,747	244,428	231,920
Number of Individuals With The Risk Factor (if no change from 2003)								
Smokers	674,292	682,676	691,000	700,266	709,799	719,122	728,379	737,666
LT 5 F&V / Day	1,945,702	1,970,965	1,996,456	2,023,225	2,050,771	2,077,706	2,104,451	2,131,284
Inactive	1,401,909	1,420,152	1,438,329	1,457,615	1,477,460	1,496,865	1,516,133	1,535,465
Overweight	788,993	801,565	813,010	824,770	836,315	847,063	858,126	869,925
Obese	296,424	301,307	305,447	309,865	314,203	318,241	322,397	326,830
Number of Individuals With The Risk Factor Removed								
Smokers	-	-	34,698	70,936	108,137	146,264	185,321	225,378
LT 5 F&V / Day	-	-	147,522	299,489	455,590	615,615	779,560	947,514
Inactive	-	-	54,331	110,667	168,547	227,864	288,628	350,848
Overweight	-	-	39,076	79,895	121,867	164,802	208,794	254,063
Obese	-	-	14,447	29,710	45,418	61,494	77,969	94,910

Appendix B: Additional Perspective on Economic Costs of Risk Factors

Further Information on the Costs of Smoking

Due to the wide variety of diseases caused by smoking, the cost of direct medical care attributable to smoking has been estimated at between 6% and 14% of total medical care expenditures in developed countries.³⁶² In Canada, the most recent published estimates on the direct medical spending plus indirect costs (e.g., the value of economic output lost because of illness, injury-related work disability or premature death) range from \$9.6³⁶³ to \$15.0³⁶⁴ billion annually, depending to some degree on the type of costs included. The study by Kaiserman included \$2.5 billion in direct medical costs, \$10.5 billion in lost future earnings, \$2.0 billion for worker absenteeism, and \$1.5 billion in residential care costs, for a total of \$16.5 billion annually. In addition to broader direct (e.g., residential care) and indirect (e.g., worker absenteeism) costs, Kaiserman also estimates the “avoided” healthcare costs, due to the earlier death of smokers, at \$1.5 billion. Net annual costs then become \$15.0 billion.

The issue of avoided costs, due to the earlier deaths of smokers when compared to never smokers, is a controversial one. In an often quoted study published in the *New England Journal of Medicine*, Barendregt and colleagues³⁶⁵ estimated that the direct medical costs of smokers at any given age in Holland are approximately 40% higher than non-smokers. When total lifetime expenditures on medical costs are taken into account, however, their model estimated that, if no one smoked, direct medical expenditures would ultimately be 7% higher in men and 4% higher in women, primarily due to the higher life expectancy of non-smokers and the associated medical costs incurred in the elderly. Despite the conclusion of their economic analysis, the authors maintain that, “in formulating public health policy, whether or not smokers impose a net financial burden ought to be of very limited importance. Public health policy is concerned with health. Smoking is a major health hazard, so the objective of a policy on smoking should be simple and clear: smoking should be discouraged.”

This study has recently been criticized for including a narrow scope of smoking related diseases and for the lack of inclusion of indirect costs (e.g., lost productivity).³⁶⁶ Rasmussen and co-authors addressed these limitations in a Danish study and found that lifetime direct and indirect costs were 66% and 83% higher in male ever-smokers than in male never-smokers. The results for female smokers were similar, with lifetime direct and indirect costs 74% and 79% higher.

A further controversy associated with smoking-related costs is the apparent finding that direct medical care costs increase, rather than decrease, after a smoker quits, at

³⁶² Max W. The financial impact of smoking on health-related costs: A review of the literature. *American Journal of Health Promotion*. 2001; 15(5): 321-31.

³⁶³ Single E, Robson L, Xie X, Rehm J. The economic costs of alcohol, tobacco and illicit drugs in Canada, 1992. *Addiction*. 1998; 93(7): 991-1006.

³⁶⁴ Kaiserman M. The cost of smoking in Canada, 1991. *Chronic Diseases in Canada*. 1997; 18(1).

³⁶⁵ Barendregt J, Bonneux L, Van Der Maas P. The health care costs of smoking. *New England Journal of Medicine*. 1997; 337: 1052-7.

³⁶⁶ Rasmussen S, Prescott E, Sorensen T, Sogaard J. The total lifetime costs of smoking. *European Journal of Public Health*. 2004; 14: 95-100.

least in the immediate post-quit period.^{367,368} Fishman et al³⁶⁹ suggest that there may be several reasons for this. First, former smokers may seek medical care that they have delayed while smoking. Second, smoking cessation often coincides with or immediately follows a health event that motivates the effort to quit.

Fishman and colleagues calculated the actual direct healthcare costs associated with a post-quit period of seven years. As in previous studies, they found a one-year spike in costs. On average, never-smokers cost \$1,618 (in year 2000 US\$), continuing smokers cost \$2,238, and those who had just quit cost \$3,239. This spike in costs, they suggest, “point(s) to intensive health service use consistent with above average medical care needs.” By implication, smoking cessation likely coincided with or was preceded by an expensive health event that may have actually motivated the quit attempt. In subsequent years, direct medical costs remained higher than those for never-smokers, a pattern that “is consistent with the greater health care expense we might expect from persons who may have neglected health and preventative services for extended periods of time.”

A recent study in California³⁷⁰ estimates the annual economic cost per smoker in 1999 to be \$3,331 US. The types of costs and their contribution to this total are as follows:

Direct Costs	
Hospital -	\$849
Ambulatory -	\$435
Nursing home care -	\$268
Prescriptions -	\$240
Home health -	\$18
Indirect (Lost Productivity)	
Illness -	\$320
Premature death -	\$1,201

³⁶⁷ Wagner E, Curry S, Grothaus K et al. The impact of smoking and quitting on health care use. *Archives of Internal Medicine*. 1995; 155(16): 1789-95.

³⁶⁸ Pronk N, Goodman M, O’Conner P, Martinson. Relationship between modifiable health risks and short-term health care charges. *Journal of the American Medical Association*. 1999; 282(23): 2235-9.

³⁶⁹ Fishman P, Khan Z, Thompson E, Curry S. Health care costs among smokers, former smokers, and never smokers in an HMO. *Health Services Research*. 2003; 38(2): 733-49.

³⁷⁰ Max W, Rice D, Sung H et al. The economic burden of smoking in California. *Tobacco Control*. 2004; 13: 264-7.

Further Information on the Costs of Physical Inactivity

Recent work in British Columbia by Coleman and Walker³⁷¹ has also estimated the costs directly attributable to physical inactivity in this province. Their estimate is summarized on the following table.

Estimated Cost of Physical Inactivity British Columbia, 2001 (in million\$)										
	Direct Costs					Indirect Costs			Total Cost	
	Hospital	Doctor	Drugs	Other	Direct\$ Subtotal	Premature Death	Disability	Indirect\$ Subtotal		
Heart Disease	\$ 24.91	\$ 4.42	\$ 1.21	\$ 22.17	\$ 52.71	\$ 19.40	\$ 10.40	\$ 29.80	\$ 82.51	
Stroke	\$ 17.84	\$ 1.54	\$ 2.66	\$ 16.00	\$ 38.05	\$ 6.77	\$ 11.23	\$ 18.00	\$ 56.05	
Hypertension	\$ 3.24	\$ 5.16	\$ 5.90	\$ 10.38	\$ 24.68	\$ 8.83	\$ 4.10	\$ 12.93	\$ 37.61	
Colon Cancer	\$ 2.54	\$ 0.41	\$ 0.25	\$ 2.33	\$ 5.53	\$ 11.42	\$ 1.30	\$ 12.72	\$ 18.25	
Breast Cancer	\$ 3.39	\$ 0.55	\$ 0.33	\$ 7.37	\$ 11.64	\$ 14.55	\$ 1.74	\$ 16.29	\$ 27.93	
Type 2 Diabetes	\$ 3.99	\$ 2.07	\$ 2.98	\$ 6.56	\$ 15.60	\$ 11.50	\$ 0.15	\$ 11.65	\$ 27.25	
Osteoporosis	\$ 10.72	\$ 7.13	\$ 3.87	\$ 15.77	\$ 37.48	\$ 0.77	\$ 134.20	\$ 134.97	\$ 172.45	
Total	\$ 66.63	\$ 21.28	\$ 17.20	\$ 80.58	\$ 185.69	\$ 73.24	\$ 163.12	\$ 236.36	\$ 422.05	

Source:
Colman R and Walker S. *The cost of physical inactivity in British Columbia* . GPI Atlantic, March 2004.

1,299,747 2000/01 CCHS number of people in BC aged 12+ who are physically inactive

Estimated Cost per Individual with the Risk Factor in British Columbia

	Direct	Indirect	Total
2001\$	\$ 142.87	\$ 181.85	\$ 324.72
2004\$	\$ 148.99	\$ 189.65	\$ 338.65

(use 'Health and Personal Care' component of the Canadian CPI)

In total, physical inactivity is estimated to cost the British Columbia economy \$422 million in 2001. We have used this information and calculated the annual cost per physically inactive individual in 2004 dollars. Based on this analysis, the annual cost directly attributable to physical inactivity is \$339 per sedentary individual.

The British Columbia costs calculated by Coleman and Walker are somewhat different than the Canadian costs calculated by Katzmarzyk and Janssen³⁷² as described in the body of this report. Both studies used the same disease categories and relative risks associated with physical inactivity. The higher direct costs per sedentary individual in British Columbia (\$149 vs. \$133 in 2004\$) may reflect differences in the unit cost of production in this province. A considerably larger difference in indirect costs (\$187 vs. \$304 in 2004\$) reflects differences in the methodologies used to calculate and attribute these costs. While both groups use the indirect costs per disease category as identified in *Economic Burden of Illness in Canada, 1998*³⁷³, Katzmarzyk and Janssen make several important modifications³⁷⁴

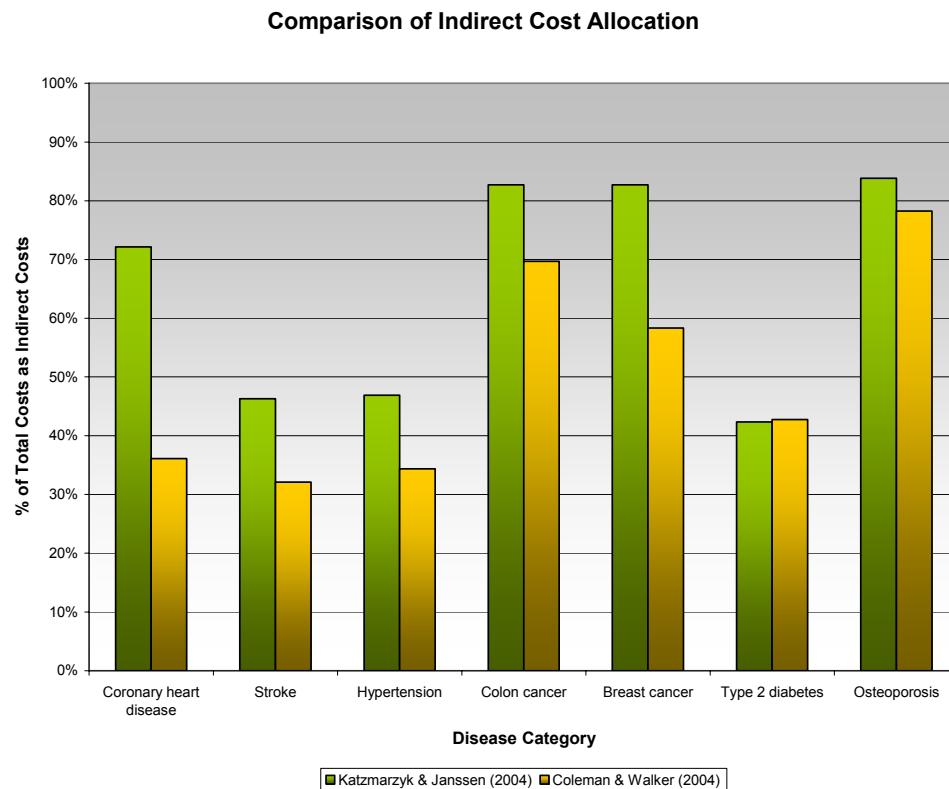
³⁷¹ Coleman R, Walker S. *The Cost of Physical Inactivity in British Columbia*, BC Ministry of Health Services, March 2004.

³⁷² Katzmarzyk P, Janssen I. The economic cost associated with physical inactivity and obesity in Canada: An update. *Canadian Journal of Applied Physiology*. 2004; 29: 90-115.

³⁷³ Health Canada, Policy Research Division. *Economic Burden of Illness in Canada, 1998*. 2002. Available at www.hc-sc.gc.ca.

³⁷⁴ See Katzmarzyk P, Janssen I. The economic cost associated with physical inactivity and obesity in Canada: An update. *Canadian Journal of Applied Physiology*. 2004; 29: pages 100 and 101 for more details.

which result in a higher allocation of indirect costs to all disease categories, as indicated on the following chart.



Based on sensitivity analysis, Coleman and Walker do suggest that total annual costs in British Columbia could be as high as \$647 million, resulting in a plausible range of \$339 to \$520 (in 2004\$) per sedentary individual. This compares well with Katzmarzyk and Janssen's estimate of \$437.

Appendix C: Smoking Status of BC Population in 2003

British Columbia Residents Smoking Status in 2003 Population Aged 12+						
Age	Daily Smoker	Occasional Smoker	Number of Former Smoker	Never Smoked	Not Stated	Total Population
12-19 years	24,753	17,438	54,917	327,353	962	425,423
20-24 years	48,973	28,345	70,323	118,338	2,238	268,217
25-34 years	78,518	47,269	184,121	223,179	714	533,801
35-44 years	125,237	32,395	286,417	260,021	1,897	705,967
45-54 years	113,723	21,457	286,828	209,843	1,670	633,521
55-64 years	54,248	9,650	227,058	137,591	1,665	430,212
65-74 years	29,487	6,927	150,182	96,200	3,064	285,860
75 years +	17,987	2,321	130,438	84,667	3,557	238,970
Total	492,926	165,802	1,390,284	1,457,192	15,767	3,521,971
% of Age Group						
Age	Daily Smoker	Occasional Smoker	Former Smoker	Never Smoked	Not Stated	
12-19 years	5.8%	4.1%	12.9%	76.9%	0.2%	
20-24 years	18.3%	10.6%	26.2%	44.1%	0.8%	
25-34 years	14.7%	8.9%	34.5%	41.8%	0.1%	
35-44 years	17.7%	4.6%	40.6%	36.8%	0.3%	
45-54 years	18.0%	3.4%	45.3%	33.1%	0.3%	
55-64 years	12.6%	2.2%	52.8%	32.0%	0.4%	
65-74 years	10.3%	2.4%	52.5%	33.7%	1.1%	
75 years +	7.5%	1.0%	54.6%	35.4%	1.5%	
Total	14.0%	4.7%	39.5%	41.4%	0.4%	

Source:
CCHS Table 105-0227

British Columbia Males
Smoking Status in 2003
 Population Aged 12+

Age	Number of					Total Population
	Daily Smoker	Occasional Smoker	Former Smoker	Never Smoked	Not Stated	
12-19 years	9,657	10,018	27,056	171,343	305	218,379
20-24 years	24,579	18,472	34,924	51,959	1,379	131,313
25-34 years	48,018	24,945	88,254	104,039	1	265,257
35-44 years	76,988	17,921	142,325	115,416	354	353,004
45-54 years	65,854	10,130	152,046	83,249	1,028	312,307
55-64 years	28,620	3,912	123,982	57,607	1,297	215,418
65-74 years	15,344	4,578	90,113	30,208	1,461	141,704
75 years +	9,692	843	65,538	17,416	1,424	94,913
Total	278,752	90,819	724,238	631,237	7,249	1,732,295

Age	% of Age Group				
	Daily Smoker	Occasional Smoker	Former Smoker	Never Smoked	Not Stated
12-19 years	4.4%	4.6%	12.4%	78.5%	0.1%
20-24 years	18.7%	14.1%	26.6%	39.6%	1.1%
25-34 years	18.1%	9.4%	33.3%	39.2%	0.0%
35-44 years	21.8%	5.1%	40.3%	32.7%	0.1%
45-54 years	21.1%	3.2%	48.7%	26.7%	0.3%
55-64 years	13.3%	1.8%	57.6%	26.7%	0.6%
65-74 years	10.8%	3.2%	63.6%	21.3%	1.0%
75 years +	10.2%	0.9%	69.1%	18.3%	1.5%
Total	16.1%	5.2%	41.8%	36.4%	0.4%

Source:
 CCHS Table 105-0227

British Columbia Females Smoking Status in 2003 Population Aged 12+						
Age	Daily Smoker	Occasional Smoker	Number of Former Smoker	Never Smoked	Not Stated	Total Population
12-19 years	15,096	7,421	27,860	156,009	658	207,044
20-24 years	24,394	9,873	35,399	66,379	860	136,905
25-34 years	30,500	22,324	95,867	119,140	713	268,544
35-44 years	48,249	14,474	144,092	144,605	1,543	352,963
45-54 years	47,869	11,327	134,782	126,595	640	321,213
55-64 years	25,628	5,738	103,076	79,985	368	214,795
65-74 years	14,143	2,349	60,069	65,992	1,603	144,156
75 years +	8,295	1,450	64,900	67,251	2,161	144,057
Total	214,174	74,956	666,045	825,956	8,546	1,789,677
Age	Daily Smoker	Occasional Smoker	% of Age Group Former Smoker	Never Smoked	Not Stated	
12-19 years	7.3%	3.6%	13.5%	75.4%	0.3%	
20-24 years	17.8%	7.2%	25.9%	48.5%	0.6%	
25-34 years	11.4%	8.3%	35.7%	44.4%	0.3%	
35-44 years	13.7%	4.1%	40.8%	41.0%	0.4%	
45-54 years	14.9%	3.5%	42.0%	39.4%	0.2%	
55-64 years	11.9%	2.7%	48.0%	37.2%	0.2%	
65-74 years	9.8%	1.6%	41.7%	45.8%	1.1%	
75 years +	5.8%	1.0%	45.1%	46.7%	1.5%	
Total	12.0%	4.2%	37.2%	46.2%	0.5%	
Source: CCHS Table 105-0227						

Appendix D: Additional Input for a Media Advocacy Campaign

In developing a rough plan for a media advocacy campaign, the following media strategies were taken into consideration.

The most significant marketing fact of the tween/teen community as a whole is that they congregate at movie theatres, game arcades, schools, and community centres for entertainment and social, seasonal, and cultural functions. They also use the Internet. Their lifestyle is focused on weekend activities, seasonal festivals, school weeks, and traditional holiday events. The objective is to reach this community effectively when they are congregated. This is best achieved by focusing on when and where they socialize, where they work/attend school, and where they live.

In order to take the marketing message to the tween, teen, and young adult markets, purchasing ads in a group of youth-oriented lifestyle publications would be important. This would include publications such as *Terminal City*, *The Only*, *The Nerve*, *Adventure West*, *F.I.L.E.S.*, *The Georgia Straight*, *ION*, *Butter*, and *Lou Lou Magazine* (a shopping magazine that is key in reaching the female teen market in BC). Each of these publications has an individual editorial focus that includes rock music, alternative music, and contemporary music, as well as articles that touch on social issues and extreme sporting activities that are of interest to people under the age of 18 and 18-34.

The marketing message would also be focused on the universities, colleges and high schools of the province. This would include information in such publications as *Ubysey*; *UBC Graduate*; *UBC The Point*; *Simon Fraser The Peak*; *U.C. of Fraser Valley The Cascade*; *Langara The Gleaner*; *Capilano Courier*; *Douglas College The Other Press*; *B.C.I.T. The Link*; and *Kwantlan College the Chronicle*. The high school publication *Youthink* is available in high schools in Vancouver; North and West Vancouver; Richmond; Burnaby/New Westminster; Surrey; Coquitlam; Maple Ridge; and Langley.

A supportive advertising poster campaign in the universities and colleges is recommended to bolster the print component. The advertising units are located in the university and college common areas, washrooms and pubs.

To reach adults more generally, publications such as community newspapers, dailies, *Western Living*, *Vancouver Magazine*, *Chatelaine* (BC Edition), perhaps *Canadian Living* (BC Edition), *Common Ground*, and *Shared Vision*. Each of these publications has an individual editorial focus that includes health, nutrition, and lifestyle articles, as well as articles that touch on social issues and activities that are of interest to people in the age category of 25-54. A supportive advertising poster campaign in medical clinics, dental clinics/offices and doctor's offices would bolster the print component.

Publications used to target specific ethnic groups could include the following.

- To reach the Asian Communities: *Mingo Pao*, *Sing Tao*, and *World Journal*.
- To reach the South Asian Communities: *Indo-Canadian Times*, *Akai Guardian*, *Indo-Canadian Voice*, and *Asian Star/Punjabi Star*.

- To reach the Native communities: *Raven's Eye*, *First Nations Drum*, *Secwepemc News*, and *Ha-Shilth-Sa*.

Each of these publications has an individual editorial focus that includes news of the communities, information articles, news from their native countries, local news, lifestyle, and social information. In short, articles that are of interest to people of a particular ethnic community.

The use of display posters for bulletin boards, or as framed counter cards, are recommended as means of extending the campaign to non traditional advertising opportunities in such places as community centres, medical/dental offices and clinics. They can also be used in bars, and other businesses in the geographic territories deemed important. They can be supplied to the university, and college/university associations and clubs, and general information areas in the educational institutions.

The local television stations (mainstream and ethnic) can be approached to carry a public service message with requested placement in their young adult programs. This could be done in conjunction with paid advertising. It would be important to be selective in program selection to ensure that programs target the different demographic groups – e.g. the O.C. is one of the top-ranked programs for teens.

Advertising on T.V. would be purchased during prime time and late night News on various stations, to create the image that this is a “news” story, and to ensure that a broad range of people will be reached. All local and network stations would be considered with other specialty programs included to reach specific target audiences (e.g. APTN - Aboriginal People's Television Network).

Movie theatre advertising could be used to reach tweens and teens effectively and efficiently as well as adults.

Other possible sources for advertising include outdoor posters, transit and transit shelters, as well as the Internet.

Appendix E: Community Action Coordinators

The following is a sample position description for a community action coordinator from the Canadian Cancer Society. This position description would need to be modified for the current purposes but serves as a general overview of the roles and responsibilities associated with this kind of a position.

CANADIAN CANCER SOCIETY
British Columbia & Yukon Division
POSITION DESCRIPTION
STANDARD FORMAT & COMPLETION GUIDELINES

ADMINISTRATION SECTION

Name:

Title: Community Action Coordinator

Date: February 2004

NATURE OF THE ORGANIZATION

The Canadian Cancer Society (CCS) provides leading financial support for cancer research and delivers community-based support programs and prevention information for all types of cancer.

I. PURPOSE

The position of Community Action Coordinator, is accountable for effectively coordinating, implementing and mobilizing strategies for action in cancer control. Particular emphasis will be in creating supportive environments for cancer prevention in communities and supporting advocacy initiatives aimed at governments and institutions. These accountabilities are achieved through a combination of community action, advocacy and public education.

II. WORKING RELATIONSHIPS

Reports to: Regional Manager
Functional direction provided by the Manager, Prevention & Peer Support and the Manager, Public Issues

Overall strategic direction will be provided by the Prevention Strategy Steering Committee

Primary Resources/Contacts (internal, external):

INTERNAL: Regional staff and volunteers, unit volunteers, Division program staff, Prevention Strategy Steering Committee, Manager, Volunteer Resources, Manager, Policy, Planning and Evaluation and Managers as stated above

EXTERNAL: Community leaders, government officials, Chronic Disease NGOs, school officials
Volunteer Partner(s):

III. ACCOUNTABILITIES

Note: The Community Action Coordinator has the following specific accountabilities under the day to day supervision of the Regional Manager with functional direction provided by the Manager, Prevention & Peer Support and the Manager, Public Issues

Accountable for effective coordination, implementation and mobilization of strategies for action, primarily in cancer prevention, in communities and support of division wide advocacy initiatives aimed at governments and institutions.

- Demonstrates commitment to the Division Prevention Strategy through adherence to the principles, approach for action and relative emphasis on priority risk factors;
- Keeps current with emerging cancer prevention issues, evidence and information;

Community Action and Advocacy (75%)

- Identifies strategic opportunities within the Region towards mobilizing communities towards action and achieving advocacy objectives.
- Participates in setting and achieves regional goals, outcomes and indicators that are aligned with the overall strategy;
- Supports, guides and is a resource for community groups taking action on cancer prevention and advocacy issues that fit with CCS mandates and priorities;
- Represents the CCS on partnership alliances (e.g., Regional CDPABC);
- Identifies potential opportunities for collaboration with external contacts through a commitment to integrated chronic disease prevention and advocacy initiatives;
- Coordinates the Regional field work of Division-wide advocacy initiatives (such as letter-writing campaigns);
- Coordinates efforts to lobby local institutions for changes that will promote healthy living;
- Identifies key community leaders and cultivates partnerships for action on specific issues related to the five priority risk factor areas (tobacco use, obesity-inactivity-poor nutrition, sun exposure and environmental carcinogens).
- Conducts environmental scans of the communities to identify and understand emerging issues and opportunities for action;
- Identifies communities working on similar advocacy issues, connects them where lessons can be learned and ensures the database of all regional activity is maintained;
- Provides training, guidance, support and resources to staff, volunteers and community members on the various advocacy and community action

initiatives, including sourcing best practices and suggested strategies for specific issues and providing those resources to communities;

- Seeks opportunities for funding grants related to community action and coordinates funded projects.

Public Education (20%)

- Mobilize targeted groups and community members through the presentation of issue specific information;
- Coordinates the collection of the materials and resources needed by Regions to undertake community action and advocacy in consultation with the Communications and Public Affairs Department and the Public Education Coordinator
- Maintains effective linkages with respect to regional public education activities and messages;
- Identifies areas of greatest need in Public Education and assists in laying the foundation for community mobilization, in conjunction with the Public Education Coordinator

Administrative (5%)

- Participates in the development and maintenance of the community action/advocacy budget;
- Tracks initiatives in community action and advocacy within the Region, reports on successes and challenges and shares lessons learned with other community action coordinators and the Prevention Strategy Steering Committee
- Collects field data for the evaluation in consultation with the Manager, Planning, Policy and Evaluation and the Manager, Public Issues

Division wide Responsibilities

Each member of the Community Action Coordination team may be asked to take on responsibilities periodically involving division wide coordination. These responsibilities could include:

- Represents the Community Action Coordinators on the Prevention Strategy Steering Committee and provides status/activity reports on regional information in community action/advocacy.
- Represents the CCS on division-wide partnership alliances where appropriate
- Makes presentations as required to Division staff/volunteers/Board on community action and prevention issues.
- Assists Manager, Public Issues by coordinating regional field work of division-wide advocacy initiatives (letter-writing campaigns etc).
- Assists Manager of Planning, Policy and Evaluation in the coordination of evaluation initiatives in communities and across the division as a whole
- Liaises with Communications and Public Affairs Department and Public Education Coordinator in the development of the materials and resources needed by regions to undertake community action and advocacy

Accountable for role modeling the Society Values by demonstrating appropriate behaviour in Accountability, Caring, Integrity, Respect, Quality, Responsiveness and Teamwork

Accountable for performing other job duties as required

IV. QUALIFICATIONS

a) Training and/or equivalent experience

- University degree in the area of health sciences, social sciences, political science, public administration, adult education, or related discipline
- Three to five years experience in health promotion, community development and capacity building or related field

b) Job Knowledge

Knowledge relates to the broad activities within the following departments and functional areas (Communications and Public Affairs, Programs and Regions, Revenue Development) and involves:

- Excellent community development skills utilized to maintain and build community partnerships through outreach;
- Demonstrated knowledge of how communities function and the ability to access community resources
- Knowledge of issues related to chronic disease prevention;
- Understanding health care environmental trends
- Understanding of the population health approach and determinants of health
- Understanding the Society's general policies and goals
- Understanding the volunteer and staff partnerships and organizational structure
- Understanding diversity issues
- Understanding of matrix reporting relationships in a regionally based organization
- Understanding of initiatives, goals and relationships of other organizations

c) Communication Skills

- Demonstrated superior verbal and written communication; presentation skills, excellent group facilitation and public speaking skills, media relations skills an asset
- Ability to motivate and inspire individuals towards change
- Excellent conflict resolution skills, problem solving
- Ability to communicate effectively with community agencies/members, government agencies

d) Computational Skills and Operations of Business Equipment or Tool

- Working knowledge of MS Office (Word/Excel) and use of databases

e) Other Qualifications, Unique Requirements, Skills Assets

- Experience coordinating initiatives across various regions and a sensitivity to regional differences as well as an understanding of macro initiatives.

- Experience in non-profit organizations preferred
- Strong organizational skills, including the ability to assess and manage others effectively, establish clear accountabilities, develop the capabilities of others and copy effectively with change
- Demonstrated ability to effectively partner and collaborate with other organizations
- Strong project management skills including: handling complex political situations, clearing roadblocks, providing feedback, teambuilding
- Ability to work simultaneously on a variety of projects with tight deadlines
- Extensive experience working with volunteers at committee level
- Experience with community-based research
- Ability to travel regionally
- Ability to work variable hours including weekends
- Experience working with diverse groups of people
- Must have valid driver's license and access to a vehicle, as travel is required
- Knowledge of issues related to chronic disease prevention is an asset
- Must value teamwork

Appendix F: Elementary and Secondary Schools in British Columbia

British Columbia Elementary and Secondary Schools By Health Services Delivery Area

HA	HSDA	District Number	District Name	# of Schools	# of Students	Mean # Students / School
Fraser Health Authority						
Fraser North		042	Maple Ridge-Pitt Meadows	38	16,933	446
		040	New Westminster	20	7,741	387
		041	Burnaby	65	28,175	433
		043	Coquitlam	87	37,231	428
Fraser South		035	Langley	57	23,097	405
		036	Surrey	154	73,061	474
		037	Delta	42	19,461	463
Fraser East		033	Chilliwack	38	14,745	388
		034	Abbotsford	56	23,958	428
		078	Fraser-Cascade	17	2,627	155
		075	Mission	24	7,704	321
Fraser HA Overall				598	254,733	426
Vancouver Coastal Health Authority						
Richmond		038	Richmond	65	25,729	396
Vancouver		039	Vancouver	172	74,760	435
North Shore / Coast Garibaldi		044	North Vancouver	52	20,544	395
		045	West Vancouver	25	8,919	357
		048	Howe Sound	17	4,617	272
		046	Sunshine Coast	16	4,313	270
		049	Central Coast	8	442	55
Vancouver Coastal HA Overall				355	139,324	392
Vancouver Island Health Authority						
South Vancouver Island		061	Greater Victoria	81	26,315	325
		062	Sooke	28	9,625	344
		063	Saanich	24	9,265	386
		064	Gulf Islands	12	1,839	153
		068	Nanaimo-Ladysmith	55	16,699	304
		069	Qualicum	18	5,473	304
Central Vancouver Island		047	Powell River	12	3,012	251
		070	Alberni	18	5,346	297
		071	Comox Valley	29	9,800	338
		072	Campbell River	29	7,048	243
		079	Cowichan Valley	42	12,443	296
		084	Vancouver Island West	5	528	106
North Vancouver Island		085	Vancouver Island North	21	2,294	109
Vancouver Island HA Overall				374	109,687	293

British Columbia Elementary and Secondary Schools
By Health Services Delivery Area (continued)

HA	HSDA	District Number	District Name	# of Schools	# of Students	Mean # Students / School
Interior Health Authority						
East Kootenay		005	Southeast Kootenay	29	6,808	235
		006	Rocky Mountain	20	3,859	193
		008	Kootenay Lake	33	6,773	205
Thompson Cariboo Shuswap		019	Revelstoke	5	1,413	283
		073	Kamloops/Thompson	55	17,252	314
		074	Gold Trail	16	2,166	135
		083	North Okanagan-Shuswap	37	9,153	247
Okanagan		022	Vernon	26	10,175	391
		023	Central Okanagan	58	25,184	434
		053	Okanagan Similkameen	13	3,284	253
		058	Nicola-Similkameen	16	3,163	198
		067	Okanagan Skaha	27	7,880	292
		027	Cariboo-Chilcotin	39	7,859	202
Kootenay Boundary		010	Arrow Lakes	5	698	140
		020	Kootenay-Columbia	17	5,097	300
		051	Boundary	12	1,936	161
Interior HA Overall				408	112,700	276
Northern Health Authority						
Northeast		059	Peace River South	28	5,234	187
		060	Peace River North	24	6,088	254
		081	Fort Nelson	6	1,326	221
Northern Interior		057	Prince George	65	18,409	283
		054	Bulkley Valley	14	3,704	265
		091	Nechako Lakes	30	6,903	230
		028	Quesnel	22	5,004	227
Northwest		082	Coast Mountains	31	7,333	237
		087	Stikine	6	486	81
		092	Nisga'a	4	573	143
		050	Haida Gwaii/Queen Charlotte	7	972	139
		052	Prince Rupert	16	3,334	208
Northern HA Overall				253	59,366	235
Other						
		093	Conseil scolaire francophone	36	3,155	88
		101	Distance Education	9	4,147	461
		103	Offshore	-	1,135	
British Columbia Overall				2,033	684,247	337

December 2004



Appendix G: Prevention Detailing in BC

Prevention Detailers									
Potential Number and Location									
HA	HSDA / Community	# of GPs	Est # of Locations	Annual Visits	Time Required (in Hours)				Location of Detailer
					Direct Contact	Other Contact	Travel	Total	
Fraser Health Authority									
	Fraser North	383	179	3	268	537	537	1,341	Fraser North
	Fraser South	387	181	3	271	542	542	1,356	Fraser South
	Fraser East	177	83	3	124	248	372	744	Fraser East
	Fraser HA Overall	947	442		663	1,327	1,451	3,441	
Vancouver Coastal Health Authority									
	Vancouver	774	362	3	542	1,085	813	2,440	Vancouver
	Richmond	130	61	3	91	182	137	410	Richmond
	North Shore / Coast Garibaldi	188	88	3	132	264	198	593	North Shore
	Squamish, Whistler, Pemberton	37	17	2	17	35	52	104	North Shore
	Sunshine Coast	37	17	2	17	35	104	156	North Shore
	Powell River	27	13	2	13	25	126	164	North Shore
	Vancouver Coastal HA Overall	1,193	557		812	1,625	1,429	3,867	
Vancouver Island Health Authority									
	South Vancouver Island	485	227	3	340	680	680	1,701	Victoria
	Central Vancouver Island								
	Nanaimo Area	99	46	3	69	139	139	347	Nanaimo
	Parksville, Qualicum Beach, Port Alberni	56	26	3	39	79	157	275	Nanaimo
	Comox, Courtney	65	30	3	46	91	182	319	Nanaimo
	Tofino, Ucluelet	7	3	2	3	7	26	36	Nanaimo
	North Vancouver Island								
	Campbell River Area	39	18	3	27	55	219	301	Nanaimo
	North Island	18	8	2	8	17	90	115	Nanaimo
	Vancouver Island HA Overall	769	359		533	1,067	1,493	3,093	
Interior Health Authority									
	East Kootenay	91	43	2	43	85	598	726	Kelowna
	Kootenay-Boundary	91	43	2	43	85	596	724	Kelowna
	Okanagan	16	7	2	7	15	105	127	Kelowna
	Kelowna Area	138	64	3	97	193	193	484	Kelowna
	Vernon Area	72	34	3	50	101	202	353	Kelowna
	Penticton Area	65	30	3	46	91	273	410	Kelowna
	Thompson / Cariboo	76	36	2	36	71	497	604	Kelowna
	Kamloops Area	76	36	3	53	107	213	373	Kelowna
	Salmon Arm Area	34	16	3	24	48	95	167	Kelowna
	Interior HA Overall	660	257		321	642	2,465	3,428	
Northern Health Authority									
	Northwest HSDA	106	49	2	49	99	693	841	Prince George
	Northern Interior HSDA								
	Prince George	77	36	3	54	108	162	324	Prince George
	Within 4 RT Hours of PG	38	18	3	27	53	213	293	Prince George
	More than 4 Hours	12	6	2	6	11	79	95	Prince George
	Northeast HSDA	44	21	2	21	41	288	350	Prince George
	Northern HA Overall	277	129		156	312	1,434	1,903	
	LHA Unknown	7							
	British Columbia Overall	3,852	1,745		2,487	4,973	8,273	15,732	

Community Health Nurse (Masters prepared with 5 Years Experience)					
	Years of Experience				
	Five	Six	Seven	Eight	Nine
Paid Days	260	260	260	260	260
Paid Hours	1,950	1,950	1,950	1,950	1,950
Wage (assume Level three)					
Hourly (April 1, 2003)	\$ 35.02	\$ 35.84	\$ 36.83	\$ 37.76	\$ 38.91
Monthly (April 1, 2003)	\$ 5,484	\$ 5,613	\$ 5,768	\$ 5,913	\$ 6,093
Annual (April 1, 2003)	\$ 65,808	\$ 67,356	\$ 69,216	\$ 70,956	\$ 73,116
Assume a 4% wage and cost of living allowance increase per year					
Worked Days					
Statutory Holidays	(11)	(11)	(11)	(11)	(11)
Vacation	(21)	(22)	(23)	(24)	(25)
Sick Leave	(18)	(18)	(18)	(18)	(18)
Total Worked Days	210	209	208	207	206
Worked Hours	1,575	1,568	1,560	1,553	1,545
Rest Periods (2-15min. Per day)	(105)	(105)	(104)	(104)	(103)
Total Worked Hours	1,470	1,463	1,456	1,449	1,442
Client Contact Hours (70%) ¹	1,029	1,024	1,019	1,014	1,009
Non-client Contact Hours (30%) ²	441	439	437	435	433
Notes:					
1) Includes personal or group visits, telephone, correspondence, travel time, etc.					
2) Includes education, research, preparation for client contacts					

Prevention Detailers Travel Costs							
HA	HSDA / Community	Estimated Annual Travel Costs				BC Ferries	
		# Trips	KMs	\$/Km	Annual \$	\$/Trip	Annual \$
Fraser Health Authority							
	Fraser North	537	21,461	\$ 0.44	\$ 9,443		
	Fraser South	542	21,692	\$ 0.44	\$ 9,545		
	Fraser East	248	9,925	\$ 0.44	\$ 4,367		
	Fraser HA Overall	1,327	53,078		\$ 23,354		
Vancouver Coastal Health Authority							
	Vancouver	1,085	32,536	\$ 0.44	\$ 14,316		
	Richmond	182	5,467	\$ 0.44	\$ 2,406		
	North Shore / Coast Garibaldi	264	10,541	\$ 0.44	\$ 4,638		
	Squamish, Whistler, Pemberton	35	1,383	\$ 0.44	\$ 609		
	Sunshine Coast	35	1,383	\$ 0.44	\$ 609	\$ 40	\$ 1,383
	Powell River	25	1,009	\$ 0.44	\$ 444	\$ 80	\$ 2,019
	Vancouver Coastal HA Overall	1,625	52,320		\$ 23,021		\$ 3,402
Vancouver Island Health Authority							
	South Vancouver Island	680	27,215	\$ 0.44	\$ 11,974		
	Central Vancouver Island						
	Nanaimo Area	139	5,551	\$ 0.44	\$ 2,443		
	Parksville, Qualicum Beach, Port Alberni	79	7,850	\$ 0.44	\$ 3,454		
	Comox, Courtney	91	18,224	\$ 0.44	\$ 8,019		
	Tofino, Ucluelet	7	2,617	\$ 0.44	\$ 1,151		
	North Vancouver Island						
	Campbell River Area	55	16,402	\$ 0.44	\$ 7,217		
	North Island	17	13,458	\$ 0.44	\$ 5,921		
	Vancouver Island HA Overall	1,067	91,317		\$ 40,180		
Interior Health Authority							
	East Kootenay	85	94,007	\$ 0.44	\$ 41,363		
	Kootenay-Boundary	85	59,634	\$ 0.44	\$ 26,239		
	Okanagan	15	11,963	\$ 0.44	\$ 5,264		
	Kelowna Area	193	7,738	\$ 0.44	\$ 3,405		
	Vernon Area	101	10,093	\$ 0.44	\$ 4,441		
	Penticton Area	91	13,668	\$ 0.44	\$ 6,014		
	Thompson / Cariboo	71	56,822	\$ 0.44	\$ 25,002		
	Kamloops Area	107	37,290	\$ 0.44	\$ 16,407		
	Salmon Arm Area	48	10,486	\$ 0.44	\$ 4,614		
	Interior HA Overall	642	253,927		\$ 111,728		
Northern Health Authority							
	Northwest HSDA	99	108,830	\$ 0.44	\$ 47,885		
	Northern Interior HSDA						
	Prince George	108	6,477	\$ 0.44	\$ 2,850		
	Within 4 RT Hours of PG	53	13,318	\$ 0.44	\$ 5,860		
	More than 4 Hours	11	4,486	\$ 0.44	\$ 1,974		
	Northeast HSDA	41	41,121	\$ 0.44	\$ 18,093		
	Northern HA Overall	312	174,231		\$ 76,662		
LHA Unknown							
	British Columbia Overall	4,973	624,873		\$ 274,944		

Prevention Detailing Estimated Cost						
	Fiscal Year					
	2005/06	2006/07	2007/08	2008/09	2009/2010	2010/11
Fraser North						
FTEs	1.5	1.5	1.5	1.5	1.5	1.5
Salary	\$ 106,767	\$ 113,650	\$ 121,459	\$ 129,493	\$ 138,773	\$ 144,324
Benefits (@20%)	\$ 21,353	\$ 22,730	\$ 24,292	\$ 25,899	\$ 27,755	\$ 28,865
Overhead (@40%)	\$ 42,707	\$ 45,460	\$ 48,584	\$ 51,797	\$ 55,509	\$ 57,729
Travel	\$ 9,443	\$ 9,820	\$ 10,213	\$ 10,622	\$ 11,047	\$ 11,489
Total \$	\$ 180,270	\$ 191,660	\$ 204,548	\$ 217,811	\$ 233,083	\$ 242,406
Fraser South						
FTEs	1.5	1.5	1.5	1.5	1.5	1.5
Salary	\$ 106,767	\$ 113,650	\$ 121,459	\$ 129,493	\$ 138,773	\$ 144,324
Benefits (@20%)	\$ 21,353	\$ 22,730	\$ 24,292	\$ 25,899	\$ 27,755	\$ 28,865
Overhead (@40%)	\$ 42,707	\$ 45,460	\$ 48,584	\$ 51,797	\$ 55,509	\$ 57,729
Travel	\$ 9,545	\$ 9,926	\$ 10,323	\$ 10,736	\$ 11,166	\$ 11,612
Total \$	\$ 180,372	\$ 191,766	\$ 204,658	\$ 217,925	\$ 233,202	\$ 242,530
Fraser East						
FTEs	1.0	1.0	1.0	1.0	1.0	1.0
Salary	\$ 71,178	\$ 75,766	\$ 80,973	\$ 86,329	\$ 92,515	\$ 96,216
Benefits (@20%)	\$ 14,236	\$ 15,153	\$ 16,195	\$ 17,266	\$ 18,503	\$ 19,243
Overhead (@40%)	\$ 28,471	\$ 30,307	\$ 32,389	\$ 34,532	\$ 37,006	\$ 38,486
Travel	\$ 4,367	\$ 4,542	\$ 4,723	\$ 4,912	\$ 5,109	\$ 5,313
Total \$	\$ 118,252	\$ 125,768	\$ 134,280	\$ 143,039	\$ 153,133	\$ 159,258
Vancouver						
FTEs	2.5	2.5	2.5	2.5	2.5	2.5
Salary	\$ 177,945	\$ 189,416	\$ 202,432	\$ 215,822	\$ 231,288	\$ 240,539
Benefits (@20%)	\$ 35,589	\$ 37,883	\$ 40,486	\$ 43,164	\$ 46,258	\$ 48,108
Overhead (@40%)	\$ 71,178	\$ 75,766	\$ 80,973	\$ 86,329	\$ 92,515	\$ 96,216
Travel	\$ 14,316	\$ 14,888	\$ 15,484	\$ 16,103	\$ 16,747	\$ 17,417
Total \$	\$ 299,027	\$ 317,954	\$ 339,376	\$ 361,419	\$ 386,808	\$ 402,280
Richmond						
FTEs	0.5	0.5	0.5	0.5	0.5	0.5
Salary	\$ 35,589	\$ 37,883	\$ 40,486	\$ 43,164	\$ 46,258	\$ 48,108
Benefits (@20%)	\$ 7,118	\$ 7,577	\$ 8,097	\$ 8,633	\$ 9,252	\$ 9,622
Overhead (@40%)	\$ 14,236	\$ 15,153	\$ 16,195	\$ 17,266	\$ 18,503	\$ 19,243
Travel	\$ 2,406	\$ 2,502	\$ 2,602	\$ 2,706	\$ 2,814	\$ 2,927
Total \$	\$ 59,348	\$ 63,115	\$ 67,380	\$ 71,769	\$ 76,826	\$ 79,899
North Shore						
FTEs	1.0	1.0	1.0	1.0	1.0	1.0
Salary	\$ 71,178	\$ 75,766	\$ 80,973	\$ 86,329	\$ 92,515	\$ 96,216
Benefits (@20%)	\$ 14,236	\$ 15,153	\$ 16,195	\$ 17,266	\$ 18,503	\$ 19,243
Overhead (@40%)	\$ 28,471	\$ 30,307	\$ 32,389	\$ 34,532	\$ 37,006	\$ 38,486
Travel	\$ 9,701	\$ 10,089	\$ 10,493	\$ 10,912	\$ 11,349	\$ 11,803
Total \$	\$ 123,586	\$ 131,315	\$ 140,049	\$ 149,039	\$ 159,373	\$ 165,748
Victoria						
FTEs	2.0	2.0	2.0	2.0	2.0	2.0
Salary	\$ 142,356	\$ 151,533	\$ 161,946	\$ 172,658	\$ 185,030	\$ 192,431
Benefits (@20%)	\$ 28,471	\$ 30,307	\$ 32,389	\$ 34,532	\$ 37,006	\$ 38,486
Overhead (@40%)	\$ 56,942	\$ 60,613	\$ 64,778	\$ 69,063	\$ 74,012	\$ 76,973
Travel	\$ 11,974	\$ 12,453	\$ 12,952	\$ 13,470	\$ 14,008	\$ 14,569
Total \$	\$ 239,744	\$ 254,906	\$ 272,065	\$ 289,722	\$ 310,057	\$ 322,459
Nanaimo						
FTEs	1.5	1.5	1.5	1.5	1.5	1.5
Salary	\$ 106,767	\$ 113,650	\$ 121,459	\$ 129,493	\$ 138,773	\$ 144,324
Benefits (@20%)	\$ 21,353	\$ 22,730	\$ 24,292	\$ 25,899	\$ 27,755	\$ 28,865
Overhead (@40%)	\$ 42,707	\$ 45,460	\$ 48,584	\$ 51,797	\$ 55,509	\$ 57,729
Travel	\$ 28,205	\$ 29,333	\$ 30,507	\$ 31,727	\$ 32,996	\$ 34,316
Total \$	\$ 199,032	\$ 211,173	\$ 224,842	\$ 238,916	\$ 255,032	\$ 265,234
Kelowna						
FTEs	3.5	3.5	3.5	3.5	3.5	3.5
Salary	\$ 249,123	\$ 265,182	\$ 283,405	\$ 302,151	\$ 323,803	\$ 336,755
Benefits (@20%)	\$ 49,825	\$ 53,036	\$ 56,681	\$ 60,430	\$ 64,761	\$ 67,351
Overhead (@40%)	\$ 99,649	\$ 106,073	\$ 113,362	\$ 120,860	\$ 129,521	\$ 134,702
Travel	\$ 111,728	\$ 116,197	\$ 120,845	\$ 125,678	\$ 130,706	\$ 135,934
Total \$	\$ 510,324	\$ 540,488	\$ 574,293	\$ 609,120	\$ 648,790	\$ 674,742
Prince George						
FTEs	2.0	2.0	2.0	2.0	2.0	2.0
Salary	\$ 142,356	\$ 151,533	\$ 161,946	\$ 172,658	\$ 185,030	\$ 192,431
Benefits (@20%)	\$ 28,471	\$ 30,307	\$ 32,389	\$ 34,532	\$ 37,006	\$ 38,486
Overhead (@40%)	\$ 56,942	\$ 60,613	\$ 64,778	\$ 69,063	\$ 74,012	\$ 76,973
Travel	\$ 76,662	\$ 79,728	\$ 82,917	\$ 86,234	\$ 89,684	\$ 93,271
Total \$	\$ 304,431	\$ 322,181	\$ 342,031	\$ 362,486	\$ 385,732	\$ 401,161
Provincial Co-ordinator						
FTEs	1.0	1.0	1.0	1.0	1.0	1.0
Salary	\$ 81,178	\$ 85,766	\$ 90,973	\$ 96,329	\$ 102,515	\$ 106,216
Benefits (@20%)	\$ 16,236	\$ 17,153	\$ 18,195	\$ 19,266	\$ 20,503	\$ 21,243
Overhead (@40%)	\$ 32,471	\$ 34,307	\$ 36,389	\$ 38,532	\$ 41,006	\$ 42,486
Travel	\$ 10,000	\$ 10,400	\$ 10,816	\$ 11,249	\$ 11,699	\$ 12,167
Total \$	\$ 139,885	\$ 147,626	\$ 156,373	\$ 165,375	\$ 175,723	\$ 182,112
British Columbia Overall						
FTEs	18.0	18.0	18.0	18.0	18.0	18.0
Salary	\$ 1,291,203	\$ 1,373,794	\$ 1,467,513	\$ 1,563,919	\$ 1,675,271	\$ 1,741,882
Benefits (@20%)	\$ 258,241	\$ 274,759	\$ 293,503	\$ 312,784	\$ 335,054	\$ 348,376
Overhead (@40%)	\$ 516,481	\$ 549,518	\$ 587,005	\$ 625,568	\$ 670,108	\$ 696,753
Travel	\$ 288,346	\$ 299,880	\$ 311,875	\$ 324,350	\$ 337,324	\$ 350,817
Total \$	\$ 2,354,271	\$ 2,497,951	\$ 2,659,896	\$ 2,826,620	\$ 3,017,758	\$ 3,137,828

Appendix H: Pedometers

The quality of moving parts in a pedometer affects accuracy, reliability and durability.

- A long-well-balanced lever arm determines sensitivity. It is best if the calibration happens at the factory rather than via external, manual switches.
- A coil spring is more expensive than the more common hairspring, but the latter will lose its strength quickly and produce inaccurate results. The difference in durability between these two types of springs can be lost accuracy after only a million steps compared to hundreds of millions of steps (for the coiled spring).³⁷⁵ The pedometers.com website noted only two brands with coil springs selling in the US: Yamax DigiWalker and Robic M307.
- Quality engineering at the point of contact is also important. The metal-to-metal contact wears out the fastest; conductive rubber helps to extend life. Some pedometers use a magnetic switch, thus eliminating all physical contact.

Improvements have been made over the mechanical approach. In an accelerometer, a strain gauge deforms due to inertia. This allows the accelerometer to know how hard or soft each step is, as well as counting the number of steps. According to the latest research, accelerometers, sometimes referred to as piezoelectric pedometers, represent the most accurate and reliable step counting technology. The drawbacks of accelerometers are shorter battery life, due to the constant sampling of the strain gauge, and usually a higher price. The website pedometers.com noted only two brands marketed to general public in the US, New-Lifestyles 2000 and Omron HJ-112.³⁷⁶ Apparently, at least one other is also available, the Kenz Lifecorder. Speed distance meters are more high-end devices using accelerometer technology to estimate distance travelled; they tend to be expensive (US\$200 to \$370). Recent studies have raised questions about inaccurate results with piezoelectric technology, for example, false counts generated when travelling in motor vehicles (a potentially frequent occurrence for the sedentary people who are targets of physical activity campaigns).³⁷⁷

Japan appears to be several years ahead of the US in mainstream pedometer design and usage; that country set the standard, requiring pedometers to be accurate within 3% of actual steps taken. In fact all four models tested in one study exceeded 96% accuracy, but the one piezoelectric model used outperformed the seismic technology at slower speeds.³⁷⁸ Thus this type of pedometer may be indicated for people such as the elderly who walk at a slower rate.

³⁷⁵ See the review website at <http://pedometers.com/mechanism.asp> (accessed January 2005).

³⁷⁶ Available at <http://pedometers.com/mechanism.asp> (accessed January 2005).

³⁷⁷ Le Masurier G, Tudor-Locke C. Comparison of pedometer and accelerometer accuracy under controlled conditions. *Medicine & Science in Sports & Exercise*. 2003; 35(5): 867-71.

³⁷⁸ Melanson E, Knoll J, Bell M et al. Commercially available pedometers: considerations for accurate step counting. *Preventive Medicine*. 2004; 39(2): 361-8.

The newest (and fairly expensive) devices are based on a global positioning system (GPS). The main liability of this approach is that signals can be easily blocked; for instance, GPS devices do not work indoors.

The most recent published review of pedometers examined 13 models, concluding that Yamax DigiWalker (either SW-200 or SW-701), Kenz Lifecorder, Sportline 330, and the New Lifestyles (NL)-2000 were the most accurate.³⁷⁹ Apart from the positive result for the Sportline model, these results concur with earlier studies (by the same research group in Tennessee), as well as with the results published on consumer websites.³⁸⁰ Of course, the fact that these products rose to the top is not surprising given that they mostly use superior technology, as described above. As a final comparison, another set of researchers evaluated the DigiWalker as superior to both Omron and Sportline pedometers; it even performed better than one of the accelerometer models on the market.³⁸¹

³⁷⁹ Schneider P, Crouter S, Bassett D. Pedometer measures of free-living physical activity: comparison of 13 models. *Medicine & Science in Sports & Exercise*. 2004; 36(2): 331-5.

³⁸⁰ See, for example, <http://walking.about.com/cs/measure/a/pedaccuracy04.htm> (accessed January 2005).

³⁸¹ Le Masurier G, Lee S, Tudor-Locke C. Motion sensor accuracy under controlled and free-living conditions. *Medicine & Science in Sports & Exercise*. 2004; 36(5): 905-10.